DG Energy project: *"Study on good practices in implementing the requirements on public information in the event of an emergency, under the Euratom Basic Safety Standards Directive and Nuclear Safety Directive"*

Study on good practices in implementing the requirements on public information in the event of an emergency, under the Euratom Basic Safety Standards Directive and Nuclear Safety Directive – final report

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Executive summary

OBJECTIVES, BACKGROUND AND SCOPE

The overall objective of this study, carried out under contract to DG Energy, is to review existing procedures amongst Member States (MS) and identify good practices for the purpose of promoting the effective implementation of the public information and transparency provisions of the Euratom legislation. Its scope includes both arrangements to deal with national emergencies as well as those with cross-border impacts. The study's objective was achieved by obtaining and reviewing in detail the declared arrangements of the various governments, local authorities and licensees, responsible for informing the general public prior to and in the event of radiological or nuclear emergencies. The project studied how the arrangements are implemented at a practical level in 28 MS, considering the strengths and weaknesses of the different approaches, reviewed the experience from previous radiological and nuclear accidents worldwide to see what additional lessons they provide for improvements, and made practical and feasible recommendations for improving these practices and procedures. Communication approaches and challenges in other significant non-radiological accidents were also studied in order to learn from other experiences out of nuclear. The situation of 28 EU Member States with and without nuclear installations and the potential for emergencies with cross border consequences is also examined. Although the Euratom Directives principally address requirements for public information, the study also considers the experience and practices related to communication with the public in preparedness and response, and evaluated the benefits or otherwise of different approaches. A specific objective of the study was to include the viewpoint, experience and expectations of civil society as an important affected stakeholder in the event of a nuclear or radiological emergency. A public opinion survey was conducted in Belgium concerning public awareness and satisfaction with information about nuclear emergencies potentially occurring in Belgium or in bordering neighbouring countries.

The study included the participation of a group of representative stakeholders with an interest in radiological and nuclear emergencies (drawn from the nuclear industry, competent regulatory authorities, local authorities, civil protection services, citizen groups, economic interest groups, radiological protection and medical expert groups), who were consulted and invited to provide input to the study, as well as to help identify good practices, review the reports and comment on the recommendations.

EU citizens expect high standards of nuclear safety and radiological protection to be maintained under all circumstances. In case of a nuclear or radiological incident, any release of radioactive material can have geographically widespread consequences. Keeping the public adequately informed to assist in their protection can be a major challenge. The experience in Japan of the Fukushima accident in 2011 has shown that even where measured radioactivity levels are below thresholds that are likely to have a direct effect on human health, the public perception of the risks can be disproportionate. Responsible authorities must be prepared to provide reliable and up-to-date information, as well as to deal with difficulties in comprehending the information presented, contradictory information from different unofficial sources, or even an unwillingness to accept experts' views about risks from radiation. Ensuring the highest levels of safety, security and emergency preparedness and response (EP&R) is a central objective of EU policy. With the adoption of the Spent Fuel and Radioactive Waste Directive (Directive 2011/70/Euratom), a revised Basic Safety Standards (BSS) Directive in 2013 (Directive 2013/59/Euratom) and the amended Nuclear Safety Directive (NSD) in 2014 (Directive 2009/71/Euratom as amended by Directive 2014/87/Euratom), the EU has developed an advanced legally binding and enforceable framework for nuclear energy in the EU.

The transposition and implementation of these two Directives provides opportunities amongst the EU Member States to revisit existing practices and to improve implementation measures, for example in the area of public information requirements in the event of an emergency. The Nuclear Safety Directive was amended in July 2014, considering the lessons learned from the Fukushima nuclear accident, the findings of the EU stress tests of nuclear power plants, and the safety standards developed at European and international level through the Western European Nuclear Regulators Association (WENRA) and the International Atomic Energy Association (IAEA). The key aims of the amended Nuclear Safety Directive are to strengthen the power authority and independence of national regulatory authorities; to introduce a high-level EU-wide safety objective to prevent accidents and avoid radioactive releases; to set up a European system of peer reviews on specific safety issues every six years; to increase transparency on nuclear safety matters by informing and involving the public; and to promote an effective nuclear safety culture. The amended Nuclear Safety Directive requires that information is provided promptly to the public and other stakeholders in case of incidents and accidents at nuclear installations. The provisions of the amended Directive had to be enacted in Member States legislation and administrative measures by August 2017.

Basic safety standards to protect the health of workers and the general public against dangers arising from ionising radiation are defined in the Euratom Basic Safety Standards Directive, first adopted in 1959 and regularly updated since then. The latest revision in December 2013 takes account of the scientific and technological progress since the 1990s, incorporating in particular the recommendations of the ICRP in its publication 103, such as introducing definitions of exposure situations. It consolidates five earlier legal acts, including Directive 89/618/Euratom "Public Information", into a single piece of legislation. Furthermore, the BSS Directive strengthens the requirements on emergency preparedness and response in case of radiological emergency, and provides for radiation protection education, training, transparency, and provision of information to the public. The new Directive includes a requirement on cooperation between Member States EP&R including the coordination of information provision to the public. The new Basic Safety Standards Directive had to be transposed into Member States' national legislation and administrative provisions by February 2018. The framework on information provision to the public is already contained in Directive 89/618/Euratom and hence enacted in Member States' legislation for many years. Although Member States have relevant legal and administrative provisions in place, the effective implementation of these is primarily a national responsibility, and has not necessarily been treated as a matter for coordination amongst Member States. Whilst updating the definition of an emergency, the revised BSS Directive retains essentially the same requirements on public information as Directive 89/618/Euratom, with the aim of defining common objectives for measures and procedures for informing the general public for the purpose of improving their radiation protection in case of an emergency. Furthermore, the implementation of Council Decision 87/600/Euratom on Community arrangements for the early exchange of information in the event of a radiological emergency requires notification by Member States not only of protection measures but also of "the measures which they have taken or planned to inform the general public". The scope of this study therefore includes current practices in public information and communication in EU Member States under existing legal requirements, as well as the planned changes and potential improvements for implementation of the recently adopted Directives which are to be transposed in the near future.

KEY FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

The findings, conclusions and recommendations developed in this project are set out in Sections 2, 3 and 4 of this final report and are summarised below. They cover the following topics: public information and transparency requirements; the role of media in nuclear and radiological emergencies; communication in exercises; stakeholder engagement before and during an emergency and cross-border arrangements. Good practices identified in the study for each of these topics are briefly summarised below and could be used as an inspiration for enhancing public information and transparency in case of a nuclear or radiological emergency in the different MS. Recommendations are aimed at different actors, mainly Member States, nuclear regulatory organisations in Europe as well as the European Commission. Finally, the main findings, conclusions and recommendations from the public opinion survey conducted in Belgium in the framework of this study are briefly summarised.

Public information and transparency requirements

In the new BSS Directive and NSD, information provision and transparency requirements have changed only slightly compared to the previous legal texts. Therefore, most requirements should have been already implemented by Member States. However, the provisions of the BSS Directive do not limit additional measures that go beyond the minimum requirements. In fact, most of the MS to some extent already exceed the EURATOM minimum obligations in alignment with international guidance and good practice. The legal basis may be implemented at national level in a way which responds to rapid societal changes (social media, citizen science, citizen journalism). There may be a gap between the requirements for public information and transparency in legal documents, conventions (e.g. Aarhus Convention) and practice. In addition, civil society requests to be involved in the development and implementation of emergency preparedness and response (EP&R) plans.

All Member States include aspects of communication with the public in their respective Emergency Preparedness and Response plans. These aspects can be included as part of a general public information strategy, in the annex of general National Disaster Plans, as specific arrangements for crisis situations, in Emergency Preparedness and Response plans, or in a specific act (e.g. Strategy for informing the public and media in a radiological emergency).

Revision and improvement of the public information or communication plan or strategy is carried out in some countries on a regular basis, once a year or at least once in five years and also after specific events, e.g. after exercises and drills or real events.

The study findings show that current arrangements and procedures for information and transparency regarding nuclear and radiological emergencies in EU MS appear, on paper, to be broadly compliant with EU legislative requirements, based on the responses provided by the NROs. Emergency preparedness plans are based on administrative scientific approaches. However, these findings need to be carefully assessed by a more in-depth review of arrangements in practice at national and local levels and from lessons learned from recent nuclear and radiological events in Europe and neighbouring countries. Some actors of civil society, primarily NGOs, observe that there is still a substantial lack of communication practices by authorities and that communication should be improved. They point to a discrepancy in the viewpoints regarding communication with public in EP&R between NGOs and authorities (national and local). For instance, the study from the NTW (Zeleznik and Klemenc, 2015) points at the gaps in implementation of emergency preparedness provisions also in the field of public information and transparency. Thus, it demonstrates the existence of gaps between the announced provisions and the reality and/or the absence or poor implementation of planned activities in practice. Our study also points towards similar findings.

Examples of nuclear and radiological events in Europe and neighbouring countries have shown that regular communication, even with limited safety significance events, allows building institutional trust in public institutions at critical moments. It may also help to raise awareness about the NROs and ionizing radiation. Depending on the context, it might be better to communicate first on social media because it is faster than traditional media and rumours of lack of transparency in releasing information may be avoided.

The following good practices regarding timely, clear and understandable public information were identified in the study: Rumours that appear during a nuclear or radiological accident are systematically collected in real-time and are also responded by using the same communication channel that published the rumour in a few countries. In case of a nuclear or radiological emergency, a specific website that becomes active in the event is developed in a few countries. A call center is planned and tested in advance in some EU MS.

The following good practices regarding public information needs, understanding and evaluation of effectiveness were found in some EU MS: Online querying tools (e.g. social media, hotlines and Q&A) are used for posting online questions and answers during an emergency; Public communication and information material on emergencies and/or protective actions is in few MS tested to see whether it is sufficiently clear and understandable. Verification of these materials is in a few MS undertaken by using different and complementary methods and approaches, e.g. focus groups, public opinion surveys, meetings, etc. Few NROs encourage emergency management to communicate also about uncertainties in emergency management. European Commission and several national authorities invest in research related to communication before, during and after nuclear or radiological emergencies. Evaluation and adjustment of the internet webpage of the nuclear regulatory organisation with the emergency preparedness and response related information is in a few MS conducted by external evaluators, stakeholder panels or through public opinion surveys.

The following good practices regarding transparency were identified in the study: Some EU MS pay attention to recognising challenges concerning transparency during a nuclear or radiological emergency in advance and developing approaches to deal with these challenges during an emergency. In most EU MS NROs report to the parliament on duties concerning transparency related to nuclear emergencies. In most EU MS dedicated authorities monitor and review regulatory processes related to emergency preparedness and response to ensure openness and transparency. In a few MS informed civil society and citizen scientists (i.e. volunteers in the scientific process) are included in emergency management, including in conducting independent measurements. A committee or government body for oversight of transparency related to emergency preparedness and response is established and operational in several MS.

The study **recommends** that:

- *The EC should involve experts in communication in drafting European legislation related to information and communication on radiological and nuclear emergencies in order to incorporate the terminology and mindset of communicators and engagement experts.*
- *The EC and MS in particular should consider more ambitious international guidance and conclusions from European projects on engagement in emergency preparedness as a basis for developing legal documents.*
- *International organisations and the EC should clearly define some of the key terms used in the legal texts and international guidance – e.g. public information, communication, transparency, stakeholders – in order to be understood unambiguously and consistently across MS.*
- *The EC should develop European level guidance on the interpretation and implementation of the BSS and NSD requirements in the area of public information and transparency. This EU guidebook should contain the practical advice on the procedures and methods for the implementation of good practices collected in this study.*
- *The EC should undertake systematic evaluations of public information and transparency practices in MS in order to recognise pitfalls as well as to provide recommendations on how to adapt to the evolving communication landscape. This kind of evaluation would support MS in good communication practice.*
- *The EC should carry out a detailed assessment of how the arrangements of public information and transparency during nuclear and radiological emergencies are implemented in practice at local level by consulting elected politicians, civil society organizations' representatives, local NGOs, stakeholders involved in emergencies (first responders, measurement teams, etc) through public opinion polls and discussions. This should be systematically followed in regular intervals due to fast evolving technological innovations and societal - social changes. The changing society and communication environment should be reflected in evolving arrangements of public information and transparency.*
- *Member States should communicate to the public also insignificant events as soon as possible in order to be recognized as a honest, transparent, trustful and high speed source of information and avoid speculation and rumours.*

- *Member States should establish mechanisms to systematically collect rumours related to a nuclear or radiological accident and respond by using the same communication channel. This mechanism should be tested during non-nuclear emergencies.*
- *Member States should have a communication strategy in place with the two-fold aim to provide information on radiation in general and a radiological or nuclear event as well as protective measures in particular and engage early enough in a two-way communication with the public.*
- *Member States with NPPs should conduct participatory public communication campaigns on ionizing radiation where the use and purpose of iodine tablets is explained and the information needs of specific population groups are met. These aspects should also be included in educational curricula in schools with the primary aim to increase public awareness regarding radiation issues. Public communication campaigns should address all protective measures foreseen in a MS as well as in neighboring countries.*
- *Member States should assess the effectiveness of public information and transparency arrangements in the preparedness and response phase based on feedback from the public. These should be also assessed during emergency exercises.*
- *The EC and MS should organize and support the organization of conferences and workshops related to public information and transparency on a regular basis. This type of events empowers practitioners, academics and stakeholders, including journalists, to learn from each other's findings, share lessons learned, experiences, state-of-the-art, challenges and solutions in the evolving media landscape and build a radiological communication network at European level*.
- *Member States should empower a body or committee with the oversight of transparency related to emergency preparedness and response.*

The role of media in nuclear and radiological emergencies

Mass media offer great opportunities for emergency management since it is by definition capable of reaching a large number of people simultaneously. It can increase awareness and understanding of protective actions, improve the response of affected populations and facilitate the remediation process and the return to normal life. Emerging and evolving communication technologies, such as social media, offer the possibility of improved nuclear emergency communication, as these technologies have the potential for increased information capacity, dependability, and interactivity. Mass media is a challenge for the emergency management since communication has evolved into a multiple-way process where information is disseminated at an, often, uncoordinated incredibly rapid pace, and is able to easily reach all kinds of audiences: affected, indirectly affected and not affected by radiological risks. An overload of (mis)information coming from all kinds of sources (e.g. government, expert organisations, traditional media, individuals, inhabitants, NGOs, etc.) can make it difficult for people to differentiate the correct information. Moreover, the rise of social media has enabled users to demand more transparent, high-speed communication and accountability from governments, public institutions and emergency managers. Besides their obvious advantages, social media can potentially become a tool for misinformation and manipulation, as well as spread anxiety. These actions cause high time pressure and an additional personnel burden for an emergency management, as well as the need of the competent skills, training and resources.

The results of this study indicate that traditional media is the most often used channel for the provision of information for the general protection measures to be applied and steps to be taken in the event of a nuclear emergency by NROs. The second most used channel is the internet including authority websites, online newspapers and social media. Early warning systems are the third most often used channel of communication. Moreover, the analysis of recent non-nuclear emergencies shows the growing importance of social media as a key information channel during emergencies. In addition, the results of the public opinion survey conducted in Belgium showed that the preferred communication channel for personal communication between family members and friends during a nuclear emergency would be the mobile phone, although the use of mobile phones is discouraged by authorities in case of an emergency. This shows that several information tools or channels have to be used, including prior information concerning family reunions.

The following good practices regarding media communication were identified in EU countries: In various MS, professionals of NROs who may appear in media as spokespersons during a potential nuclear or radiological emergency receive media training on a regular basis. Some NROs ensure that personnel within the NRO is trained to use social media for public information in nuclear or radiological emergencies. This task is in a few NROs shared among different employees and is not limited to the communication personnel only. The use of social media (e.g. twitter, Facebook, blogs, etc.) is done in conjunction with traditional media (e.g. journals, TV, radio, sirens, warning systems) during an emergency in order to reach all the different audiences. Relationships of authorities with journalists are in some EU MS developed and maintained before a potential emergency by involving them in exercises, specific trainings and seminars where they can be familiarized with reporting on nuclear or radiological emergencies. Some NROs release public information in more than only official national languages. In several EU MS the policy for NRO staff concerning media communication, including the definition of rules, roles and responsibilities, is developed and the elements of media communication are tested and trained in advance. Finally, it is worth mentioning the work of the organization Atomic Reporters in collaboration with Stanley Foundation which published one page “Recommendations for improving communication with journalists to enhance public safety in the event of a nuclear or radiological emergency” which could be used by different organisations to improve their relationship with media and ensure quality reporting.

The project **recommends** that:

- *Member States should develop integrated strategies for the use of social media prior to and during an emergency and should include a variety of mechanisms for information provision (traditional media, social media, warning systems) in the event of a nuclear or radiological emergency.*
- *Member States should also have in place a specific policy regarding staff speaking to the media and train their personnel for its effective use.*
- *The EC should develop practical guidance and training on social media communication regarding nuclear or radiological emergencies, prior to, during and after an event.*

- *The EC should support and stimulate the national authorities to implement the “Recommendations for Improving Communication with Journalists to Enhance Public Safety in the Event of a Nuclear or Radiological Emergency” from Atomic Reporters in collaboration with Stanley Foundation.*

Communication in exercises

Exercises, trainings and drills are an important aspect of the emergency preparedness stage. They can provide unique insight in the state of preparedness of nuclear emergency response organizations, including in public information and transparency capacities of the MS. They can also be the basis for continued improvement programs for the emergency response infrastructure. Exercises are conducted to ensure that all specified functions required to be performed for a nuclear emergency response and all organizational interfaces for facilities are tested at suitable intervals. Exercises should include the participation of as many as possible of the organizations and other stakeholders concerned, including civil society.

Nearly all MS include aspects of communication with the public in nuclear or radiological emergency exercises/drills. The frequency by which aspects of communication in exercise or drills are included varies from once every five years to several times a year. Experiences gained during exercises indicate challenges and pitfalls related to public information, not only on paper but also in practice, e.g. use of templates, use of preapproved messages, use of key messages, expressing empathy, etc. Contrary to the responses from NROs surveyed in 26 EU MS, representatives from local communities involved in taking part in emergency management on the municipality level and emergency experts state that the communication aspects about protective actions in exercises and drills is not regularly trained and depends on the country considered.

Familiarisation of journalists with reporting on nuclear or radiological emergencies through participation in exercises, specific trainings and seminars is on-going in a few countries. In most countries, the communication personnel are included in regional exercises, but the regularity by which they are included varies among MS.

The following good practices regarding exercises were identified in the study: Evaluation and adjustment of the communication material after exercises is done in order to improve the communication strategy for the response to future emergencies in most of the EU MS. Public information and communication aspects with the public are tested in regular exercises and drills to review the effectiveness of public information, identify challenges and pitfalls, not only on paper but also in practice in majority of the EU MS. Local communities and other stakeholders (first responders, schools, hospitals, journalists, students of journalism) are included in exercises in several countries.

The study **recommends** that:

- *Public information and transparency aspects of emergencies should be included in regular exercises. Countries should involve not only communication personnel in regular exercises but also train first responders in their communication with the affected people (e.g. during decontamination, measurement), communication with humanitarian organisations and journalists should be exercised. Students from relevant degrees and local communities may be included in the preparation and conduction of exercises and drills as an essential part of all emergency preparedness and response plans.*

- *The EC should encourage MS to conduct systematic regular and frequent exercises and drills where the effectiveness of public information and transparency is tested and improved to respond to future emergencies. The EC should provide the platform for MS to share the lessons learned from exercises conducted in different Member States and at regional level.*
- *Member States should organize training in risk communication for any professional who will have to communicate face-to-face with the affected people, with groups or public during an emergency. This training should also address the consideration of ethical and moral values.*

Stakeholder engagement before and during an emergency

Stakeholder engagement is an evolving principle in nuclear emergency preparedness, response and recovery. However, some of the recognised challenges for engagement in nuclear or radiological emergencies include: insufficient involvement of local population and non-institutional stakeholders in emergency preparedness; social and technological changes; and communication with local populations about protective actions in case of an emergency. Member States may use different tools to engage with stakeholders, like formal consultations, public meetings, written inquiry points (emails, letters…) and telephone enquiry points, communication campaign material, public meetings hosted by NROs or by nuclear or radiological installations, local information committees, regional information committees, etc. Recent nuclear and radiological events in Europe and neighbouring countries have pointed out to the need to engage early enough in a two-way communication, rather than only providing one-way information. This is relevant to all stakeholders.

In relation to the stakeholder involvement in EP&R in Europe, NGOs, like the NTW claim that citizens are insufficiently informed and involved, and in most countries civil society can neither participate nor observe EP&R exercises. NGOs and civil society organisations recommend that the top-down approach should be changed and the local populations and interested civil society organisations should be involved in the development of emergency plans.

The study has shown that there are citizen science initiatives for radiation measurements which prove to be useful communication and engagement tools between experts, policy-makers and the public. Also, different European projects recommended to nuclear emergency authorities to enable citizens to perform measurements and support citizens to collect and share measurement data with authorities. This study has already identified some countries supporting citizen science initiatives in the framework of nuclear and radiological emergencies, for instance FP7 projects EAGLE, PREPARE, SHAMISEN and H2020 project CONCERT, ENGAGE and SHAMISEN-SINGS.

The following good practices in the field of communication and stakeholder engagement were identified: Communication strategy for nuclear or radiological emergency is designed, evaluated and adjusted in order to respond to emergency challenges and public information needs in case of an emergency in most EU MS. The communication cell is in direct contact with the decision-makers on emergencies and the communication officer or liaison are present in the incident command centre during an emergency in majority of EU MS. The NROs in most MS establish a specific position or function in the organization with responsibility for public information and communication both during the preparedness stage and in case of a nuclear or radiological emergency. Citizen science initiatives for radiation measurements are encouraged by authorities as useful communication and engagement tools between experts, policy-makers and the public in few countries.

The study **recommends** that:

- *Member States should foster participatory practices such as citizen science initiatives and citizen-led social media which create opportunities for people to monitor radioactivity in their environment with the help of scientists, through the development of public online platforms.*
- *Member States should involve a wide range of stakeholders (e.g. local councillors, health service, police, radiation protection societies, etc) who have a major role to play in decision-making processes related to the emergency response situation, in order to take decisions in a democratic way.*
- *The EC should review the results, conclusions and recommendations of European research projects addressing public communication and engagement in nuclear and radiological emergencies and ensure that these are taken up in new practical guidance document to assist Member States in public information arrangements in nuclear and radiological emergencies.*

Cross-border arrangements

Arrangements for cross-border communication in nuclear or radiological emergencies are a challenge due to many reasons: different European languages, different protective actions, the lack of collaboration between public information responsible people in MS and different nature of arrangements. Approximately half of the countries surveyed in this study collaborate with public information officers from other countries involved in emergency management, directly or indirectly, via e-mail exchange, bilateral meetings, working group, regional exercises, etc. A few countries indicate that they do not have specific arrangements in place to collaborate with public information officers from other countries indicating room for improvement in the cross-border collaboration involving emergency management. Furthermore, a majority of countries do not publish public information in the official language of neighbouring countries in the event of an emergency. However, most countries will publish information in English. This may help to reach out to international newswires and correspondents identified at the preparedness stage to ensure that international media use the primary source. The translation of press releases and any documents for public information is sometimes undertaken by embassies or using professional translation tools in order to publish swift information.

The following good practices in cross-border collaboration the field of public information and transparency were recognized: Communication personnel is included in cross-border and regional exercises in most countries. Information on the emergency is published in English in most countries while information in the official languages of neighbouring countries is done in a few MS. Public information officers collaborate cross-border with officers from other countries either via email or through more formal ways of communication (e.g. working group, regular meetings) in several EU MS.

The study **recommends** that:

- *The EC should encourage Member States to conduct regional and cross-border exercises in which they involve communication personnel in order to promote a common understanding, coherent and consistent communication at European level and internationally.*
- *The EC, in cooperation with Member States, should build on the HERCA-WENRA approach to support early information exchange (through ECURIE as the interface to the EU early notification and information exchange system for radiological emergencies and other channels) in the preparedness stage between public information officers of neighbouring territories as well as consistency of recommendations issued by the radiation protection and safety authorities for the protection of populations during the accident.*
- *Member States should publish all information about radiological or nuclear emergencies in English and in the language of their neighbouring countries.*

Findings related to public opinion in Belgium

As part of this study, public opinion about potentially occurring nuclear emergencies has been investigated by a large-scale public opinion survey with a random-route sample (n=1083) that is representative for the Belgian adults (18+) with respect to province, region, level of urbanisation, gender, age and professionally active status. Different questions related to radiological emergency topic were included in the SCK•CEN Barometer survey in order to investigate in-depth citizens' views, opinions, needs and expectations related to communication before and during a nuclear or radiological emergency.

The results showed that environmental pollution and potential misuse of nuclear technologies are the highest perceived risks among the risks investigated (radiological and chemical risks). A majority of the respondents expresses concern regarding the vulnerability of nuclear installations to terrorism. Public information should therefore include information on safety and security issues related to nuclear technologies, for instance related to safeguards programmes. One in two respondents also considered personal risks from an accident in a nuclear installation as high or very high. However, the confidence in authorities as regards protective actions taken against radiological risks is also among the highest, with one in three citizens (32%) having a high or very high level of confidence in authorities. This suggests that authorities can build high trust from the citizens, by communicating proactively and responding to people's concerns, for instance by regular public information campaigns related to nuclear emergencies as carried out in Belgium. Opinions concerning the safe management of nuclear installations are divergent. For instance, 31% disagree that there is insufficient control on nuclear installations, while 40% agree with the statement that there is sufficient control. In Belgium, the survey followed a series of incidents at nuclear installations, for instance micro-cracks in some installations and sabotage in one unit. This result accentuates the need for transparent communication about the management of nuclear installations, including the related challenges.

The most trusted communicators about risks and benefits of nuclear technologies are scientists from universities, medical doctors and environmental organisations. In terms of technical competence, scientists from universities and medical doctors enjoy the trust from highest numbers of respondents. A good practice in nuclear emergency communication for nuclear safety authorities is thus to engage with actors already in the preparedness stage.

Relatively few respondents (21%) feel well informed about what to do in case of a nuclear accident and a majority (75%) say they do not know enough to judge the efficiency of protective actions (such as for instance sheltering or intake of iodine tablets). A large majority (87%) are of the opinion that the authorities should do more to inform the population in advance about protective actions that can be taken in the event of a nuclear accident. A good practice is thus to carry out regularly surveys assessing the needs for and satisfaction with information about emergency preparedness, to carry out regular information campaigns addressing the needs of specific groups, to assess the impact of information campaigns, and to make available on a permanent basis (e.g. website) information about protective actions.

Rescue services and scientists from universities enjoy high trust related to information concerning protective actions in case of a nuclear accident from more than half of the population; a high number of respondents also express their trust in the Federal Crisis Centre, the Red Cross and medical doctors. A good practice is to integrate first respondents and the medical profession in the nuclear emergency communication chain, including exercises and emergency plans. In case of emergencies, media and national politicians are not trusted by more than half of the Belgian population, while local authorities enjoy a rather high level of trust from 20% of the population. Safety authorities are trusted but not very well known; therefore, a good practice is to communicate on a continuous basis who they are and what they do.

In general, there is low awareness related to the intake of iodine tablets - specifically the right time when iodine tablets should be taken, with half of the respondents believing that iodine tablets should be taken immediately after a nuclear alert. A good practice is thus to address in communication campaigns the use and purpose of these tablets and the needs of specific population groups.

Knowledge about ionizing radiation is rather low: e.g. every second person in Belgium thinks that exposure to radiation always lead to radioactive contamination and one in four does not know about the natural radioactivity in the human body. Such aspects should receive more attention in education curricula in schools and included in the public information campaigns.

These results are similar to the results found by the local community’s public opinion survey in Belgium, the results reported by the French research institute IRSN and the Slovenian research conducted by authorities.

Contents

List of acronyms

Country abbreviations

AT – Austria
BE – Belgium
BG – Bulgaria
CY – Cyprus
CZ – Czechia
DE – Germany
DK – Denmark
EE – Estonia
EL – Greece
ES - Spain
FI- Finland
FR – France
HR – Croatia
HU – Hungary
IE- Ireland
IT – Italy
LT – Lithuania
LU – Luxembourg
LV – Latvia
MT – Malta
NL – Netherlands
PL - Poland
PT – Portugal
RO - Romania
SE – Sweden
SI – Slovenia
SK – Slovakia
UK – United Kingdom

Other acronyms

ALA	Atomic Law Act in Poland
ALLIANCE	European Radioecology Alliance
ANVS	Dutch Nuclear Safety and Radiation Protection Authority (Autoriteit voor Nucleaire Veiligheid en Stralingsbescherming)
ASN	Autorité de Sûreté Nucleáire (French Nuclear Safety Authority)
ASUNE	Bulgarian Act on the Safe Use of Nuclear Energy
BfS	Bundesamt für Strahlenschutz (Federal Agency for Radiation Protection)
BMUB	Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit (German Federal Ministry for Environment, Nature, Building and nuclear safety)
BSS	Basic Safety Standards
BNI	Basic Nuclear Installation
CEZAR	Polish Radiation Emergency Centre
CGCCR	Comité Gouvernemental de Coordination et de Crise (Belgian Governmental Centre for Co-ordination and Emergencies)
CEA	Commissariat à l'énergie atomique et aux énergies alternatives (CEA) (French

	Alternative Energies and Atomic Energy Commission)
CIC	Slovakian Civil Information Commission
CLI	Commission Locale d'Information (Local Information Commission)
CNCAN	Comisia Națională pentru Controlul Activităților Nucleare (Romanian Nuclear Safety Authority)
CNRA	Committee of Nuclear Regulatory Activities (NEA/OECD)
CNS	Convention on Nuclear Safety
CNSSU	County Committees for Emergencies in Romania
COBR	Cabinet Office Briefing Rooms in the United Kingdom
COM	European Commission
COMRSIN	Comissão Reguladora para a Segurança das Instalações Nucleares (Portuguese Regulatory Commission for the Safety of Nuclear Installations)
CONVEX	Convention Exercise (Emergency drills and exercises in the frame of the convention on Early Notification of a Nuclear Accident)
CSN	Consejo de Seguridad Nuclear (Spanish Nuclear Safety Authority)
CSNI	Committee on the Safety of Nuclear Installations (NEA/OECD)
DECC	Department for Energy and Climate Change in the United Kingdom
DEMA	Danish Emergency Management Agency
DG ENER	Directorate General Energy of the European Commission
DHPCLG	Department of Housing, Planning, Community and Local Government (Ireland)
DRP	Luxembourg Department of Radiation Protection within the Directorate of Health (Regulatory Body)
ECURIE	European Community Urgent Radiological Information Exchange
EDF	Energie de France EDF
NGL	Energie de France Nuclear Generation Limited
NSD	Nuclear Safety Directive
EEAE	Greek Atomic Energy Commission
ENSREG	European Nuclear Safety Regulators Group
EPA	Irish Environmental Protection Agency
EPD	Extended Planning Distance
EPR	European Pressurised Reactor
EP&R	Emergency Preparedness & Response
EU	European Union
EURADOS	European Radiation Dosimetry Group
EURAMED	European Alliance for Medical Radiation Protection Research
EURDEP	European Radiological Data Exchange Platform
EP&R	Emergency Preparedness and Response
EPZ	Emergency Preparedness Zone
EPZ	Elektriciteitsproductiemaatschappij Zuid-Nederland
EPREV	Emergency Preparedness Review
FANC	Federal Agency for Nuclear Control
GDFSPP-MI	General Directorate of the Fire Safety and Protection of the Population of the Ministry of the Interior
GRR-2001	Belgian General Regulations regarding the protection of the public, workers and the environment against the hazards of ionizing radiation, laid down by Royal Decree of 20 July 2001
GSR	General Safety Requirements (IAEA)
HAEA	Hungarian Atomic Energy Agency
HCPN	Luxembourg High Commission of National Protection
HCTISN	Haut Comité pour la Transparence et l'Information sur la sûreté nucléaire (French: High Committee for Transparency and Information on Nuclear Safety)

HERCA	Heads of the European Radiological Protection Competent Authorities
IAEA	International Atomic Energy Agency
ICPD	Ingestion and commodities planning distance
INES	International Nuclear and Radiological Event Scale (IAEA)
INPP	Ignalina Nuclear Power Plant
INSAG	International Nuclear Safety Advisory Group
IRPA	International Radiation Protection Association
IRRS	Integrated Regulatory Review Service (peer review of the national regulatory and organisational framework conducted under IAEA auspices)
IRSN	Institute de radioprotection et de sûreté nucléaire (French Institute for Radiation Protection and Nuclear Safety)
MELODI	Multidisciplinary European Low Dose Initiative
MS	Member States
NEA	Nuclear Energy Agency (OECD)
NEPNA	National Emergency Plan for Nuclear Accidents (Ireland)
NERIS	European Platform on Preparedness for Nuclear and Radiological Emergency Response and Recovery
NOST	National Operative Staff in Denmark
NRA	Bulgarian Nuclear Regulatory Authority
NRO	Nuclear Regulatory Organisation
NPP	Nuclear Power Plant (including all nuclear power units at one site)
NRWG	Nuclear Regulators Working Group
NTW	Nuclear Transparency Watch
OBK	Civil Safety Commission in Czech Republic
OECD	Organisation for Economic Co-operation and Development
OECD/NEA	Nuclear Energy Agency of the Organisation for Economic Co-operation and Development
OEIC	Off-site Emergency Information Centre in Bulgaria
ONR	UK Office for Nuclear Regulation
PAA	Polish National Atomic Energy Agency
PAZ	Precautionary action zone
PAGD	Fire and Rescue Department in Lithuania
PEN	Off-site Nuclear Emergency Plan (Plan de Emergencia Nuclear Exterior)
PLABEN	Basic Nuclear Emergency Plan in Spain
PREPARE	Innovative integrative tools and platforms to be prepared for radiological emergencies and post-accident response in Europe
REC	Radiological Evaluation Cell
REPPIR	Radiation Emergency Preparedness and Public Information Regulations in the United Kingdom
RNM	Réseau National de Mesures de la Radioactivité de l'Environnement (French: National Network for Measurement of Radioactivity in the Environment)
RSC	Radiation Protection Centre in Lithuania
SELCA	System of exchange and liaison between Cattenom and the authorities
SGDSN	Secrétariat général de la défense et de la sécurité nationale (French General Office of Defence and National Security)
SNSA	Slovenian Nuclear Safety Administration
SORNS	Croatian State Office for Radiation and Nuclear Safety
SSM	Stralsakerhetsmyndigheten (Swedish Radiation Safety Authority)
STUK	Finish Radiation and Nuclear Safety Authority
SÚJB	Czech State Office for Nuclear Safety (Státní úřad pro jadernou bezpečnost)
TECV	French Act on Energy Transition for Green Growth,

VATESI	Valstybine atomines energetikos saugos inspekcija (State nuclear power safety inspectorate)
ÚJD SR	Úrad Jadrového Dozoru Slovenskej Republiky (Slovakian Nuclear Safety Authority)
UPZ	Urgent protective action planning zone
USIE	IAEA Unified System for Information Exchange in Incidents and Emergencies
UK	United Kingdom of Great Britain and Northern Ireland
VATESI	Lithuanian State Nuclear Power Safety Inspectorate
WANO	World Association of Nuclear Operators
WENRA	Western European Nuclear Regulators Association

1. Introduction

This report summarises the findings of the “Study on good practices in implementing the requirements of public information in the event of an emergency, under the Euratom Basic Safety Standards Directive and Nuclear Safety Directive” commissioned by DG Energy of the European Commission to the consortium, comprising SCK·CEN and Merience, under the contract ENER/2017/NUCL/SI2.756526[1]. This chapter describes the legal and policy background (section 1.1), the objectives (section 1.2) and the methodology of the study (section 1.3). It finishes with a short overview of the further contents of this report (section 1.4).

1.1.Legal and policy context of the study

Ensuring the highest levels of safety, security and emergency preparedness and response (EP&R) is a central objective of EU policy. With the adoption of the Spent Fuel and Radioactive Waste Directive (Directive 2011/70/Euratom), a revised Basic Safety Standards Directive in 2013 (Directive 2013/59/Euratom) and the amended Nuclear Safety Directive in 2014 (Directive 2009/71/Euratom as amended by Directive 2014/87/Euratom4), the EU has developed an advanced legally binding and enforceable framework for nuclear energy in the EU. Responsible authorities must be prepared to provide reliable and up-to-date information, as well as to deal with difficulties in comprehending the information presented, contradictory information from different unofficial sources, or even an unwillingness to accept experts’ views about risks from radiation. EU citizens expect high standards of nuclear safety and radiological protection to be maintained under all circumstances. In case of a nuclear or radiological incident, any release of radioactive material can have geographically widespread consequences. Keeping the public adequately informed to assist in their protection can be a major challenge.

For this, the European Union has developed an advanced legally binding and enforceable framework for nuclear energy grounded on the Article 2(b) and Title II, Chapter 3 of the Euratom Treaty:

- Council Directive 2011/70/Euratom of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste OJ L 199, 2.8.2011, p. 48–56,
- Council Directive 2013/59/Euratom of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation, OJ L 13, 17.1.2014, p. 1–73, and
- Council Directive 2009/71/Euratom of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear installations, OJ L 172, 2.7.2009, p.18, as amended by Council Directive 2014/87/Euratom of 8 July 2014, OJ L 219, 25.7.2014, p. 42–52.

Council Directive 2014/87/Euratom introduced a review of the EU framework on nuclear safety in the light of the accident at the Fukushima Dai-ichi Nuclear Power Plant in 2011 and the

[1] Value of the contract is EUR 90,000 euro.

findings of the EU stress tests.[2] Member States had to transpose this Directive into national legislation by 15 August 2017. Additionally, Member States had to transpose the new Basic Safety Standards Directive into national legislation by 6 of February 2018. The implementation of these Directives provides opportunities amongst the EU Member States to review existing procedures and improve implementation measures in the area of public information and transparency requirements in the event of an emergency. Furthermore, Council Decision 87/600/Euratom on Community arrangements for the early exchange of information in the event of a radiological emergency stipulates the arrangements that shall apply regarding the notification and provision of information whenever a Member State decides to take measures of wide-spread nature in order to protect the general public in case of a radiological emergency.

A motivation for these requirements includes also lessons learned from public information and transparency during and after the Fukushima Dai-ichi Nuclear Power Plant accident in Japan in 2011. Although EU Member States did not suffer from any direct radiological consequences related to health, the accident revealed to have a global effect on EU as well as worldwide. Among others, the accident resulted in an increased risk perception of nuclear installations, negative consumers behaviours towards food and other products from Japan (e.g. boycott), adaptation of legal norms for residues of radionuclides in food and other products and nuclear energy policy changes in some EU countries. Several challenges regarding communication during and after the accident in Fukushima have been identified in the literature focusing on risk communication after the Fukushima disaster (Prezelj et al. 2016; Figueroa, 2013; Hobson, 2015; NAICC, 2012; Younghwan, et al., 2013, IAEA, 2013). These include:

- emergency management failure by emergency management groups to communicate protective actions to the public during the Fukushima accident (e.g. evacuation or intake of potassium iodide),
- failure to communicate uncertainties related to the on-going emergency (e.g. inadequate information related to radioactive release),
- inability of experts to admit uncertainties related to health effects of radiation (e.g. low radiation doses effects),
- inability to deal with public fears (e.g. how the contamination from the accident will affect children's health, including thyroid abnormalities) and
- lack of stakeholder involvement in decision-making at a later stage (e.g. lack of involvement of women in decisions related to the return to evacuated villages).

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[2] In response to the 2011 Fukushima nuclear accident, risk and safety assessments ('stress tests') were carried out on all EU nuclear power plants to check whether the safety standards used were sufficient to cover unexpected extreme events. Related documents, see: https://ec.europa.eu/energy/en/topics/nuclear-energy/nuclear-safety/stress-tests; Communication from the Commission to the Council and the European Parliament on the comprehensive risk and safety assessments ("stress tests") of nuclear power plants in the European Union and related activities, COM/2012/0571 final, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52012DC0571, https://www.consilium.europa.eu/uedocs/cms data/docs/pressdata/en/ec/120296.pdf (last accessed 20 February 2019).

These flaws resulted in improper public response and difficulties in the recovery from the Fukushima accident. The communication failures contributed to citizens' anxiety and distrust in emergency management, the government, the safety regulators, the experts and the nuclear industry worldwide (Figueroa, 2013; Younghwan et al., 2013; NAIIC, 2012; Ropeik, 2011; Siegrist & Visschers, 2013) and had a negative impact on stakeholder involvement processes for the remediation and recovery of contaminated villages (Hobson, 2015). According to Janssens (2013) "*The accident also prompted further reflection on the capacity of the EU and of Member States to respond to a nuclear emergency. This reflection concerns information exchange, response to remote accidents with implications on trade, communication, and the adequacy of the legislation on the placing on the market of food and feeding stuffs".*

As a result of Fukushima, national and international authorities, various organisations and NGOs worldwide - for instance IAEA (IAEA, 2013), the Red Cross (IFRC, 2015) and the International Radiation Protection Association (Coates et al., 2012) - reviewed risk communication plans and improved strategies for communication in nuclear emergency preparedness and response. Nuclear emergency authorities acknowledged the need to include communication aspects in emergency preparedness exercises and trainings (Perko et al., 2016a). Open-source, citizen-science-centred radiation mapping solutions were developed through a process of collaborative open innovation. Thus, citizen's science entered the radiation protection field. An example is provided by Safecast in Japan (Brown et al., 2016). In addition, investments in risk communication research and improvements in the coordination of risk communication before, during and after nuclear emergencies were approved (e.g., FP7 projects EAGLE, PREPARE, OPERRA and H2020 projects CONFIDENCE, ENGAGE, TERRITORIES supported by European Commission and EURATOM).

The results from some European funded projects point to a big difference between public perception regarding ionising radiation risks and the way of communication of those who are providing the information on nuclear emergency (Turcanu et al., 2014; Železnik et al., 2015). Thus, communication about emergencies and emergency preparedness are currently still interpreted as a one directional transfer of information from a source to a receiver (Železnik et al., 2014), while international guidance shows that what the population needs would be a multiple-way communication considering expectations, views, concerns and questions from different stakeholders. Currently, those using ionising radiation and those in positions of authority seem mainly inspired by the idea that the general public should be 'educated' by 'explaining the facts' (Zeleznik et al., 2014). In only very few situations are citizens considered as competent stakeholders whose own questions and needs could guide the approach to emergency communication (Železnik et al., 2014). Differences between individuals, groups and authorities in their motivation, values, goals, level of knowledge, interests, perceptions, beliefs about the objectivity and efficacy are often taken as justification for avoiding involving stakeholders in decision-making process in nuclear emergency preparedness. In addition, arguments over the objectivity, validity, credibility and relevance of scientific findings are common in debates related to health effects of radiation, especially related to scientific uncertainty and effects of low doses. These differences should be seen as a drawing factor for stakeholder involvement and not as caveats. Sound communication and participative processes may lead to effective, democratic, ethical and transparent decisions important for radiological risk governance.

Yet, to date, the EURATOM legal requirements oblige Member States to "*inform* the public" and do not explicitly require ensuring a two (or multiple)-way *communication* with the public prior or in the event of an emergency. In order to improve public information during an emergency, Articles 70 and 71 of the new Basic Safety Standards Directive contain the existing obligation upon Member States to provide information (referring to a basically unchanged Annex XII) to members of the public about health protection measures to be applied and steps to be taken in the event of an emergency. Public information arrangements should be included in the emergency management system and emergency response plans as well as involvement of stakeholders, as stated in Annex XI.

DG Energy commissioned a study (ENER/D1/2012-474) to review the off-site nuclear emergency preparedness and response arrangements in EU Member States and Neighbouring Countries (ENCO, 2013). The study assessed the status of current arrangement and capabilities for off-site emergency preparedness and response, identified best practice, gaps and inconsistencies and made recommendations on potential areas for improvement. The findings showed that in the event of an emergency, the large number of actors involved in the provision of information could complicate the development of efficient public information and communication arrangements. Later on, in 2015, the Nuclear Transparency Watch (NTW) evaluated the European and national emergency preparedness and response provisions from the point of view of civil society and indicated the limitations of the study commissioned by DG ENER (Zeleznik & Klemenc, 2015). NTW is very critical of the current level of involvement of local populations and interested civil society organisations in emergency preparedness and response (EP&R) and the lack of update of EP&R plans in response to social and technological change. NTW proposes, among others, to develop “a legal framework requiring the involvement of civil society organisations at each level of EP&R preparation and for related decisions, in the spirit of the Aarhus Convention and in compliance with its requirements” (Zeleznik and Klemenc, 2015). However, the results of the NTW study are also preliminary and incomplete.

The present study aims to contribute to further assess the current practices in public information in 28 EU Member States under the existing legal requirements, and to highlight good practices, taking into account the points of view of various governmental and local authorities, licensees and stakeholders.

The findings reported in this document are supported by the following five deliverables and five reports developed as part of this project[3]:

- Annex A: D1.1. Analysis of national legislative provisions and review of standards and guidance supporting the implementation of EU legislation in Member States;
- Annex B: D1.2. Report on surveying EU Member States;
- Annex C: D1.3. Public awareness and satisfaction with information about nuclear

[3] In addition, the findings are also supported by a round table discussion with regional emergency experts focusing on cross-border arrangements between EU Member States in the Benelux area organized by SCK·CEN in the framework of this project. The publicly available link of the recorded workshop can be found at: https://youtu.be/keC-xkDodZM

emergencies potentially occurring in Belgium;

- Annex D: D2.1. Lessons learned from recent nuclear and radiological events in Europe and neighbouring countries;
- Annex E: D2.2. What can we learn from non-nuclear hazard industries and how it is valuable for the Euratom Basic Safety Standards and Nuclear Safety Directives;
- Annex F: Final workshop report: “Public information and transparency in case of radiological emergency according to new Basic Safety Standards and amended Nuclear Safety Directive: collecting good practices”;
- Annex G: Report “Stakeholder consultation: feedback from NERIS platform members”;
- Annex H: GMF workshop report;
- Annex I: Report from local communities’ point of view on public information in case of a nuclear emergency;
- Annex J: Reference Group members.

1.2.Objectives of the study

The “Study on good practices in implementing the requirements of public information in the event of an emergency, under the Euratom Basic Safety Standards Directive and Nuclear Safety Directive” (hereinafter also referred to as “the study”) was launched by DG ENER of the European Commission, under the tender ENER/D3/2016-409. It was subsequently awarded to SCK·CEN and Merience in July 2017 for a period of 15 months.

The overall objective of this study is to review existing procedures amongst Member States and identify good practices for the purpose of promoting the effective implementation of the public information and transparency provisions of the Euratom legislation. Its scope includes both arrangements to deal with national emergencies and well as those with cross-border impacts. This was achieved by obtaining and reviewing in detail the declared arrangements of the various government, local authorities and licensees, responsible for informing the general public prior to and in the event of radiological or nuclear emergencies. It surveyed stakeholder interest groups and local liaison groups about how the arrangements are implemented at a practical level, considering the strengths and weaknesses of the different approaches, reviewed the experience from previous radiological and nuclear accidents worldwide to see what additional lessons they provide for improvements, and made practical and feasible recommendations for improving these practices and procedures. The situation of EU Member States with and without nuclear installations and the potential for emergencies with cross border consequences arising from different causes, Although the Euratom Directives principally address requirements for public information, the study also considered the experience and practices related to communication with the public in preparedness and response, and evaluated the benefits or otherwise of different approaches. A specific objective of the study was to include the viewpoint, experience and expectations of civil society as an important affected stakeholder in the event of a nuclear or radiological emergency.

In order to obtain the widest possible input of experience, identification of good practices, and validation of its recommendations, the study included the participation of a group of representative stakeholders with an interest in radiological and nuclear emergencies (drawn from, for example, the nuclear industry, competent regulatory authorities, local authorities, civil protection services, citizen groups, economic interest groups, radiological protection and medical expert groups), who were consulted and invited to provide input to the study, as well as to review and comment on the recommendations, as explained in Section 1.3.

This project has the following objectives:

- Analysis of national legislative provisions and review of standards and guidance supporting the implementation of EU legislation in Member States (focus on the legal framework): i) A legal analysis of the provisions in the applicable EU legislation ii) a review of existing and latest draft international and European level standards and guidance that are available to support the implementation of the legal requirements; assessing their scope, detail and level of practicability and describing possible gaps, iii) a comprehensive survey of the existing legal framework for applying the public information requirements in all the EU Member States.
- Comprehensive overview of public information settings in the 28 EU Member States from the perspective of EU legislation, including public awareness of protective measures and public satisfaction with information (focus on the administrative and organizational aspects): Conducting a comprehensive survey of the existing administrative and organisational framework for applying public information requirements in all 28 EU Member States, specifically examining how these systems, procedures and practices have been set up and would work in practice.
- Lessons learned from nuclear and radiological accidents: Reviewing experience from nuclear and radiological accidents worldwide, and examining the evolution of the event and the way public information needs were managed, the lessons learnt and their relevance in the EU context.
- Learning from non-nuclear hazard industries, non-nuclear requirements and practices: Collecting experiences from requirements and practices in the European non-nuclear hazard industries, particularly chemical incidents and emergencies and natural disasters, for illustrative purposes. Extending the analysis to comparative requirements and practices in all hazards emergency communication (including industrial – chemical, nuclear, radiological- and natural disaster management – earthquakes, volcano eruptions, tsunami, etc) for illustrative purposes.
- Collection of stakeholders' views, needs and recommendations: Evaluating the effectiveness of the existing systems, procedures and practices in Member States at national and regional levels, particularly from a civil society perspective, pointing out the strengths and weaknesses of different approaches. SWOT analysis and case studies including cross-border arrangements and practices for implementing the requirements on public information in the event of an emergency.
- Establishment of the Reference group: The aim is to establish the Reference group as the consultative body to provide advice and expertise to the consortium. It will

provide input, will be consulted on the work performed and will review the recommendations.

As a result, this report provides the European Commission with a complete overview of the various provisions, practices, the gaps and inconsistencies between the national strategies to implement the requirements on public information and transparency in the event of a nuclear or radiological emergency, under the Euratom BSS Directive and NSD. Ultimately, the present study helps Member States improve the implementation of legal requirements related to practices of information provision, transparency, communication and engagement in the event of an emergency.

1.3. Methodological approach

In order to collect data to assess the state of the art regarding the implementation of information provisions put forward by the Euratom Basic Safety Standards Directive and Nuclear Safety Directive, the present study followed an approach based on desk study and stakeholder consultation. Figure 1 below shows a schematic overview of the overall project approach.

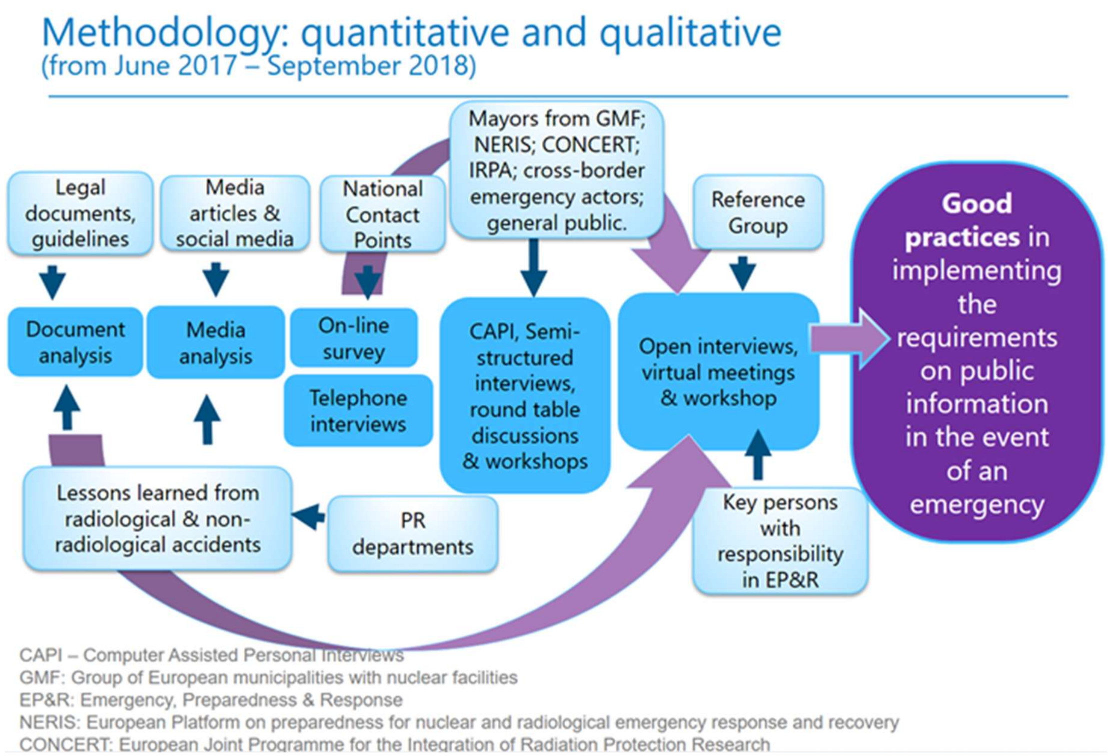

Figure 1. Schematic overview of the project approach

Desk study

- document analysis of applicable EU legislation and international guidelines, including an analysis of the implementation in national legislation of the 28 EU Member States (Deliverable 1.1 in Annex A);

- on-line survey with 26[4] regulatory bodies (nuclear safety authorities or other responsible authorities) to collect and assess the national legal frameworks for applying the public information requirements in all the EU Member States. In order to increase the response rate and the completeness of the survey, several email reminders and telephone calls were made to most of the relevant national authorities (Deliverable 1.2 in Annex B);

- document analysis to review lessons learned from recent nuclear and radiological events, in Europe and neighbouring countries (Deliverable 2.1 in Annex D);

- document analysis to review lessons learned from non-nuclear hazard industries regarding public information and communication (Deliverable 2.2 in Annex E);

- case study in Belgium concerning public awareness and satisfaction with information about nuclear emergencies potentially occurring in Belgium or in bordering neighbouring countries with a representative national sample of 1,000 Belgian adults (Deliverable 1.3 in Annex C);

Stakeholder consultation

- round table discussion with regional emergency experts focusing on cross-border arrangements between EU Member States in the Benelux area organised on 16 April 2018, as part of the training course on preparedness and response for nuclear and radiological emergencies held at SCK·CEN from 16 to 19 April 2018[5], as well as by a table-top exercise in a context of international emergency preparedness and response course conducted by SCK·CEN[6];

- consultation with the sixteen members of the Reference Group set up for this study, representing all areas involved in the definition, implementation or subject to the information and transparency arrangements dealing with national radiological and nuclear emergencies. Three exchanges were held with the Reference Group members

[4] Two regulatory authorities did not provide answers to the survey, while the remaining 26 Member States responded.

[5] Participants of the roundtable discussion: Wolfgang Raskob, Karlsruhe Institute for Technology, Germany (CONFIDENCE coordinator);Wolfgang Weiss, Bundesamt für Strahlenschutz, Germany; Horst Miska, radiation protection adviser, Germany; Patrick Majerus, Ministry for Health, Luxembourg; Ilma Choffel de Witte, IRSN Public information and communications, France; Anne Nisbet, Public Health England, United Kingdom; Johan Camps, SCK•CEN, Belgium (NERIS platform); Catrinel Turcanu, SCK•CEN, Belgium (ENGAGE coordinator); Hans Vanmarcke, SCK•CEN, Belgium (UNSCEAR president). The round table discussion could be followed via a YouTube channel and it was video recorded and could be accessed through this link: https://youtu.be/keC-xkDodZM

[6] Course information: http://academy.sckcen.be/en/Customised_trainings/Calendar/Preparedness-and-response-fornuclear-and-radiological-emergencies-20180416-20180420-8e9db74ad45be71?leftmainmenu=4

throughout the duration of the project;

- consultation with local authorities through the Group of European Municipalities with Nuclear Facilities (GMF) using a questionnaire and personal interviews as part of their Assembly held in Madrid on 6 October 2017. The views, needs and recommendations of local communities have been collected through an on-line survey sent to the Group of European Municipalities with Nuclear Facilities (GMF) via the GMF Secretariat and to ANCCLI through a member of the Reference Group on 14th of December 2017 and 2nd of February 2018. Six local communities with nuclear facilities replied to the survey from the following EU Member states: Belgium, France, Germany, Hungary, Spain and the United Kingdom. While this number is not representative of the situation at local level, it is illustrative of how public information and transparency aspects on nuclear emergencies are addressed at local level. (Annex H and Annex I);

- consultation with experts from radiation protection societies at the International Radiation Protection Association (IRPA) Congress 2018 held in the Hague, the Netherlands, 4-8 June 2018 (https://irpa2018europe.com);

- consultation with experts of the European Platform on Preparedness for Nuclear and Radiological Emergency Response and Recovery (NERIS) working group on information, participation and communication in the framework of the NERIS workshop held in cooperation with the Irish Environmental Protection Agency in Dublin on 25 April 2018 (Report Stakeholder consultation: Feedback from NERIS platform members in Annex G);

- consultation with the 54 participants from 15 different countries at the final workshop “Public information and transparency in case of a radiological emergency according to new Basic Safety Standards and amended Nuclear Safety Directive: collecting good practices” held in Antwerp on 11 and 12 June 2018 as a pre-conference event before the RICOMET conference (Report: Final project workshop in Annex F) .

- Consultation with CONCERT partners and the following platforms representatives MELODI, ALLIANCE, NERIS, EURADOS and EURAMED during the meeting ‘Identifying research needs and R&D priorities supporting the implementation of BSS’ held on 10th of October 2017 in Paris, France.

The interaction with the different stakeholders consulted during the study is shown in the Figure 2 below.

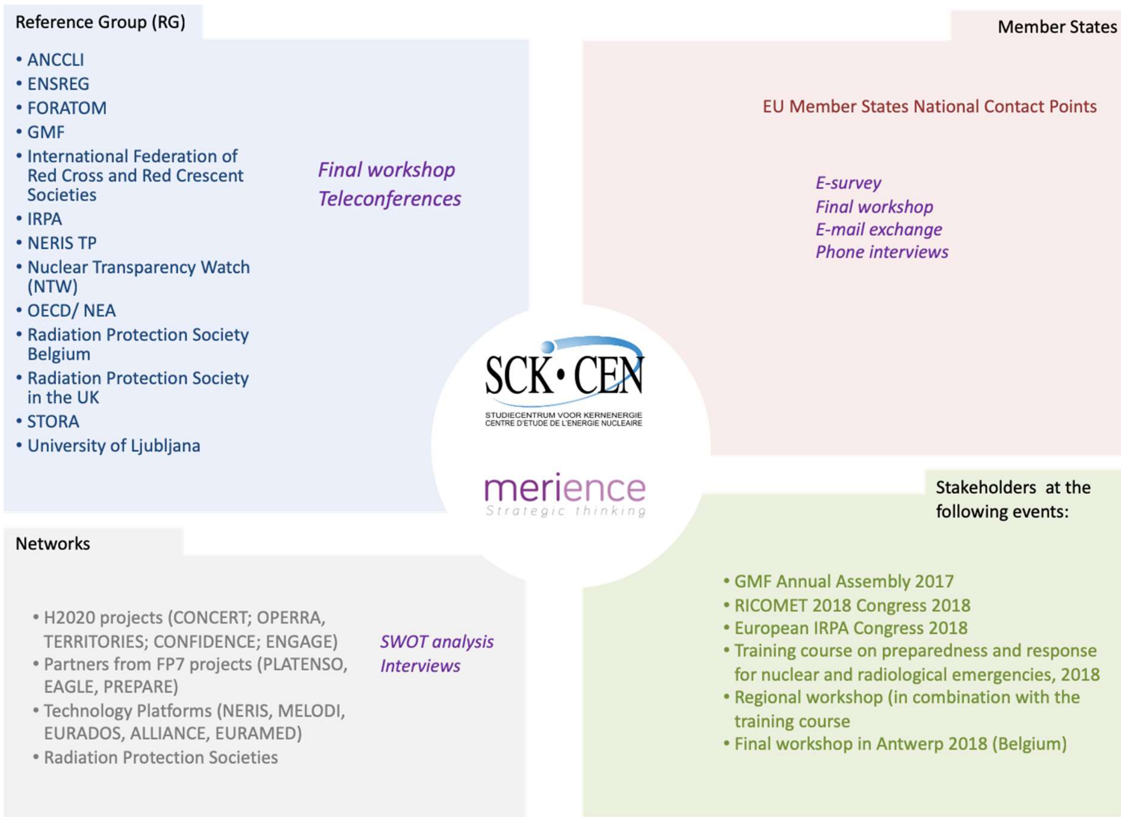

Figure 2. Interaction of the project consortium with stakeholders

1.4. Outline of the main content of the final report

This report will further set out an overview and analysis of the findings with regards to the current public information and transparency in the event of an emergency in the 28 EU Member states. For this, Section 2 follows with a summary of the findings and identified good practices throughout the study relating to public information and transparency in radiological emergencies in the 28 EU Member States with a focus on implementation of the two Directives. Section 3 summarises the lessons learned related to radiological events in EU and neighbouring Member States as well as the lessons learned from non-nuclear events with regard to public information and transparency. The final section follows with a summary of conclusions and recommendations.

2. Current practices relating to public information and transparency in radiological emergencies in the EU28: summary of findings and good practices

Overall the *Study on good practices in implementing the requirements on public information in the event of an emergency, under the Euratom Basic Safety Standards Directive and Nuclear Safety Directive* provides useful insights into the common and often innovative public information practices in place to ensure informed decision-making, public response, openness and transparency in case of a nuclear or radiological emergency. NROs and other authorities or organisations responsible for defining and implementing public information requirements are significantly challenged as information-communication technology continues to advance and as the public's expectations for engagement continue to rise.

The new Euratom Basic Safety Standards Directive and Nuclear Safety Directive provide minimum requirements for public information and transparency which are, due to national and socio-cultural differences in MS, in some cases applied more ambitiously in routine and non-routine public information practice in EU MS. While international guidelines go further than the recently adopted EURATOM Directives, 28 Member States have to transpose and implement the revised provisions into national law. This section looks at the revised EURATOM legal framework, which establishes legal requirements for public information prior to and in the event of an emergency as well as transparency requirements and contributes to an assessment of current practices in the implementation in EU Member States with the objective to highlight good practices. The intention behind this "good practice collection" is to be used as an inspiration for the implementation of the new and amended directives by the MS and not as an obligation to be applied in any emergency context or any Member State. It is important to bear in mind that the collected good practices are strongly related to the context of each specific event and the political-societal-communication culture in each Member State.

2.1. Findings related to public information requirements

2.1.1. Legal aspects related to public information

The new Basic Safety Standards Directive 2013/59/Euratom and the amended Nuclear Safety Directive 2014/87/Euratom are in a way complementary in terms of increased transparency and public information. Together, they introduce the obligation for Member States to inform the public during normal operation and in the event of an emergency on the one side (regulated by the Nuclear Safety Directive) and to inform the public affected and likely to be affected prior the event of an emergency and its coordination between Member States and third countries on the other side (regulated by the Basic Safety Standards Directive).

The obligation in Article 70 of the new BSS "to provide at regular intervals updated information to the population likely to be affected in the event of such an emergency" has only been slightly changed in view of linguistic adaptations compared to the previous Council Directive 96/29/EURATOM and Directive 89/618/EURATOM. Neither does Annex XII of the new BSS contain fundamental changes. Except for slightly enhanced requirements to inform now also the public likely to be affected in the event of a pre-alarm phase ("shall" instead of "should") in Annex XII of BSS, the content of relevant information basically remains the same for the affected and likely affected population as in the Council Directive 89/618/EURATOM. The list of relevant information in Section A and B of Annex XII of BSS, which has to be supplied, shall include at least the following elements: health protection measures to be applied and steps to be taken prior to and in the event of a radiological emergency.

Both Articles 70 and 71 of the BSS as well as Annex XI clearly establish the obligation of Member States to ensure that the necessary information is given to or received by the public affected or likely to be affected. In addition, Annex XI specifies, among others, also the elements related to public information to be included in an emergency management system: clear allocation of the responsibilities of persons and organisations having a role in preparedness and response arrangements (Annex XI, A2), reliable communication and efficient and effective arrangements for cooperation and coordination at the installation and at appropriated national and international levels (Annex XI, A4); public information arrangements ((Annex XI, A8) and involvement of stakeholders (Annex XI, A9). Among elements to be included in an emergency response plan of each Member State, there are also arrangements to be reviewed and revised to take account of changes or lessons learned from exercises and events (Annex XI, B7). Moreover, "*Member States shall ensure that emergency response plans are tested, reviewed and, as appropriate, revised at regular intervals, taking into account lessons learned from past emergency exposure situations and taking into account the results of the participation in emergency exercises at national and international level*." (Art. 98 (4)).

The content of Member States obligations in terms of public information has not been substantially revised in the BSS and in essence the Member States should have already implemented these provisions in their national legislation as reported in D1.1 in Annex A. However, the provisions of the Directive do not limit additional measures that go beyond the minimum requirements. This is stated in the text of the BSS Directive as follows: "As the BSS Directive "provides for minimum rules, Member States should be free to adopt or maintain more stringent measures in the subject-matter covered by the Directive" (L13/1, (5)). Furthermore, the interpretation of the provisions under the new BSS Directive as well as their implementation can be significantly improved. It is upon Member States, who adopted the relevant Euratom legislation which is binding to them, to use more ambitious non-binding international texts as guidance for an efficient and effective implementation. As reported in D1.2 in Annex B., out of 26 Member States surveyed, seven (BE, CZ, EE, FI, FR, LV, SE) indicate that they experience no need for changes in national legislation regarding public information in radiological emergencies as their legislation already includes the changes foreseen in the new BSS Directive. The rest of the countries indicated changes, either concerning information and communication (HR, DK, DE, EL, HU, IE, LU, SK), radiation protection and safety (BG, HR, CY, DE, IT, LT, SK) and/or international cooperation (AT). Six countries (HR, DE, HU, IE, LU, ES) specifically mention changes being made concerning public information and communication in Emergency Preparedness and Response legislation.

In this context, international (IAEA) Safety guides (e.g. IAEA GSR 2015; IAEA GS-G-2.1. 2007) may be useful as they require that the public be provided with "useful, timely, truthful, consistent and appropriate information in the event of a nuclear or radiological emergency". In practical terms, IAEA (2007) defines that the arrangements for information provision should include provision:

- To designate an individual within each organization with the role, during the response, of coordinating the provision of information to the news media.
- To arrange to coordinate the provision of information to the public by national officials, local officials and the operator. This could include the establishment, as soon as possible, of a public information centre […] to serve as the single source of information. […]

- To give plain language answers to typical questions, descriptions of the risks involved and appropriate actions that the public can take to reduce the risks.
- To identify and correct misleading and harmful information.

Although BSS Directive "provides for minimum rules", the present study shows that although in general, most Member States do not go beyond these minimum requirements in the transposition of the EU law into national law, there are also countries that take BSS and NSD directives as a chance for improvement, try to rethink, develop a new communication plan and improve public information and transparency in radiological emergencies (e.g. Hungary, Austria). At local level, two out of the six municipality representatives responding to the study survey included in the "report from local communities' in Annex I point of view on public information in case of a nuclear emergency" and who claim to know about the BSS Directive, think that the directive will not make any changes in the field of nuclear emergency preparedness and response in their municipalities.

In addition, throughout the project consultation and as reported in the final workshop report in Annex F, it has been pointed out that international 'exchange' events - such as IAEA symposiums, NERIS workshops, RICOMET conferences as well as the Final Workshop of this study -, help to identify, document, validate and disseminate good practices. Thus, these events can be considered as good practices themselves.

Good practices related to the implementation of BSS and NSD

- Recognising in advance a challenge related not only to the transposition of the Directives but also to their implementation is a step towards improving the existing national legal framework.

- The exchange of information regarding public communication in nuclear and radiological emergencies at European and international events can be considered as a good practice.

2.1.2. Routine access to information

Public information requirements oblige MS to update and distribute information to the population likely to be affected in the event of an emergency at regular intervals (Article 70 of the BSS Directive). This information includes at least: basic facts about radioactivity and its effects on human beings and on the environment; the various types of radiological emergency covered and their consequences for the general public; emergency measures envisaged to alert, protect and assist the general public and the environment in the event of a radiological emergency; and appropriate information on action to be taken by the general public in the event of an radiological emergency (Section A of Annex XII of the BSS Directive). This information shall be permanently available to the public and not only upon request and whenever significant changes take place.

In some countries, information about radiation measurements in also open and accessible to the public on a permanent basis. For instance, in France, the TELERAY gamma dose rate alert network ensures the radiological monitoring of the French territory in the air by the IRSN while the TELERAD network in Belgium monitors radioactivity in the air and water. As reported during the round table discussion with regional emergency experts on cross-border arrangements between EU MS in the Benelux area held in the framework of this study in April 2018, these systems may stimulate discussion about radiation among the publics (Annex M).

On the basis of the survey sent to Member States and reported in D1.2 in Annex B., the study shows that several types of documents and services are routinely shared with the public in EU MS. Of these, document incident reports are shared by most countries surveyed (n=20 out of 26), secondly accident reports (n=18) are shared, thirdly notifications of matters being investigated (n=17) are shared followed by formal disclosure request (n=12) and FAQ (n=10). Safety reviews are shared by ten Member States, among those, Periodic Safety Reviews (PSRs) are specifically reported by Denmark, Finland, Hungary and Poland. Since the question in the survey did not specifically asked for PSR, also other Member States may routinely share Periodic Safety Reviews.

Good practices related to routine access to information

- Incident notifications, accident reports and notification of matters being investigated are routinely shared with the public using different mass media (e.g. formal consultations, public meetings with local authorities, written inquiry points, telephone enquiry points).

2.1.3. Public affected or likely to be affected

The Convention on Nuclear Safety (IAEA, 1994), in its Article 16 on emergency preparedness establishes, for the first time, the obligation for Contracting Parties to ensure that the population likely to be affected by a radiological emergency are provided with “appropriate information for emergency planning and response”. The IAEA GSR (2015) specifically mentions the public who is affected and potentially affected and goes a bit further to define ‘permanent population’, ‘transient population groups’ (those members of the public who are residing for a short period of time -days to weeks - in a location that can be identified in advanced) and ‘special population groups’ (members of the public for whom special arrangements are necessary for effective protection actions to be taken in the event of a nuclear or radiological emergency). BSS establishes requirements for information provision to the public likely to be affected by an emergency and to the affected members of the public prior to and in the event of an emergency. The NSD, however, obliges MS to inform the general public, with specific consideration to local authorities, population and stakeholders in the vicinity of a nuclear installation.

The survey results in EU MS reported in D1.2 in Annex B. show that all countries provide for the information of the affected population and the population likely to be affected in their national legal framework. There are some countries which updated their communication policy and established more or less detailed national provisions for the information of or the communication with the general public prior and in the event of an emergency following the transposition of the BSS. As described in D1.2 in Annex B, a little less than half of the countries surveyed in this study which answered the corresponding questions (n=18) indicate that they do not intend to make any changes to their public communication plan or strategy as a result of the new BSS and Nuclear Safety Directives (BG, DK, HU, LU, SK, SI, ES). The rest of the countries (AT, HR, CY, EL, IE, IT, PL, RO and NL) which indicated changes in national legislation declare that specific changes are made concerning the overall communication strategy or plan in their respective countries. Two countries, Germany and Lithuania, were still reviewing whether these changes were needed in their respective countries, at the time when the survey was sent.

At local level, based on the survey to GMF representatives in the "Report from local communities' point of view on public information in case of a nuclear emergency" (Annex I), mayors state that, in case of an emergency, they would inform the citizens, even if no actions would be needed in the area. The systems they would use to inform citizens include acoustic loud speakers placed in the municipality, loud speakers in the vans, local radio, local TV, warning systems like BE-alert in the case of Belgium, text messages, press releases, social media, speeches, phone calls, municipal website, etc. Three out of the six respondents from local communities to the survey point out that the weakest point regarding communication of a nuclear emergency is social media and the spread of rumours and false information. The other respondents state that the weakest point is informing the whole population, not receiving information and sending the emergency alarm in time. When asked to what extent they personally trust the different actors to provide useful information about the measures to protect people in case of a nuclear accident, their responses differ. Whilst the majority trusts the nuclear safety authority, the rescue services (firefighters, civil protection, police) and the crisis centre, the level of trust in media and environmental organisations is very different depending on the respondent.

2.1.4. Media relations and good practices regarding media communication

Since the BSS directive requires from MS to have clear allocation of the responsibilities of persons and organisations having a role in preparedness and response arrangements (Annex XI, A.2.), it is expected that responsibilities for media relations are assigned. Indeed, good practices can be found in countries where the nuclear safety authority establishes a specific position or function in the organisation with responsibility for public information in case of a nuclear or radiological emergency as well as for public information and communication during the preparedness stage. Using social media for public information in nuclear or radiological emergencies require having personnel within the NRO trained to undertake this task. It is also possible that this task is not the responsibility of only one person, but can be shared among different employees. During a radiological or nuclear emergency, 24 out of 26 NROs who answered the survey in D1.2 in Annex B. in this study (exceptions are IT and MT) indicate that they have a specific policy regarding the staff speaking to the media. In seventeen countries (AT, CY, CZ, DK, EE, FI, FR, DE, EL, IE, LV, LT, LU, PL, SK, SI, ES) a dedicated and trained spokesperson(s) is available to speak to media. In Hungary and Poland, it is the Director General or his/her Deputy who are appointed to address the media, although in Poland it can also be the division/section head, like in Austria, Finland and Slovenia. For instance, in Slovenia, the emergency director is the person appointed for communication with the media. A different approach is followed in Finland, where STUK, the nuclear regulatory organization has developed a social media policy through which all 240 employees are encouraged to use social media in their relations with journalists and the public.

A good practice is to share this responsibility between more trained and responsible people due to the high information demand during and after an emergency. Personnel responsible for public information regularly participate at educational and networking activities organised at international level, where they can learn from other countries' experience. In 23 out of 25 (all except Luxembourg and Malta) who responded the questionnaire, the staff of the public information office had attended a meeting and/or educational programmes related to communication aspects in the last three years. Luxembourg indicated that this information is not available to them whereas Malta stated that they do not have a public information office. On average, five educational activities were attended in the last three years, mostly at international level organized by IAEA (in 16 out of 23 countries) or by the OECD NEA (in 9 out of 23 countries).

Most countries (AT, BE, CZ, HR, CY, FI, FR, HU, IE, LV, LU, RO, SI, ES, SE) indicate that they have some form of collaboration with public information officers from other organisations involved in emergency management (e.g. health ministry, civil protection, regional crisis staff, etc). In eight of these countries, collaboration is with other ministries, either directly or via the PR office of these ministries. Media is the first partner most often cited to cooperate with NROs, beyond official collaborations. Collaborations usually take place via email or telephone or is established in joint workshops.

Most MS (19 out of 26) indicate that they have a specific policy on media training for regulatory staff in the event of an emergency. A great variety however exists on who receives this training and what this training specifically entails. Five countries (BE, EE, HU, SK, SI) indicate that specifically management receives media training. In six countries (BU, DK, PL, RO, SK, SI, ES) a specific spokesperson or public relations expert is trained in media handling, whereas in nine countries (BE, CZ, EE, FI, FR, PL, SI, ES, SE) media training is provided to either all or a specific selection of staff members. The responsible person for communication with the media and the content of the specific policy varies significantly, revealing a major diversity across the EU. All MS indicate they have one or more spokespersons at their disposal in the event of a nuclear or radiological emergency. The number of spokespersons available differs between the MS ranging from 1 person in Bulgaria, Malta, Romania and Spain to 50 persons in France. On average, eleven spokespersons are available.

Traditional media is the most often used channel for the provision of information for the general protection measures to be applied and steps to be taken in the event of a nuclear emergency. The second most used channel is the internet including authority websites, online newspapers and social media. Early warning systems are the third most often used channel of communication.

In general, social media are one of the main concerns at local level, according to the “report from local communities’ point of view on public information in case of a nuclear emergency” in Annex I. Representatives of municipalities with nuclear installations point out that they are concerned on how to address social media and claim that social media is the least trusted source of useful information, whilst the level of trust in traditional media is usually higher. Particularly, one of the respondents claimed that social media are likely to spread ungrounded rumours and they do not know how to address this.

Timeliness of communication in the event of a radiological or nuclear emergency is flexible and depends on the event in many MS. When impact of the emergency for a MS increases, the timing for communication decreases and it can go down to optimal communication within 15-30 min. Also local communities participating in this study claim that it would take a maximum of 30 minutes from the moment the nuclear emergency is declared for the affected citizens to get information about protective actions.

NTW identified poor updating of EP&R plans regarding recent changes in technology, like internet, mobile phones, social media, availability of basic radiation measurement equipment among the broader population, etc (Zeleznik and Klemenc, 2015, p. 4).

Familiarisation of journalists with reporting on nuclear or radiological emergencies through participation in exercises, specific trainings and seminars is on-going in eight out of 25 countries (AT, BU, CZ, FI, FR, EL, IE, PL). Examples of the application of this good practice can be found in the following cases:

– -Atomic Reporters published one page "Recommendations for improving communication with journalists to enhance public safety in the event of a nuclear or radiological emergency[7]" which could be used by different organisations to improve their relationship with media and ensure quality reporting (Annex F);

  - NGOs like Green Cross, Red Cross and Greenpeace, train journalists in radiation protection before working in contaminated areas (Annex F).

  - The NRO in Greece establishes personal communication with journalists and writes letters to editors in order to correct erroneous coverage related to emergencies (Annex F).

Good practices regarding media communication

- Professionals who may appear in media as spokespersons during a potential nuclear or radiological emergency receive media training on a regular basis.

- Ensure that personnel within the NRO is trained to use social media for public information in nuclear or radiological emergencies. This task can be shared among different employees.

- Relationships with journalists are developed and maintained before a potential emergency by involving them in exercises, specific trainings and seminars where they can be familiarized with reporting on nuclear or radiological emergencies.

- Releasing public information in more than only official national languages is a good practice.

- Policy for NRO staff concerning media communication, including the definition of rules, roles and responsibilities, is developed and the elements of media communication are tested and trained in advance.

- The use of social media (e.g. twitter, facebook, blogs, etc) is done in conjunction with traditional media (e.g. journals, TV, radio, sirens, warning systems) during an emergency in order to reach all the different audiences.

2.1.5. Identification of public information needs, understanding and evaluation of effectiveness

BSS Directive requires from MS to have arrangements for the emergency response plan to be reviewed and revised to take account of changes of lessons learned from exercises and events (Annex XI, B.7.). This study, through D1.2 in Annex B and based on the final workshop report in Annex F, reveals that some MS identify citizens needs by applying public opinion

[7] http://www.atomicreporters.com/wp-content/uploads/2016/06/RotterdamJournalistsRecommendations616LR2.pdf, accessed on 20th of Sept. 2018

surveys, analysing lessons learned or social media, or by using any other relevant approach. Some examples were provided during the final workshop. In France, IRSN conducts surveys to investigate public needs of information. Identifying stakeholder concerns and needs of plural publics in France is important for the content of communication during an emergency. Different institutions in Europe (e.g. SCK·CEN in Belgium, CIEMAT in Spain or IRSN in France) publish regularly national barometers on the level of knowledge on protective actions, the level of information regarding emergencies, the level of trust in institutions addressing emergencies, risk perception, attitudes, etc. For instance, D1.3 in Annex C reports selected results from Belgium for the years 2017-2018.

According to D1.2. in Annex B, half of the MS surveyed (13 out of 26) indicate that they test whether the communication material they normally use results in people understanding the emergency or protective actions (AT, HR, CZ, FI, FR, DE, EL, IE, IT, PL, ES, SE, NL). Four countries (BE, HU, LT, RO) indicate that they plan to test their communication material. Testing, evaluation and adjustment of communication materials is in some MS done in various ways e.g.; focus groups, public opinion surveys, meetings with local communities, exercises, etc. Some examples of the way regulatory authorities test communication materials were provided in the final workshop of this project held in Antwerp on 11-12 June 2018 (Annex F and all presentations are available at http://ricomet2018.sckcen.be/en/Presentations). For instance, effect of visualization of evacuation maps on public understanding of protection actions is tested in Finland by using public opinion surveys[8] . Testing whether dispersion maps are understood by decision-makers and the lay public is undertaken in Slovakia. Austria has also developed dispersion mapping on the basis of the FLEXRisk modeling and is actively sharing this with civil society and authorities in other European countries. Indicating uncertainties and the use of a map to point out conclusions is done by IRSN and BfS. In Germany, the regulatory authority developed a leaflet on iodine tables which was tested by school children to check whether the information was clear and understandable. The H2020 project CONFIDENCE is also investigating how to communicate radiological emergencies and related uncertainties by using maps[9] and also how to communicate iodine tablets uptake as well as safe food consumption[10].

As reported in D1.2 in Annex B., evaluation and adjustment of internet webpage with the emergency preparedness and response related information is in some MS undertaken by external evaluators, public information surveys or stakeholder panels. Whilst most countries indicate that this is not their general practice, in Ireland, for instance, they conduct web-user testing, public information surveys or stakeholder panels, whilst the Netherlands is planning an external evaluation.

When querying whether MS have a dedicated person or persons to follow and respond to

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[8] Final workshop: http://ricomet2018.sckcen.be/-/media/Files/Ricomet2018/Presentations/Friday/2_when-used-in-communication-to-general-public-K-Raitio.pdf?la=en&hash=75BBF47AF71F896C5E883F47404C56635DE85A64 (last accessed 20 February 2019).

[9] Final workshop: http://ricomet2018.sckcen.be/-/media/Files/Ricomet2018/Presentations/Friday/3_Uncertainties-related-to-reciological-maps-L-Benighaus.pdf?la=en&hash=5D20D9B0B4EBD7E0D4B194FF509F78BFD37A957F (last accessed 20 December 2018)

[10] Final workshop: http://ricomet2018.sckcen.be/-/media/Files/Ricomet2018/Presentations/Friday/5_Communicating-Uncertainties-regarding-Radiological-Risks-H-V-Wolf.pdf?la=en&hash=B5317BE4ED685FD83A0F2CE2CFBE5566C2F1F8DA (last accessed 20 December 2018)

social media, more than half (15 out of 26) of the MS indicate that they have one or more persons that are assigned to this task (AT, BE, CY, CZ, DK, FI, FR, EL, IE, LV, LU, PL, ES, SE, NL). The number of people involved in this task varies from 1 (AT, LV, PL) to 15 persons (IE). It is often the case that this task is not concentrated only on one person but shared between more employees.

Good practices regarding public information needs, understanding and evaluation of effectiveness

- Online querying tools (e.g. social media, hotlines and Q&A) are used for posting online questions and answers during an emergency.

-Public communication and information material is tested for its clarity concerning understanding on emergencies and/or protective actions. Verification of these materials can be done by using different and complementary methods and approaches, e.g. focus groups, public opinion surveys, meetings, etc.

- Investing in research related to communication before, during and after nuclear or radiological emergencies.

- Communicate about uncertainties in emergency management.

-Evaluation and adjustment of the internet webpage of the nuclear regulatory organisation with the emergency preparedness and response related information can be conducted by external evaluators, stakeholder panels or through public opinion surveys.

-Messages during radiological or nuclear emergencies should be concrete and simple.

2.1.6. Good practices regarding exercises

Nearly all MS indicate that they include aspects of communication with the public in nuclear or radiological emergency exercises/drills. The frequency by which aspects of communication in exercise or drills are included varies from once every five years to several times a year. Experiences gained during exercises indicate challenges and pitfalls related to public information, not only on paper but also in practice, e.g. use of templates, use of preapproved messages, use of key messages, expressing empathy, etc. Contrary to the responses from NROs surveyed in 26 EU MS, representatives from local communities taking part in emergency management on the municipality level, state that the communication aspects about protective actions in exercises and drills is not regularly trained and depends on the country considered. In Spain, for instance, the last exercise involving information and communication aspects to the public was in late 2013. Until then, there have not been any further exercises and it is the civil servant in charge of civil protection who updates the municipal plan for nuclear emergencies. The respondents from municipalities in France, Germany and the UK state that they have not been involved in exercises where communication aspects with the local population have been tested. Exceptionally, in France, a local representative declared to have been accepted as an observer (not participant) in an exercise where communication between the authorities and the local community were not tested. This was also confirmed by ANCCLI at the final project workshop. In the UK, as reported in the final workshop (Annex F), local communities have been involved in emergency exercises and the general public have been engaged also in evacuation exercises.

However, good practices can be found in some countries (e.g. Hungary, Ireland, Belgium), which include and test public information and communication aspects in regular exercises and drills. Exercises and drills can be a good opportunity to review the effectiveness of public information, identify challenges and pitfalls, not only on paper but also in practice, and incorporate those as lessons learned in the revised communication strategies and plans. For instance, in Belgium, students of journalism are involved in nuclear emergency exercises. In Hungary, there are exercises every two years involving the regulatory authority, first responders, the operator and civil protection. The municipality leaders are invited to participate in the drills organised by Paks Nuclear Power plant and the National Disaster Management Directorate. In Belgium, there are exercises once a year and these involve the regulatory authority, first responders (medical services, firefighters, police), the operator and hospitals. In the UK, exercises involve regulatory authorities, first responders, operator, schools, civil protection, national representatives from the parliament and senate and the military-navy. In France, ASN organizes five drills a year with media pressure, involving journalists, and analysing text consistency, coordination of messages, quality of messages during speeches, etc.

However, NTW states that full scope exercises involving the local population are missing and that "*lessons learned from exercises and drills are not taken into account in new versions of plans, nor are they communicated to the stakeholders. NTW believes that there is a need for developing a legal framework requiring the involvement of civil society organisations at each level of EP&R preparation and for related decisions, in the spirit of the Aarhus Convention and in compliance with its requirements*."(Zeleznik and Klemenc, 2015, p. 4)

Good practices regarding exercises

- Evaluation and adjustment of the communication material after exercises is one of the possible options to improve the communication strategy for the response to future emergencies.
- Public information and communication aspects with the public are tested in regular exercises and drills to review the effectiveness of public information, identify challenges and pitfalls, not only on paper but also in practice.
- Communication personnel is included in cross-border and regional exercises.
- Local communities and other stakeholders (first responders, schools, hospitals, journalists, students of journalism) are included in exercises.

2.1.7. Good practices regarding timely, clear and understandable public information

The BSS Directive requests public information arrangements in emergency management systems and emergency response plans as referred to in articles 69, 97 and 98 at place in every MS (Annex XI,B. 8). Having a robust overall communication plan or strategy for nuclear or radiological emergency serves to communicate with the public before, during and after an emergency and supports national authorities with a view to helping them achieve the overall objective of improving public information and transparency, as required by the new Basic Safety Standards Directive and Nuclear Safety Directive. All countries surveyed for this study (i.e. 26 Member States who replied to the questionnaire in D1.2. in Annex B) include communication aspects in their respective emergency response plans (either in general emergency plans or specific plans for radiological and nuclear emergencies). In addition, revision and improvement of a public information or communication plan or strategy is carried out in some countries (e.g. AT, HR, DK, EE, FI, etc) on a regular basis and also after specific events, e.g. after exercises and drills or real events as reported in Annex B (p. 31).

Another good practice is related to a generic communication tool which allows to communicate protective actions as well as information on the disaster. This multi-channel public warning mechanisms to alert the population in case of crisis (not restricted to nuclear, but a large-scale disaster) is called BE-alert in Belgium and NL-alert[11] in the Netherlands. This type of system may be generalized at the European level. The Decision No 1313/2013/EU of the European Parliament and of the council of 17 December 2013 on a Union Civil Protection Mechanism, which pursues a better integration of alert systems.

As reported in the project final workshop report (Annex F), in Germany, the KatWarn is a public warning system originated from competent government agencies or responsible safety and security organisations who decide on the content, timing and extent of issued warnings. Always in Germany, BfS is currently developing an automatic system to inform decision-makers and can be customised as the basis for press communications. This system could speed up communication and represents a good practice.

It is important to deal with misinformation. Rumours that appear during a nuclear or radiological accident can be systematically collected and can also be responded by using the same communication channel that published the rumour. As reported in D1.2 in Annex B, eleven out of 26 MS (AT, BE, DK, FI, FR, EL, LV, ML, PL, SE, NL) indicate that they have a mechanism in place that would allow them to systematically collect rumours during an emergency, some MS (CY, DE) have planned to implement the system to collect rumours. In France and Finland, social media is used by the regulatory authorities to gather, respond and follow misinformation and rumours. They have dedicated and trained personnel for this task as presented at the final workshop (Annex F). Most MS (13 out of 26) indicate they routinely attempt to correct erroneous coverage related to emergencies by e.g. explanations, press conferences, interviews, press releases, statements on websites, social media, specific media, calls or letters to editors or press agencies. Also, the H2020 project SHAMISEN-SING research results presented at RICOMET2018[12] proved that new technologies for public service help engage people in radiation protection and preventive health behavior in case of a nuclear emergency (Oughton et al., 2018).

Timeliness of communication in the event of a radiological or nuclear emergency is flexible and depends on the event. When the impact of the emergency for a MS increases, the timing for communication decreases and it can go down to optimal communication within 15-30 min, as is the case in AT, BU, EL, RO, SK and SI, as reported in D1.2 in Annex B. Opposite, to the

[11] NL-Alert is the warning system in the Netherlands through which the government sends a text message to mobile phones and digital departure signs for bus, tram and metro in the immediate vicinity of an emergency.

[12] RICOMET conference: http://ricomet2018.sckcen.be/-/media/Files/Ricomet2018/Presentations/Friday/6_New-technologies-for-public-service-Liudmilla-Liutsko.pdf?la=en&hash=4446F18B2BF384BC15B713CBEC6804789A8B314A (last accessed 20 February 2019).

expected time indicated by authorities, the project reference group members expressed a skepticism in the time within 15-30 min. They agreed that time needed for the first public communication about an emergency is measured in hours. Also, lessons learned from recent nuclear and radiological events in Europe and neighboring countries show, that there is inconsistency between expectations of the authorities and practice (Annex D).

According to the responses analysed in D1.2 in Annex B, twelve out of 26 MS (AT, BG, CY, CZ, DK, DE, IE, IT, LU, PL, SI, SE) indicate they foresee a call centre in the event of an emergency. The time frame to organise the call-centre is relatively short despite the fact that organisational aspects are demanding and available and trained people are rapidly required. Most MS publish public information primarily in their official languages, followed by English. In some MS other languages are used, mainly those of neighbouring countries or the second language most often spoken in the respective MS (minority groups, vulnerable groups or tourists). In Belgium, for instance, a functionality of the call centre was tested during a two days long emergency exercise (Annex F). In addition, non-nuclear emergency experience in Belgium showed, that a call center although planned and foreseen in an emergency response plan, is rather challenging during a real emergency as experienced during a big fire in city centre in Liege or during a storm at a music festival in Belgium (Annex E).

For the case of a nuclear or radiological emergency a specific website that becomes active in the event is developed in ten MS (DK, FI, FR, DE, HU, LU, PL, SK, ES, SE). This site is used to address high information needs during an emergency and can be also used as a back-up of the official, public website of the authorities. Most MS, 18 out of 26 (AT, CY, CZ, DK, FI, FR, DE, EL, IE, IT, LU, ML, PL, RO, SK, SI, SE, NL), have online querying tools which may be used for posting online questions during an emergency. These tools include but are not limited to social media, hotlines and Q&A.

Good practices regarding timely, clear and understandable public information

- Rumours that appear during a nuclear or radiological accident can be systematically collected, as already done in France with “Radarly”, and can also be responded by using the same communication channel that published the rumour.
- In case of a nuclear or radiological emergency, a specific website that becomes active in the event is developed. This site is used to address high information needs during an emergency and can be also used as a back-up of the official, public website of the authorities.
- Call center is planned and tested in advance.

2.2.Transparency requirements

2.2.1. Legal aspects of related to transparency

The revision of Article 8 of the revised Nuclear Safety Directive focuses on increasing the transparency of regulatory authorities and operators of nuclear power plants with their obligation to make necessary information available in relation to the safety of the nuclear installations and its regulation, with specific consideration to local authorities, population and stakeholders in the vicinity of a nuclear installation both in times of normal operation and in the event of incidents and accidents.

All EU MS have a legal basis for the disclosure of information. In most cases, there is a general Freedom of Information Act (FOI) which requires NROs to follow guidance on the way in which information is made available to the public. In addition to special laws, the obligations of the Aarhus Convention on access to information, public participation in decision-making and access to justice in environmental matters (UNEC, 1998) also required disclosure of information. However, practices on proactive disclosure of information may vary a great deal among the MS.

Academic research shows that transparency is likely to occur in situations where all or most of the following conditions exist/have been created: an active civil society, that connects to state actors and/or enters into the governance space; alliances are formed between different reform-minded state and non-state actors, across the branches of government (legislative, executive, and judiciary) and involving associations, citizen movements, civil society organisations, media, academics etc (J. Fox, 2011, p. 29). In other words, stakeholder involvement is key to strengthening transparency.

2.2.2. Implementation of transparency

Results of this study show that, according to the Member States (Annex B), there will be no major changes concerning release of information subsequent to the new BSS Directive and Nuclear Safety Directive given the fact that most MS responded that their national arrangements are already compliant, as reported in Deliverable 1.2 (Annex B). Only three MS (AT, EL, RO) indicate specific changes in relation to the aforementioned aspects regarding the release of information. These aforementioned aspects include laws, codes of practice, guidelines or other requirements for the release of information which apply to the NRO; law/codes/guidelines specifying exemptions or exclusions from public information; requirements/laws on the release of information on request or proactively; laws/requirements on release of information on the industry; laws/requirements on certain format or timeframe for the release of information; agreement in advance concerning the release of information; policy on public information and documents other than media (press) releases; explanations for withholding information; release of information in relation to emergency phase; restriction on time spend responding to enquiries; amount of responses on formal 'disclosure' request, queries to enquiry points, and queries from elected officials; correction of erroneous coverage related to emergencies in own countries or in other Members States or third countries. The identified changes include increase in international cooperation (Austria), changes related to hazard assessment and emergency plans (Greece), and changes in specific requirements regarding public information and communication aspects addressed to the public, authorities and to the licensee (Romania). It is worth to mention, that NTW representatives in the Reference Group project (Annex J), and participants from NTW as well as Greenpeace at the project final workshop expressed higher expectations from the authorities concerning release of information subsequent to the new BSS Directive and Nuclear Safety Directive (Annex F). They expect that authorities will, at least, introduce changes concerning release of information.

Most MS, except HR, EE and LT out of 22 who answered this question, indicate that there are specific laws, codes of practice, guidelines or requirements that apply specifically to their NRO either concerning release of information in general or specifically concerning nuclear or radiological issues/emergencies. Additionally, ten countries (BU, FR, EL, FI, IE, LV, PL, SK, SI, NL) out of 25 indicate that they have specific laws, codes or guidelines that include the regulations for the exemption or exclusion of information. In Germany, this is under review. Concerning the release of information in the event of an emergency, almost all MS (22 out of 24) indicate that they release information proactively rather than on request. Seven countries (CY, DE, HU, IE, RO, SI and NL) indicate that they release both information proactively and on request. Several MS (8 out of 22) indicate that they use a specific format for language as for example the use of simple language. France and Spain referred to the format they use as that of the IAEA (USIE) and the European Union (ECURIE).

Most countries (17 out of 23) indicate that there does not need to be an agreement in advance for the release of information with any other organisation such as the industry or other government agencies. In Ireland, based on the answer to the survey, this is only true for the initial messages sent in the event of an emergency: other messages need to be discussed and agreed upon with other organisations. During the final workshops, some country representatives (HU, DE, IT, SK and SI) indicated that documents for public information related to nuclear emergency have to be agreed in advance with other organizations e.g. industry, other government agencies.

According to the results in D1.2 in Annex B, several countries provide specific guidelines, laws or acts they refer to when providing an explanation to the public on the rationale for what information must be withheld related to an emergency. These include for example: NRO Safety Guides and Recommendation in the Czech Republic, the Act on the Openness of Government Activities in Finland, Protection of Classified information in Slovakia, or the Public Access to information and security Act in Sweden. Some MS have provisions for the disclosure of information within specific timescales during an emergency. However, most MS indicate that there are no restrictions on how much time the NRO should spend to address a specific request for release of information during an emergency. Only two MS, Bulgaria and Poland, report that that there are specific legal-type judgements to balance between the public's right to know and security restrictions in an emergency situation.

Respondents from MS (Annex B) brought forward a variety of challenges associated with transparency during a nuclear or radiological emergency. These challenges include: avoidance of rumours, panic, confusion, and unsettlement; and the provision of reliable and proper information. It is challenging to avoid contradictions, to provide information in a timely manner, to balance the provision of secure information, the handle the amount of information, to ensure that sufficient information is available and to present it in plain language. Furthermore, the responses from MS indicate that it is challenging to keep the balance between: the right of the public to be informed and national regulations on emergency planning; the truth and frightening people; and a desired highest level of transparency on the one side and a reliable and deliberate crisis communication on the other side. These issues have been discussed also at the stakeholder consultation: feedback from NERIS platform members (Annex G), at the round table discussion with regional emergency experts focusing on cross-border arrangements between EU MS in the Benelux area[13], and at the project final workshop (Annex F). For instance, the dilemma on what is public and what is expert information has been presented on the case of Fukushima[14]. Members of the informed civil society (NGO's, journalists, local communities) pointed out that

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[13] https://youtu.be/keC-xkDodZM
[14] http://ricomet2018.sckcen.be/-/media/Files/Ricomet2018/Presentations/Tuesday/Sugawara.pdf?la=en&hash=D5FBBA089277D590C13CC1A00373CDDE3243BCA4

this balance could be achieved with developing respectful relationship and collaboration in the preparedness stage of a nuclear emergency management and including citizens and independent organizations in an emergency response plan (e.g. measurements).

Atomic Reporters, for instance, asked to support journalists covering nuclear news[15] as well as the organization of courses and trainings on reporting from nuclear and radiological emergencies, as the EC and JRC Ispra did for the 2016 Rotterdam Nuclear Security Workshop. The following recommendations were drafted after this workshop by a group of participating representatives of news media for international, national, and local authorities regarding improved communication with the media in the event of a nuclear or radiological emergency:

- Recognizing that in the event of a radiological emergency, where there is risk to public safety from ionizing radiation, governments and journalists share the goal of minimizing harm to the public;

- Recognizing that the availability of factual, reliable, timely information is indispensable to an appropriate public response to prevent avoidable panic and chaos;

- Recognizing that ongoing fragmentation of the contemporary media landscape, including the ascendance of social media networks and the advent of citizen journalism, requires a corresponding multifaceted response;

- Recognizing that tools by which authorities have traditionally communicated with media are insufficient today (for example, press releases may be issued long after journalists have received eyewitness photos and accounts);

- Recognizing that in an emergency, without the most expeditious release of information, citizen journalists untrained in standard codes of practice for news gathering and factual reporting may unwittingly circulate rumours and unverified information;

- Also recognizing that radiological emergency first responders may not have the capacity to give priority to informing journalists as a means of assuring public;

- And further recognizing that despite the need for robust scientific data, its compilation should not hinder the earliest release of basic facts and safety protocols to journalists[16].

Also representatives of citizens scientists at the project final workshop shared a concrete example of citizens performing measurements and its added value for engagement[17]. Rumours, panic, confusion, and unsettlement can be avoided or minimized whereas engagement with decision-makers and awareness and discussion is promoted through citizen science initiatives. Citizen science projects have been developed in all environmental fields and include all types of citizen science actions, from monitoring and occasional reporting to crowd-sourcing, as found out in Bio Innovation Service (2018). Back in the 1980s, Gray and Baratta (1983) already described the citizen radiation monitoring programme after the Three Mile Island accident as a way to involve communities in the measurement, interpretation and dissemination of radiation levels and try to restore public confidence.

The more recent project SAFECAST and its application to the EU MS was presented as a good practice example in the final workshop of this project.[18] The same experience is presented

[15] http://www.atomicreporters.com/
[16] http://www.atomicreporters.com/wp-content/uploads/2016/06/RotterdamJournalistsRecommendations616LR2.pdf
[17] Azby Brown (2018), Good practice from citizen science and engagement during an emergency: the case of SAFECAST in Japan (and Europe); http://ricomet2018.sckcen.be/-/media/Files/Ricomet2018/Presentations/Tuesday/Azby-Brown.pdf?la=en&hash=A5808FC9E7A1C524B5BC718FF777EEDF8876094B (last accessed 20 February 2019).
[18] http://ricomet2018.sckcen.be/-/media/Files/Ricomet2018/Presentations/Tuesday/Azby-

in a scientific article (Brown et al., 2016). The potential of citizen science and monitoring by citizens for improved nuclear and radiological emergency management and recovery was discussed and recommended also at the NERIS workshop in 2018[19] and in several articles and reports. For instance, Richardson and Rickwood (2013) provide evidence of public involvement making a significant contribution to improved safety. Similarly, Coletti et al. (2017) also states that the data of Safecast proves to be reliable and useful for public safety.

As described in D1.2. in Annex B, eight out of 26 MS indicate that they report directly to the parliament on duties concerning transparency related to nuclear emergencies: parliamentary questions (AT, EL, LT), emergency plan (BU) and annual reports (DE, HU, IE, LT, RO and ES). Participants from Germany in the final workshop indicated that in order to ensure transparency, a rationale for what information must be withheld related to an emergency (e.g. aspects of site security plans, threat information, commercial interests, etc) is currently under review. In most MS (15 out of 25) the responsibility and the authority to draft public information documents are shared among different actors and is not limited to NRO. Twelve out of twenty MS monitor and review their regulatory processes related to EP&R to ensure openness and transparency. This review occurs in several manners: internal procedures, internal audits, stakeholder consultation, NRO quality process, feedback, science and technology, experiences. During the final workshop (Annex F) it was reported that at international level, the IAEA organized a workshop in the early 2000s, in which the transparency policies and reports from NROs were commented by a panel of critical stakeholders, like Greenpeace and Friends of the Earth, in order to surface weaknesses and improvements. This type of reviews could be an opportunity to enhance transparency policies in nuclear and radiological emergencies. Similarly, during the final workshop, ASN and IRSN reported as a good practice the fact of inviting critical stakeholders, like NGOs or independent experts, to discuss their reports with management and expert staff or for consultations. For instance, they invited Greenpeace to discuss on security aspects. The case of the round table discussions on the Aarhus Convention with ANCCLI supported by the EC DG Energy is another example of an initiative which attempts to improve transparency in nuclear-related activities.[20]

Finally, as reported in D1.2 in Annex B., seven out of 21 MS indicate that there are committees or governing bodies that are responsible for the oversight of transparency related to emergency preparedness and response e.g. oversight is done by stakeholders (AT), general transparency bodies (HR, FR, ES) or specific governing bodies (CY, FR, LT and ES).

2.2.3. Good practices on transparency in Member States

- Recognising challenges concerning transparency during a nuclear or radiological emergency in advance and developing approaches to deal with these challenges during an emergency.
- Reporting to the parliament on duties concerning transparency related to nuclear emergencies.
- Monitor and review regulatory processes related to emergency preparedness and response

Brown.pdf?la=en&hash=A5808FC9E7A1C524B5BC718FF777EEDF8876094B (last accessed 20 February 2019).

[19] https://eu-neris.net/activities/workshops/dublin-2018.html (last accessed 20 February 2019).

[20] http://www.anccli.org/wp-content/uploads/2014/07/Luxembourg-roundtable-report.pdf (last accessed on 17 December 2018).

to ensure openness and transparency.

- Involve informed civil society and citizen scientists in emergency management, including in conducting independent measurements.
- A committee or governing body for oversight of transparency related to emergency preparedness and response is established and operational.
- In the event of an emergency, it is good practice to release information both proactively and on request, including information related to the industry involved in the emergency.
- Radiation measurements are publicly available on-line on the website of the national authorities and summarized on the EC EURDEP website.

2.3. Communication and stakeholder engagement

2.3.1. Legal aspects related to communication in radiological emergencies

Article 8 of the NSD refers to “communication policy” during normal operating conditions and in case of an emergency, whilst “communication” is used in different articles of the BSS to refer to “communication channels (Annex XII), “communication links” (Art. 88), “reliable communications” (Annex XI) and “rapid” communication (Art. 76)". These cases seem to refer more to information provision than to dialogue. In this context, a distinction could be made between the concepts of:

i) Simple one directional information provision (or transfer of information without expectation, necessity for feedback mechanisms);

ii) Information provision with receipt of feedback from the recipient to ensure the information is properly understood and any instruction complied with;

iii) Limited opportunities for dialogue and exchange such as question and answer sessions between authorities and the public (involving different communication channels);

iv) Multiple interactive opportunities for dialogue between the authorities and the public.

In the context of BSS, it is essential that information provision is effective during an emergency, i.e. that the message is clear enough to be understood and acted upon quickly if necessary and is received by all those affected and likely to be affected. Such an interpretation implies that some means of feedback or assurance should be ensured and therefore, effective information provision may extend to include all of the above (i, ii, iii and iv). However, this may depend on the specific emergency and the cultural, political and societal context and, ultimately, on the way different Member States interpret and actually implement the requirements.

IAEA (2015) EPR Public Communication Plan tend to use the term “public communication” instead of “public information”, while at the same time they refer to documents regarding command and control systems, which use the term "information". IAEA Guidance documents do not answer the question of how these terms should be interpreted in general, it depends on the context and content of the requirements and recommendations. Furthermore, despite the apparent trend to use 'public communication', some recent IAEA documents continue to preferentially use the term public information, e.g the GSR Part 7 Preparedness and Response for a Nuclear or Radiological Emergency (IAEA, 2015). If used, the terms "public information” and “public communication” are to be understood – in the relevant context – mostly as a one-way transfer or communication of information to the public. However, we note that in some instances in IAEA GSR Part 7 the different terms – information to the public and communication with the public - are used. For instance, a comparison can be made between Requirement 10 and Requirement 13 of the IAEA GSR (2015):

Requirement 10: Providing instructions, warnings and relevant information to the public for emergency preparedness and response. The government shall ensure that arrangements are in place to provide the public who are affected or are potentially affected by a nuclear or radiological emergency with information that is necessary for their protection, to warn them promptly and to instruct them on actions to be taken.

Requirement 13: Communicating with the public throughout a nuclear or radiological emergency. The government shall ensure that arrangements are in place for communication with the public throughout a nuclear or radiological emergency.

International guidance could benefit from a clear explanation of these terms so that they can be used consistently and understood unambiguously. Following the recommendations in D1.1 in Annex A, Member States should interpret the term "information to the public" as far as possible as "effective communication" in the sense of exchanging information to ensure a successful transfer of information as a "one, two- multiple way communication with the public" (Annex F). For instance, collecting FAQ, collecting and responding to rumours, engaging with social media, respond on enquires from media etc. is understood as multiple way of communication and is addressed in most documents related to public information published in the last decade (Annex A). This would mean - similarly to the enhanced transparency requirements for license holders of the Nuclear Safety Directive - Member States are required to provide for an "effective communication" with the public prior and in the event of an emergency also on the basis of the BSS and the NSD.

As a recommendation of the reference group members, Member States are strongly encouraged to interpret their public information obligations under the NSD and the BSS Directive in line with the requirements 5.69 to 5.75 of the IAEA General Safety Requirements (GSR) Part 7:

- ✓ To provide useful, timely, true, clear and appropriate information to the public in a nuclear or radiological emergency,
- ✓ to ensure that information [...] is well coordinated and consistent,
- ✓ to provide information [...] in plain und understandable language,
- ✓ to put radiological health hazards into perspective,
- ✓ to explain to the public any changes in the protective actions,
- ✓ to identify and address, to the extent practicable, misconceptions, rumours and incorrect and misleading information [...] and,
- ✓ to respond to enquiries from the public and from news media, both national and international, including enquiries received from or through the IAEA.

The BSS and NSD directives do not explicitly address the need for Member States to develop public communication programmes, strategies or plans in case of an emergency. For the field of indoor radon, a communication plan requested[21]. However, Article 8 of the NSD refers to the need of competent regulatory authorities and licence holders to develop a communication policy framework to inform the workers and general public on normal operating conditions of nuclear installations and in case of incidents and accidents. The BSS Directive mentions a strategy for communication to increase public awareness and inform local decision makers, employers and employees of the risks of radon, as part of the national action plan to address long-term risks from radon exposures.

[21] For the field of indoor radon, the BSS directive requests directly from MS '*Strategy for communication to increase public awareness and inform local decision makers, employers and employees of the risks of radon, including in relation to smoking*'.

2.3.2. Stakeholders and engagement

As reported in D1.1 (Annex A), the BSS Directive requests for existing exposure situations that (in the case emergency, this is after the emergency exposure has been declared ended): “Member States shall provide as appropriate for the involvement of stakeholders in decisions regarding the implementation of strategies for managing exposure situations” art. 102. On the one hand, it is not clear, whether these arrangements should be in place in the preparedness, emergency, transition or recovery phase. On the other hand, involvement of stakeholders and the transition from an emergency exposure situation to an existing exposure situation are two of the elements of an emergency management system under the BSS. However, members of NERIS[22] consulted in this study pointed out that it would be beneficial if these arrangements would be prepared in advance, before an emergency appears (Annex G). In addition, in Article 66 of BSS Directive on estimation of doses to the members of the public, the competent authority is required to make radiation doses also available to stakeholders upon request, while Art. 73 establishes consultation with stakeholders regarding control of exposure in contaminated areas. Finally, Annex XI includes stakeholder involvement into the emergency management systems and emergency response plans as referred to in Articles 69, 97 and 98. Stakeholders are not mentioned in Articles 70, 71 or 99 of the BSS. The term stakeholder is also mentioned in Article 8 of the NSD and refers specifically to "stakeholders in the vicinity of a nuclear installation". More generally, paragraph 23 refers to how cooperation on nuclear safety between the 28 Member States can contribute to transparency and openness towards stakeholders at the European and international level.

At international level, as referred in D1.1. (Annex A) while the term "stakeholder" is neither mentioned in IAEA EPR Public Communication (2015) nor in IAEA GSR Part 7 (2015), IAEA guidance on public communication (2012) highlights their importance without clearly defining the term. The EC H2020 project ENGAGE defines stakeholders as: “actors (individuals or groups, institutional and non-institutional) with a tangible or intangible (yet to be shaped or discerned) interest in the radiation exposure situation and the related radiation protection issues, directly affecting decisions, or affected by the formulation and resolution of a problem or challenge. In this perspective, stakeholders are “constructed” in interaction with actors, issues. In other words, the notion of stakeholder is not fixed, but changes over time. Publics are also (potential) stakeholders”.

NERIS is a key promoter of stakeholder engagement in radiological emergency management, especially in preparedness activities[23] (Annex G). Also results of the EU project PREPARE point out to many benefits of stakeholder engagement in nuclear emergency management including communication (Schneider et al. 2016, Schneider et al. 2017, Perko et al., 2016b; Baudé et al., 2016)[24]. Moreover, in emergency and post-accident preparedness and recovery (EP&R), manifold stakeholder engagement activities supported by EU could be observed throughout the past years, from national or international stakeholder panels and dialogues in research projects addressing emergency preparedness, response and recovery (e.g. CORE, ETHOS, EVATECH, FARMING, EURANOS, NERIS-TP, PREPARE, EAGLE,

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[22] NERIS was consulted for this study at a special workshop organised in Dublin, Ireland in April 2018 and reported in the document “Stakeholder consultation: feedback from NERIS platform members” in Annex G.

[23] https://eu-neris.net/activities/workshops/dublin-2018.html

[24] The PREPARE project coordinator, Wolfgang Raskob, KiT, Germany was one of the Reference Group members of this study.

ENGAGE, CONFIDENCE, SHAMISEN-SING), to activities initiated by NGO's (e.g. the Aarhus roundtables initiated by ANCCLI, NTW) or radiation protection experts (e.g. Villigen OECD CRPPH dialogues, the ICRP Fukushima dialogues), participation in emergency exercises, partnership approaches in the management of nuclear installations, the GMF and many other. In addition, after the accident in Fukushima, citizen-led initiatives have matured and continue to develop (Pölzl-Viol et al., 2018, p 30). An example is the SAFECAST initiative, where among others, European citizens measure radioactivity throughout a Europe and publish results on-line. Such activities provided for a valuable learning process regarding emergency management, on the one hand, as they highlighted the complexity of nuclear accident preparedness, response and recovery, and engagement, on the other hand (e.g. Lazo, 2016[25]) A need to empower and support citizens by citizen science, citizens journalism and informed civil society in nuclear or radiological emergency preparedness, response and recovery has been expressed by experts (Annex G and at the round table discussion[26]), NGO's and informed civil society (Annex F).

To engage with stakeholders, as shown in D1.2 (Annex B), most Member States use formal consultations (n=17), then public meetings by local authorities (n=16), written inquiry points (emails, letters…) (n=15) and telephone enquiry points (n=15), communication campaign material (n=13) and public meetings hosted by others (n=13), public meetings hosted by NRO (n=12), public meetings hosted by nuclear or radiological installations (n=12), local information committees (n=11), regional information committees (n=11) and experiences of public participation in emergency exercises (n=11), then informal or drop-in meetings in the vicinity of the site (n=9) or blogs (n=1). Besides these engagement methods, several interactive online tools are applied including twitter, a dedicated page on the NRO website, Facebook, SMS, other software or apps or other online tools. As mentioned above, STUK in Finland supports an in-house communication culture that encourages all employees to engage in dialogues with stakeholders via different tools, like social media[27]. This way, they reinforce the institutional message, allowing people to have a more personal perspective and thus, moving from "institutional trust to peer trust" (Annex F).

Examples of the way citizens may be engaged, discuss or participate in communication aspects related to preparedness plans for nuclear emergencies is through their involvement in drills (e.g. in Almaraz, Spain, during a Curiex exercise in 2013), municipal meetings, meetings of Local Information Commissions in France or meetings of the local partnerships in Belgium. Particularly, in the case of Belgium, the local partnership STORA, which includes representatives of local politicians, businesses, representatives of local associations, etc, follows up all nuclear activities in the municipality. The STORA representative in the Reference Group of this project provided the example of how STORA is involved in communication aspects related to preparedness of nuclear or radiological emergencies. STORA organised an enquiry in 2017 to assess the level of knowledge of local population regarding safety measures. Around 30% of the almost 500 interviewees could not name a single emergency measure on what to do in case of a nuclear emergency, and rest of the respondents were able to mention at least one emergency measure. STORA launched a campaign for the people from the municipalities of Dessel and Mol to reinforce at the local level a national campaign (http://www.nucleairrisico.be/) launched in

[25] Edward Lazo (OECD/NEA) was one of the Reference Group members in this study.
[26] https://youtu.be/keC-xkDodZM
[27] http://ricomet2018.sckcen.be/-/media/Files/Ricomet2018/Presentations/Monday/7_Kaisa-Good-practice-from-Finland.pdf?la=en&hash=4461E43A2BEE4E58593CA2918F98546A1F3764CE(last accessed 20 December 2018).

March 2018 to inform the Belgian population on nuclear risks and safety measures (Geert Lauwen[28], email communication, 20 April 2018). In this case, the local campaign enabled residents to make an informed decision in case of a radiological emergency in their local community. At national level, an example was provided during the final workshop of this project by a representative from Slovakia. The regulatory authority in Slovakia developed a calendar with simple emergency activities to be undertaken by the public, such as checking the availability of iodine tablets, with the aim to increase awareness on emergency protective actions (Annex F).

Examples were provided during the final workshop of two national initiatives aimed to engage stakeholders in the policy-making process and which can be considered as good practices. In the UK, Sciencewise is a public engagement programme which enables policy makers to develop socially informed policy based on deliberative public dialogue, with a particular emphasis on science and technology, including risks and emergencies. In France, CODIRPA is the Steering committee for the management of the post-accident phase of a nuclear accident or a radiological emergency which was formed by the NRO in 2005. It involves a pluralistic group of stakeholders in charge of elaborating policy elements to prepare and implement the necessary steps to address post-accident situations. They pay a lot of attention to stakeholder involvement in decision-making and transparency of information (Annex F).

Members of the Reference Group of this project and participants in the final workshop claimed that there is no interaction between EU research activities in the field of communication in nuclear emergencies and the practical arrangement (Annex F). Although most organisations know how to prepare to communicate in nuclear or radiological emergencies, they hardly do it. Communicators can be supported by research results through the collaboration between authorities, practitioners and scientists. For example, the RICOMET[29] conference held annually since the last four years provide a great opportunity for communicators to be aware of research results from European and international projects in the area of ionising radiation. A recommendation coming out of this project is to encourage the European Commission and Member States to make effective use of the published research results in the field.

2.3.3. Communication plan or strategy for radiological emergencies

The new BSS Directive requests from MS to have “clear allocation of the responsibilities of persons and organisations having a role in preparedness and response arrangements” and “public information arrangements” in their emergency management systems (Annex XI, (A.2. and A.8.). According to the responses shown in D1.2 in Annex B, at least twenty-six EU MS include aspects of communication with the public in their respective Emergency Preparedness and Response plans (two MS did not respond to the questionnaire). These aspects can be included as part of a general public information strategy (i.e. not in a specific public information or communication strategy for radiological or nuclear emergencies), in the annex of general National Disaster Plans, as specific arrangements for crisis situations, in Emergency Preparedness and Response plans, or in a specific act (e.g. Strategy for informing the public and media in a radiological emergency). In the case of Ireland, it was reported in during the NERIS stakeholder consultation as part of this study (Annex G), that there is a national plan -all hazards- which considers engagement with the affected public, beyond the requirements of the

[28] Representative of STORA, Geert Lauwen was a member of the Reference Group of this project.
[29] http://ricomet2018.sckcen.be/; http://ricomet2017.sckcen.be/, http://ricomet2016.sckcen.be/, http://ricomet2015.sckcen.be/ : accessed 20th of Sept. 2018

BSS Directive. Finally, based on D1.2, in Annex B in 13 out of 26 MS, the strategies for public information or communication are reviewed and improved on regular time intervals, mostly once a year or at least, once in five years. On the contrary, experts from the NERIS platform (Annex G), project reference group members (Annex J) and NTW and some NGOs representatives (Annex F) expressed skepticism on the level of communication aspects included in EP&R plans and its sufficiency. The position of the communication cell on the organisational chart varies considerably among MS, as do the organisational charts themselves (Annex B). In most MS the communication cell is in direct contact with the decision makers, in three MS (AT, CZ and LU), the cell is located in the crisis centre while in some other MS (DE and EE) the organisational chart is currently under review. In almost all MS at least one communication officer is present in the incident command centre during an emergency. The number ranges from one as a minimum to eleven as maximum. Public communication experts participating at the final workshop agreed that the quality of communication correlates with the number of communication officers (Annex F). Also report D2.2 on lessons learned from recent nuclear or radiological events (Annex D) shows that the lack of public communication officers may cause a caveat to an emergency response. The same lesson is reported also from non-nuclear hazard industries (Annex E).

As reported in D1.2. in Annex B, nine out of 26 MS that responded to the survey do not have a central person in charge for public information at the level of a director. Instead, they have dispersed responsibility for public information through authorities and governmental bodies. If public information is centralised, the directors of the public information office of Nuclear Regulatory Organisations are mainly public relations and communication specialists or ex-journalists. Personnel responsible for public information in most of the MS regularly participate at educational and networking activities organised at the international level, most often by the International Atomic Energy Agency (IAEA).

2.3.4. Good practices on stakeholder engagement

- Communication strategy for nuclear or radiological emergency is designed, evaluated and adjusted in order to respond to emergency challenges and public information needs in case of an emergency.
- The communication cell is in direct contact with the decision-makers on emergencies and the communication officer or liaison are present in the incident command centre during an emergency.
- The nuclear safety authority established a specific position or function in the organization with responsibility for public information and communication both during the preparedness stage and in case of a nuclear or radiological emergency.
- Citizen science initiatives for radiation measurements are encouraged as useful communication and engagement tools between experts, policy-makers and the public.

2.4. Cross-border collaboration

2.4.1. Legal aspects related to cooperation with Member States

The new provisions in Articles 97 to 99 of the Directive 2013/59/Euratom have been substantially enhanced compared to the provisions in Article 50 of Directive 96/29/EURATOM concerning cooperation and information exchange between Member States. Not only the cooperation with Member States and third countries has become mandatory; but also, the obligation to "promptly establish contact with all other Member States and with third countries which may be involved or are likely to be affected with a view to sharing the assessment of the exposure situation and coordinating protective measures and public information by using, as appropriate, bilateral or international information exchange and coordination systems" is new. This new paragraph 2 of Article 99 of the BSS Directive shows that current international guidance has gradually been taken up. Some Member States may have to include new national implementing measures, if not yet in place, to transpose this obligation.

2.4.2. Collaboration between countries

According to the data analysed from the survey sent to NROs and reported in D1.2 in Annex B, 13 out of 24 MS (AT, EE, DE, EL, IE, LV, LT, PL, RO, SI, ES, SE, NL) indicate they collaborate with public information officers from other countries involved in emergency management. Collaboration occurs either directly or indirectly e.g. e-mail exchange, bilateral meetings, working group, regional exercises, etc. Several countries also indicate that they have planned to either set up collaboration or expand upon existing collaborative practices with other MS. The Nordic public communication group (FI, SE, NO, DK and IS) meets regularly and exchanges information on issues which may cause concern. On the contrary, six countries out of 24 (HR, HU, IT, LU, MT, SK) indicate that they do not have specific arrangements in place to collaborate with public information officers from other countries indicating room for improvement in the cross-border collaboration involving emergency management.

It is worth referring here to the Common "HERCA-WENRA[30] approach for better corss-border coordination of protective actions during the early phase of a nuclear accident". This approach relied on the following principles: shared understanding, coordination and mutual trust between neighbouring countries or territories. The HERCA-WENRA approach is divided into three steps with different aims:

- preparedness stage: to achieve and maintain a shared understanding of the existing national emergency arrangements by developing or improving already existing bilateral and multilateral arrangements, to test these arrangements and implement improvements;
- early phase: rapid information exchange through existing bilateral and international arrangements;
- later phase: a common situation report will further support coordinated protective actions.

During the round table discussion on cross-border arrangements held in April 2018 as part of this study[31], the participants recognized that the HERCA-WENRA guidance for bilateral arrangements is one of possible good practices. It improves exchange of information among countries which may be affected by a nuclear accident. Although it is not a guarantee for success, it is a starting point. It may allow countries to send out the same message despite the massive problems with language.

As reported in D1.2 in Annex B., most Member States, 19 out of 22, indicate that they will not publish public information in the official language of neighbouring countries in the event of an emergency. FI, IE and PL publish information in the official language of neighbouring countries.

[30] HERCA is the association of Heads of the European Radiological protection Competent Authorities and WENRA is the Western European Nuclear Regulators Association. At the joint meeting in Stockholm on 21 October 2014, they agreed on a common / integrated approach to further improve the response and cross-border coordination for all types of possible accident scenarios.

[31] https://youtu.be/keC-xkDodZM

During the round table discussion with regional emergency experts (report on round table discussion with regional emergency experts focusing on cross-border arrangements between EU MS in the Benelux area31, participants claimed that a good practice is that public information in the event of emergency is published also in other than national language, preferably also in languages of neighbouring countries. It was claimed that in Germany, the decisions on emergencies are published in German, English and French. Furthermore, messages are translated in-house as it helps to ensure that the message conveyed is the correct one. In some cases, like in France and Luxembourg, professional translation tools or embassies are used to publish swift information in other languages. In Luxembourg, different embassies contacted the NRO to ask to receive the press releases regarding emergencies in order to translate them themselves before they are made public. Specifically, in France, information is published at least in English to fasten the communication at European level. Due to language barriers TRADOS, a professional translator used by the IAEA, is also used by NROs and TSOs for swift scientific and technical translations. Also, in some cases, like in Luxembourg, France, Germany and Slovenia-Croatia, agreement is sought with neighbouring countries on predefined statements and press releases during peaceful times.

In case countries do publish in another language than their own, the following languages are mentioned: English (AT, EE, FR, IT, LV, LT, MT, RO, SK, SI, ES and SE), Russian (EE) and Swedish (FI). Almost all countries, 22 out of 26, except HR, EE, EL and LU, indicate they would refer to the website of the NRO (or crisis centre) of the MS in which the emergency takes place. Several countries,19 out of 24, indicate that they will publish information in the official language of third countries in the event of an emergency.

Most countries, 21 out of 26, indicate that their communication personnel are included in regional exercises. The regularity by which they are included varies from not so often to about ten times a year.

2.4.3. Good practices on cross-border collaboration in Member States

Good practices regarding cross-border collaboration between countries

- Communication personnel is included in cross-border and regional exercises.
- Information on the emergency is published in English and in the official languages of neighbouring countries.
- Public information officers collaborate cross-border with officers from other countries either via email or through more formal ways of communication (e.g. working group, regular meetings).

2.5. Public opinion – survey in Belgium

Public opinion about nuclear emergencies potentially occurring has been investigated by a large-scale public opinion survey with a random-route sample (n=1083) that is representative for the Belgian adults (18+) with respect to province, region, level of urbanisation, gender, age and professionally active status. Different questions related to radiological emergency topic were included in the SCK•CEN Barometer survey (Turcanu et al. 2018) in order to investigate in-depth citizens' views, opinions, needs and expectations related to communication before and during a nuclear or radiological emergency. Deliverable D1.3 in Annex C reports the results in detail. In addition, representatives of municipalities with nuclear installations in six countries were asked similar questions related to nuclear emergencies as the general population in Belgium (Annex I).

2.5.1. Public concerns related to radiological risks

Environmental pollution and potential misuse of nuclear technologies are the highest ("very high" or "high") perceived risks among the risks investigated (radiological and chemical risks). A majority of the respondents expresses concern regarding the vulnerability of nuclear installations to terrorism.

2.5.2. Confidence in authorities

One in two respondents consider personal risks from an accident in a nuclear installation as high or very high. However, the confidence in authorities as regards protective actions taken against radiological risks is also among the highest, with one in three citizens (32%) having a high or very high level of confidence in authorities. This suggests that authorities can build high trust from the citizens, by communicating proactively and responding to people's concerns, for instance by regular public information campaigns related to nuclear emergencies as carried out in Belgium.

2.5.3. Opinions concerning management of nuclear installations

Opinions concerning the safe management of nuclear installations are divergent. For instance, 31% of the surveyed population considers that there is sufficient control on nuclear installations, while 40% are of the opposite opinion. In Belgium, the survey followed a series of incidents at nuclear installations, for instance micro-cracks in some installations and sabotage in one unit. This result accentuates the need for transparent communication about the management of nuclear installations, including the related challenges.

2.5.4. Trust in communicators about nuclear technologies

The most trusted communicators about risks and benefits of nuclear technologies are scientists from universities, medical doctors and environmental organisations. In terms of technical competence, scientists from universities and medical doctors enjoy the trust from the highest numbers of respondents. A good practice in nuclear emergency communication for nuclear safety authorities is thus to engage with actors already in preparedness related activities.

2.5.5. Trust in emergency management actors

Rescue services and scientists from universities enjoy high trust related to information concerning protective actions in case of a nuclear accident from more than half of the population; a high number of respondents also express their trust in the Federal Crisis Centre, the Red Cross and medical doctors. A good practice is to integrate first respondents and humanitarian organisations in the nuclear emergency communication chain, including exercises and emergency plans. Media and politicians are distrusted by more than half of the Belgian population, while local authorities enjoy a rather high level of trust from 20% of the population. Safety authorities are trusted but not very well known; therefore, a good practice is to communicate who they are and what they do on a continuous basis.

2.5.6. Potentially affected population

70% of people in Belgium acknowledge that they live closer than 50 km to the nearest nuclear installation. This implies that they would feel affected in case of an accident and constitute a target for communication about emergency preparedness. Relatively few respondents (21%) feel well informed about what to do in case of a nuclear accident and a majority (75%) say they do not know enough to judge the efficiency of protective actions (such as for instance sheltering or intake of iodine tablets). A large majority (87%) are of the opinion that the authorities should do more to inform the population in advance about protective actions that can be taken in the event of a nuclear accident. A good practice is thus to carry out regularly surveys assessing the needs for and satisfaction with information about emergency preparedness, to carry out regular information campaigns addressing the needs of specific groups, to assess the impact of information campaigns, and to make available on a permanent basis (e.g. website) information about protective actions.

2.5.7. Awareness of protective measurements

In general, there is low awareness related to the intake of iodine tablets - specifically the right time when iodine tablets should be taken, with half of the respondents believing that iodine tablets should be taken immediately after a nuclear alert. A good practice is thus to address in communication campaigns the use and purpose of these tablets and the needs of specific population groups. In addition, knowledge about ionizing radiation is rather low: e.g. every second person in Belgium thinks that exposure to radiation always lead to radioactive contamination and one in four does not know about the natural radioactivity in the human body. Such aspects should receive more attention in education curricula in schools and should be included in the public information campaigns.

2.5.8. Preferred communication channels between families and friends

The preferred channel for personal communication between family members and friends during a nuclear emergency would be the mobile phone, although the use of mobile phones is discouraged by authorities in case of an emergency. This shows that several information tools or channels have to be used, including prior information concerning family reunions.

Good practices from the public opinion case study in Belgium

- A good practice in nuclear emergency communication for nuclear safety authorities is to engage with the different actors involved already in the preparedness stage.
- NROs conduct regularly surveys assessing the needs for and satisfaction with information about emergency preparedness;
- NROs carry out regular information campaigns addressing the needs of specific groups regarding ionizing radiation and nuclear or radiological emergencies and assess the impact of these information campaigns. The use and purpose of iodine tables as well as the needs of specific population groups is addressed in these communication campaigns.
- NROs make available on a permanent basis (e.g. website) information about protective actions.
- NROs communicate on a continuous basis who they are and what they do.
- Ionising radiation is part of the education curricula in schools.

3. Lessons learned from radiological and non-radiological events

This section presents a summary of the findings related to the lessons learned from recent radiological events and from non-radiological emergencies with regards to public information, and transparency. Good practices which may be useful input for development of possible policies or/and actions by the European Commission and Member States are highlighted in section 3.1.7.

3.1. Lessons learned from recent radiological events

Although significant radiological emergencies have a low frequency, their potential high consequences[32] make it essential to learn from previous experiences, including what worked well and what did not in the field of communication. For this reason, Deliverable 2.1. in Annex D of the present study reviewed experiences from nuclear and radiological events in Europe and neighbouring countries to assess how communication was managed, how traditional and social media reported the accident and the lessons learned in the following cases:

- alarm in Europe because of the unusual event at the NPP Krško, Slovenia, on 4 June 2008;
- 137Cesium event in a laboratory in Finland (2016);
- event in November 2007 in Ascó I NPP (Spain) originated the release of significant amounts of radioactive particles with activated corrosion product isotopes;
- accidental release of radioactive iodine from a facility producing radioisotopes for medical use, located in Fleurus, Belgium in 2008;
- discharge stack and uranium leak in the Socatri plant, ensuring treatments of nuclear effluents coming from the Areva facilities in the Tricastin nuclear site (France), 2008;
- detection of radioactive iodine-131 at trace levels across Europe (2017);
- detection of a radioactive cloud in Europe with level of Ruthenium-106 up to almost 1,000 times the normal amount (2017).

The cases above were chosen because they represent the most significant radiological and nuclear events (incidents and accidents) which have occurred in Europe in the last ten years. They also represent events where different INES ratings were used to communicate the safety significance of the nuclear or radiological event to the public. The events clearly reveal challenges regarding radiological emergency communication in the new media landscape including broad use of social media by directly or indirectly affected population. Lessons from these cases can be learned and good practices highlighted in order to strengthen the response of responsible organisations facing the requirements to provide the public with timely, transparent and clear information in any nuclear or radiological event, including events that are

[32] Risk perception of nuclear and radiological emergencies have the following characteristics: catastrophic potential, delayed effect, effect on children, risk is uncontrollable, consequences are not fairly distributed, it is not voluntaristic, is result of tempering with nature, risks are unknown and is strongly feared. (Fischhoff et al., 1978; Slovic, 1996; Sjöberg, 2000; Perko, 2014; Perko et al., 2014)

of public interest but they do not present any radiological or health related risks. A summary of the main lessons learned from these cases is provided below.

3.1.1. Unusual Event at the NPP Krško, Slovenia, on 4th of June 2008 (INES 0)

On June 4, 2008, a minor nuclear event occurred at the NPP Krško in Slovenia. The event was classified as “unusual” but did not require any protective measures outside the plant. There were no releases of radioactivity to the environment (European Commission, 2008). However, as the full circumstances of the event were not known at the outset of the event, the Slovenian Nuclear Safety Authority (SNSA) decided to partially activate its emergency organization and to initiate international communications by informing the EC, the IAEA and the neighbouring countries. The ECURIE system was used for the first time outside the exercise framework, and therefore gave rise to unprecedented media and political attention throughout Europe. Aside from the previously mentioned points, communication mistakes were made. When SNSA reported the event to the neighbouring states and IAEA, they forgot to cross out the word “exercise” on the form. The mistake was corrected by telephone in a couple of minutes. When the SNSA reported the event to ECURIE they inappropriately used the word LOCA (loss of coolant accident) which is a much worse accident than leakage from the primary circuit. This mistake was also corrected by telephone in 17 minutes. The event was later classified as level zero on the INES scale.

The analysis revealed that despite a transparent communication policy by the affected country and low level of emergency, this event triggered a high intensity level of media coverage. The results showed that the frequency of the media articles was higher in the countries where nuclear energy was in the public agenda. The states where the future of nuclear energy was under the political discussion (e.g. a planned referendum in Italy and a strong opposition from environmental organisations in Germany) reported even more than Slovenia. Thus, public and media attention to this nuclear emergency strongly depended on the political discussion about nuclear energy in the country reporting about the event. Furthermore, media reports often included messages with negative connotation. Even if the event had no safety significance, the media linked the event with the nuclear accident at Chernobyl and used emotion triggering words such as panic and danger. Thus, the use of media reports as secondary resources may multiply the publication of misunderstanding, misinterpretation or specific interests contained in the original source.

Important differences as regards the information sources were noticed between different country groups. In Slovenia, the most frequently referred source of information was the nuclear safety authority. In the neighbouring countries decision makers (politicians) were the most important information source. In more distant countries media mostly took over other media reports. Overall, secondary media were an important source of information.

The safety and the risk aspects were the main focal point in the media reports for all country groups. In Slovenia however, the international reaction on this event received almost equal attention.

Lessons learned from the Krško emergency event, Slovenia

- Communicating immediately in English allows the NRO to reach out to international newswires and correspondents identified at the preparedness stage to ensure that international media use the primary source.

- The communication of no safety significant events allows to build institutional trust in public institutions at critical moments.
- Templates need to be used very carefully as they might lead to some negligence.
- There is a high media pressure on nuclear emergency authorities to take a side related to nuclear energy during an emergency. Emergency communication during the acute phase should not be used for political messages.

3.1.2. Cs-137 contamination at STUK's premises, Finland on 7th of March 2016 (INES 1)

On March 7, 2016, abnormally high airborne Cs-137 concentration was detected in laboratory measurements from a filter collected three days before by an air sampler located at the roof of Finnish Radiation and Nuclear Safety Authority (STUK). Concentration was three orders of magnitude higher than the normal range of concentration. Based on analysis of filters from other air samplers, no abnormal amounts of Cs-137 were found and the experts from STUK concluded that the source of cesium was in Helsinki. Samples from air ventilation system of STUK's premises revealed that cesium was released from the same building where STUK is located.

The source had been used in a factory in Finland for level gauging and was delivered to POSIVA, the radioactive waste management company, as radioactive waste. When the gauge was received by the company, one member of the staff tried to open the source shield in order to remove the actual cesium source for disposal. During the handling of the source, contamination was released into the room where the gauge was handled and also to adjacent rooms and air exhaust ventilation ducts. The detection of cesium occurred four days after the source had been opened due to the time spent in the collection, processing and measurement in the air sampler used in the detection.

Decontamination was conducted in STUK's premises and all persons involved in decontamination or who had been in the garage before contamination was detected, were monitored by whole body counting. Results showed that nobody had been contaminated.

STUK's announcement of finding the point of origin of the radiation in the same building started a discussion in the agencies' websites and in social media. There was a great media interest in Finland and Sweden. International media also reported about the incident extensively. The case evolved from high public attention on the event to increasing public trust in STUK.

Lessons learned from the Cs-137 contamination event in Finland

- Publish all public information also in English.
- Depending on the context, it might be better to communicate first on social media because it is faster before focusing on traditional media. This way, rumours of lack of transparency in releasing information may be avoided.
- Issue a concise mass media statement immediately, even if the information is not complete.
- Use the public attention of the event to explain the role and tasks of the NRO and basic

radiological concepts.

- Communicate timely and openly also about non-significant emergency events.
- Carefully select keywords used for labelling the emergency: event, incident, accident (use graded approach) and avoid referring to previous radiological and nuclear accidents or incidents.

3.1.3. Release of radioactive particles at Ascó I Nuclear Power Plant in Spain in November 2007 (INES 2)

On 14 March 2008, radioactive pollution was detected outside the Ascó nuclear power plant in Tarragona (Spain). The release of radioactive particles with activated corrosion product isotopes occurred on 26 November 2007 at the Unit 1 reactor, during routine activation of the ventilation system. The radiological checks carried out on a weekly basis did not detect the leak until four months later. The council operating the plant later estimated that a maximum of 84.95 million becquerels of radioactivity were spilled. The management of the plant took 19 days to notify the Nuclear Safety Council (CSN) that radioactive particles had been detected, despite the fact that they are required by law to do so immediately. An investigation was opened. CSN changed the classification of the leak, initially from level 1, and rated the incident at level 2 on the INES because of the "inadequate control of radioactive material and providing incomplete and deficient information to the controlling body" (CSN, 2008b). The radiological impact was not considered significant and the doses for workers below the legal limits. The company conducted radiological reviews of all persons exposed from 28 November until April (around 2,700 persons, including workers and visitors) through the wholebody radiological counter. No person was found contaminated. The event was investigated and the conclusion was that the release of hot particles to the atmosphere started on November 29th 2007, when the ventilation system was switched from filtered mode to normal mode. As a consequence, particles were dragged out through the stack and then dispersed via the stack to the roof of Unit I buildings.

Lessons learned from the Ascó I Nuclear Power Plant event in Spain

- Establishing mechanisms for engaging in dialogue around risk communication, such as focus groups or advisory boards, can be effective in increasing trust between the nuclear power plant and stakeholders.
- Honest, timely and consistent information can be provided and regularly updated by trusted sources.
- Regular training in crisis communication is essential for helping communicators avoid mistakes that could be detrimental when responding to a crisis.

3.1.4. Release of ^{131}I from a facility producing radioisotopes for medical use in August 22nd 2008, Fleurus, Belgium (INES 3)

On 25 August 2008, the International Institute for Radioelements (IRE), which produces radionuclides for nuclear medicine, informed the Federal agency of nuclear control (FANC) in Belgium of an abnormal release of iodine 131 by the chimney of the building to the environment. This release occurred following a transfer of liquid effluents between tanks. The first conservative assessments of the radiological consequences did not require taking direct protective actions for the population. However, the estimated iodine-131 deposits could locally reach or exceed the derived reference levels for the contamination of milk and leafy vegetables. For this reason, and because there was a threat of a further release, the federal emergency plan was activated on 28 August and the population potentially concerned was recommended to avoid consumption of locally produced fruits, vegetables and fresh milk. The incident was classified at level 3 on the INES scale. These protective actions were lifted on 7 September and the emergency plan was lifted on 12 September.

Lessons learned from the Fleurus emergency in Belgium

- Communication with the affected population during contamination measurements and/or decontamination should be done by native speakers, who can also target communication to different audiences (e.g. children, pregnant women, teachers and general public).
- Collect Frequently Asked Questions on a regular basis and distribute answers to all organisations and actors involved in emergency management.
- Include communication aspects in nuclear emergency exercises on a regular basis.
- Keeping first responders and measurement teams informed about the overall key messages and communication strategy followed by the public communication team is of outmost importance in order to get clear instructions on how and what to communicate.

3.1.5. Successive emergency events at the Tricastin nuclear site, July-September 2008, France (INES 1)

The night of the 7th July/8th July 2008, employees of Tricastin, the Socatri (Areva subsidiary) operated waste treatment and uranium recovery facility, noticed overflowing of a storage tank containing uranium effluents. In September 2008, the measurement results identified the presence of a former uranium contamination within Tricastin groundwater not directly linked with the Socatri incident. Although different stakeholders were involved in decision-making, the local populations became more skeptical about official information related to the Tricastin situation and lost confidence on experts and decision-makers. Other emergency events in two months contributed to a decrease of public trust and an increase of public concerns. A Pluralistic committee with representatives of local departments, regional health agency, members of local information commissions and NGOs, was established at Tricastin in order to engage different stakeholders in the emergency issue.

Lessons learned from the Tricastin nuclear event

- Establishment of a pluralistic committee involving the company, the technical support organization, the local communities, NGOs, institutional representatives, etc to discuss and improve communication in emergency and post-emergency management.

- Involve a wide range of expertise in the public information cell (technical, legal, communication, etc) to enable them to be involved in communication any time.
- Conduct regular training and exercises for spokespeople before an emergency.

3.1.6. Non-emergency events: very low concentrations of iodine-131 in air and increased levels of the radioactive isotope Ruthenium 106 detected in Russia and Europe in 2017

Iodine 131 was detected at trace levels in the ground level atmosphere in different European countries in January 2017. According to press releases of nuclear regulatory authorities in Finland, Norway or Czech Republic and IRSN in France, among others, the levels raised no health concerns. However, the origin of the released I-131 was unknown, which led to speculation that it could come from Eastern Europe. Although there were public demands for answers, no organisation claimed responsibility.

The same year, in late September and October 2017, Ru-106 was detected throughout the northern hemisphere by national environmental radioactivity monitoring networks in EU countries and by the International Monitoring System. Nuclear safety authorities in Europe and EU experts agreed that low concentrations of Ru-106 Ru-103 in Europe do not present any health risk to European citizens. However, they expressed concerns for the population living in the vicinity of the release. IRSN in France pointed out that the detected Ru-106 was likely to come from an area between the Volga and the Urals (IRSN, 2017), which was denied by the Mayak complex in the southern Urals. Nuclear safety authorities in Europe issued press releases with confirmation of the increased concentration of Ru-106 in the atmosphere based on their national measurements and in collaboration with other EU laboratories. The event was mostly framed as small quantities with no environmental and no health consequences expected.

Lessons learned from the I-131 and Ru-106 cases

- To communicate radiological events occurring beyond the national borders, even if they do not involve health or environmental impacts, as it will allow the nuclear safety authority to lead communication in case of future rumours and/or excessive media coverage and might help to increase recognition and build trust;
- Respond to misinformation by using the communication channel where the misinformation appeared. Thus, nuclear safety authorities should be better prepared to deal with unofficial sources of information in case of emergency.

3.1.7. General conclusions from lessons (to be) learned and good practices

In the cases analysed, the level of INES did not seem to make a difference regarding the need for an open and transparent communication of the event from the beginning. It seems clear though that the INES rating proves more effective if lower levels of the scale are also communicated (like events of level 1 or below). However, the extent to which the INES rating helps in effective communication with the public needs further research. From previous research projects, it has been shown that if the INES is used as a comparison criterion or reference with other radiological or nuclear emergencies, supplement with animated graphics, multimedia and links to updates from other websites is useful.

The different cases analysed point out at some contradictions or dilemmas faced in crisis communication. For instance, whilst in the event of Cs-137 contamination, STUK considered it is very important to provide information fast, even if this is not verified and exhaustive, in other cases, like in the Slovenian Krsko nuclear power plant, the transparency policy and mistakes made in the communication led to losing trust from media and the public. The very special nature of crisis communication, where information should be provided as quickly as possible in an honest manner, should be prepared in advance through regular emergency drills and communication training exercises. Generalising good practices in specific settings may run the risk to underestimate the challenges involved in crisis communication. However, it is still possible to point out some good practices which may be applicable to different contexts:

- Establishing some kind of local pluralistic committee, like in the case of Tricastin in France, in the aftermath of the event, can be a good way to assess the situation and improve communication for future events in a participatory manner;

- Providing reliable and consistent information without delay as soon as possible may help to avoid speculation and rumours as in the case of Krsko, Slovenia. Technical questions from the public are not the most challenging for public communication. The most challenging is to explain and justify a delay in communication. This delay in information may be the reason for the lack of trust and transparency. So, there is a need to communicate timely, even if related to an insignificant event;

- Systematic training and emergency exercises involving communication departments, local stakeholders and journalists is an effective means to validate and assure specific communication plans in the event of an emergency, as it was done after the Fleurus case in Belgium;

- Publishing all information regarding a nuclear or radiological emergency in English, even if there might be grammar or language mistakes, like in the case of Cs-137 contamination in Finland, is helpful to ensure access to information to different audiences;

- Combining the use of traditional media and social media helps to reach out a wider spectrum of the population, as it is done by STUK in Finland. Any incident related to radiological issues might be used as an opportunity to communicate on radiological emergencies and raise awareness on ionizing radiation among the general public. Even if a radiological event does not have any health or environmental impact in Europe, European citizens may have concerns and even some may be directly impacted e.g. workers, tourists, etc and may request information. For this reason, a proactive approach in communication is reasonable, even if the radiological impact is negligible, to increase the level of transparency of nuclear and radiological activities and build trust. It is also advisable for nuclear safety authorities to harmonize an official response, sharing and verifying information, like in the case of an increase Ruthenium or Iodine in Europe.

Good practices

- Communicate as soon as possible about significant or insignificant events;
- Establish a pluralistic committee involving the company, the technical support organization, local communities, NGOs and institutional representatives to discuss and improve communication in emergency and post-emergency management.
- Involve a wide range of expertise in the public information cell (technical, legal, communication) to enable them to be involved in communication any time.
- Systematic training and emergency exercises involving communication department, local stakeholders and journalists.

3.1.8. General conclusions European projects addressing communication in nuclear or radiological emergencies

Different European projects in the 7th European Framework Programme (i.e. EAGLE, PREPARE) and Horizon 2020 (i.e. CONCERT, OPERRA) have also analysed communication in nuclear or radiological emergencies and point out lessons learned for improving public communication and transparency in emergency management. The following Box summarises some of the lessons learned from these projects.

Lessons learned from European projects

Research in nuclear emergency communication

- governmental stakeholders need to support responsible research related to emergency management, which implies giving due attention to social and ethical issues in the research and practice of communicating about nuclear and radiological emergencies.
- in the new era of citizen science, nuclear emergency communicators should support citizen engagement and create opportunities for people to monitor radioactivity with the help of scientists.

Role of journalists in emergency communication

- Involvement of communication aspects in nuclear emergency exercises, for instance students of journalism are highly recommended.

Mass media

- Establish relationships among the information sources long before the emergency also by using social networks.
- Nuclear emergency communicators should keep track of all the parties that might be interested in the nuclear emergency and to correct any incorrect information or add information that is incomplete.

Type of information in emergency communication

- It is also important to communicate contextual information such as evacuation plans, stress tests results, similar NPP, basic knowledge (e.g. difference between contamination and irradiation) not only radiological risks.
- Nuclear emergency communicators need to learn how to communicate uncertainty to the people.

3.2. Lessons learned from non-radiological emergencies

In order to identify lessons learned and good practices from non-radiological emergencies, this study reviewed practices of public information and communication from non-nuclear and non-radiological emergencies in Europe by examining existing documents and scientific literature (document analysis). The documents analysed include newspaper articles, social media posts, scientific articles, conference presentations, proceedings, emergency reports, log-books of emergencies, etc. The study reported in D2.2. in Annex E provides a snapshot of different historical severe chemical accidents and related communication challenges with their consequences. This snapshot comprises the following accidents: mercury poisoning (Iraq, 1971); release of cyclohexame at a chemical facility (UK, 1974); Seveso accident (Italy, 1976); gas explosion in Mexico city (Mexico, 1984); Bophal, India (1984); detonation of explosives (The Netherlands, 2000) and explosion in an ammonium nitrate and fertilizer factory (France, 2001).

The study also analysed more recent emergencies, focusing on the evolution of how communication and public information was managed, how traditional and social media reported the accident and the lessons learned in the following cases:

- Earthquake in Haiti (January 2010);
- Wildfire in the USA (October 2007)
- Building explosion in Liège, Belgium (January 2010);
- Storm at Pukkelpop festival in Belgium (August 2011);
- Man-made emergencies (shooter events, Paris attacks November 2015, Brussels terrorist attacks March 2016);
- Oil spill by BP in the Guild of Mexico (April 2010);
- Fire at the Chemie-Pack chemical plant, Moerdijk, the Netherlands (January 2011);
- Chemical train accident, Wetteren, Belgium (May 2013);
- Asbestos fire, Roermond, the Netherlands (December 2014);0
- Industry fire in Lantmännen, Belgium (June 2015).

The analysis focused primarily on the role of social media reporting emergencies (Deliverable 2.2). Social media and innovative technologies change and shape emergency response. Social media present opportunities to enhance the effectiveness of crisis communication but also comes with new challenges. Social media have very much changed the rules of the game regarding emergency communication channels available. Thus, the lessons learned and good practices need to be updated with recent experiences where social media has had an important role in public communication. Social media open new potentials for multi-way emergency communication, providing fast messages from a wide range of sources to a wide range of audiences and opportunities for self-correction and continuous update. Citizens also play an active role in the process of collecting, reporting, analysing and disseminating news and information through citizen journalism. The examples of recent emergencies analysed show how social media have increasingly been used for information exchanges during emergencies. Therefore, resources need to be devoted to the management of social networks before, during and after a crisis to ensure responsiveness. As put forward by Philipps (2014 p. 69) "the power of social networking is particularly useful in transcending organizational and institutional barriers so unstructured communications can be made directly between the public, emergency professionals, and community volunteers".

There are three main complementary ways that social media are used in non-radiological emergency management and can also be used in nuclear and radiological emergencies: i.) as a situation awareness tool by monitoring eye-witness reports (bottom-up); ii.) as a state communication tool to convey official statements of what is known, about a situation, what is unknown, and what actions the public should take (top-down); iii.) as an interactive platform to support crowd-sourced verification of events (interactive). Thus, social media can be used as a communication tool to convey information but also as an interactive platform for public involvement through supporting crowd-sourced information. As it has been found in many studies, citizens trust media outlets more than they trust government sources and therefore, governments should foster citizen-led social media use and enable communities and individuals to self-initiate and volunteer in emergency efforts through the development of technological platforms and tools (OECD/NEA, 2018). Authorities should also consider the monitoring of social media, to ensure the reliability of information circulating through social networks, managing rumours and avoiding panic during a crisis.

Example: good practice during the Brussels terrorist attacks (March, 2016) from Belgium

Discipline 5 (D5) is one of the five disciplines in Belgian Crisis Management and is tasked with providing information to the public regarding the crisis. They try to actively include social media in their crisis communication strategy. Their priority lies with the monitoring and analysis of information, rumours, pictures or videos online, to stay abreast with the perception of the public. D5 was activated during the Brussels terrorist attacks of 22nd March 2016 and used the Work Process Crisis Communication Model which consists of 4 steps with one person responsible for each step or the whole team working on one step, depending on the type of crisis: 1. "Outside world" perceptions/effect; 2. Data analysis of what citizens think and experience regarding the crisis; 3. Strategic Advice given and 4. Execution via spokespersons, webcare and telephonists. During the second and third steps, the method used for the analysis of messages and to develop advice respectively is the so-called IBS model – *Information, Behaviour, Sense-making*. This model captures and categorises messages based on these three themes: messages that provide information (facts about the crisis), messages that describe behaviour (reaction to the crisis or action perspectives), and messages regarding sense making (emotional reaction to the crisis). The I-B messages are most important when the emergency is happening, since people involved want to know what is going on and what is being done to prevent further harm. Ideally, a crisis communication-team consists of an analyst, a strategist, a team-coordinator, an editor, and someone in the field. In big crises, which might be the case when a nuclear accident occurs, more staff is required to perform efficiently (Marynissen et al., 2015).

3.2.1. Lessons learned and good practices from historical non-radiological emergencies

The historical cases reviewed in D2.2 in Annex E. point out to a number of lessons learned and good practices (the latter in italics):

- The lack of public awareness and emergency preparedness aggravates the consequences of the incident or accident. *Appropriate training for the different stakeholders and the general public may help to lessen the effects of chemical accidents.*

- *Having an adequate, coordinated and tested system of alarms that the local community is able to identify can improve the response to the emergency*.

- A lack of communication or poor explanations regarding protective actions can lead to risk-enhancing behaviour among the population and therefore, contribute to increasing the fatal consequences of the accident. *Appropriate communication about protective actions may be useful to limit the consequences of the accident.*

- Risk communication to the population lays the foundation for effective crisis communication to mitigate the consequences of the incident. *Preparedness planning, including communication, should be in place before any chemical accident occurs.*

Providing continuous information during the emergency may help to reduce mental health effects, which can also be suffered by people not directly affected by the accident.

3.2.2. Lessons learned and good practices from recent non-radiological emergencies

The lessons learned and good practices from the different cases of recent non-nuclear emergencies reported in D2.2. in Annex E refer to general conclusions identified in the literature review, lessons learned and good practices (the latter shown in italics) focusing on communication aspects of social media and public information arrangements, procedures and practices in non-nuclear emergency management.

3.2.2.1. General conclusions

- Accidents usually attract spectators and media. Public behaviour during an accident has become a regrettable trend that people gather to see the accident, trying to record it and publish what is happening on social media networks. The *control of spectators is therefore an essential part of* *an off-site emergency plan and of a transport emergency plan*. The responsibility for such control rests with the police. The presence of media can cause extra workload and stress for emergency responders. A *media information centre* can be set up to serve the professionals' needs.

- It is clear that the effectiveness of public information and communication during an emergency can be enhanced. Conducting and evaluating *training exercises is essential for developing and improving all parties' capacities to cope with crises and emergencies*. It is important during these exercises and evaluation, to take into account the different cultural frames of reference of the parties involved and citizen groups who may be directly or indirectly affected in the event.
- The communication strategy of an emergency should consider individuals or group of individuals who are unable to comply with an evacuation or other protective actions, for instance, individuals who are not able to act without assistance. This might include people with limited official language knowledge, but also others (e.g. elderly people, those with disabilities or medical conditions, people with hearing and sight impairment, homeless or people unable to access social media, people without access to private vehicles, individuals who are impoverished, chemically dependent, and those with emotional or mental disabilities, minor children left alone at home after school until the parents or caregiver arrives).

3.2.2.2. Conclusions and good practices related to social media

- Social media have great potential to support two-way crisis communication at a low cost and with high efficacy and can maintain trust in government by developing a direct relationship with citizens at a time when expectations are high. The challenges of using social media in crisis communication include: the multiplicity of players, the amount of information generated, the question of open data, privacy and confidentiality, the question of liability, the expectation of the population, and the issue of security. Social media present opportunities to enhance the effectiveness of crisis communication but also involve challenges that need to be carefully addressed. *Social media can be used as a communication tool to convey information but also as an interactive platform for public involvement through supporting crowd-sourced information*.
- Using social media effectively in crisis communication requires avoiding certain pitfalls, and appropriate resources need to be devoted to the management of social networks before during and after a crisis to ensure responsiveness. *Ensuring the reliability of information circulating through social networks, managing rumours and avoiding panic are fundamental* to success.
- Dedicated *social media response teams* and the *use of crisis communication models* (like WPCC used by D5 team in Belgium) can be very useful *for sharing crisis information with citizens*, since in the age of social media both essential and false information is communicated widely from a large number of sources.
- *Combining social media with traditional ways of communication* is needed since certain population groups do not make use of modern social media.
- Information overload can cause distractions for crisis managers. *Ensuring the coordinator function and a clear division of responsibilities and roles during the crisis communication* is essential to avoid overlapping roles and unclear directions.
- Certain crises may entail damage to telecommunications networks and thereby disrupt access to many social media platforms. In addition, in many emergencies, emergency responders were not

able to maintain good communication with each other throughout the response effort because of a lack of mobile phone network coverage. *Multiple means of communication* should be foreseen for these cases.

- OECD/NEA (2018) suggests that governments should foster *citizen-led social media use* and enable communities and individuals to *self-initiate and volunteer in emergency efforts* through the development of technological platforms and tools.

3.2.2.3. Conclusions and good practices related to public information arrangements, procedures and practices

- During a crisis, it is important to *take a proactive approach in order to maintain public trust*, and not be limited to confirming or denying the information provided by the media.
- Ability to e*ngage a big team of communicators in a relatively short time and for a longer period* can be considered a good practice. Thus, the *continuation of communication, even when the emergency has been managed*, is also a good practice.
- *Use of translators in public information center* to ensure good reception and acceptance of information by affected people from different language groups is important.
- *Emotional support to the victims' relatives* should be offered, although the professionals involved in providing this support should be well *trained and prepared* to cope with traumatized people.
- The failure to adequately communicate risk and countermeasures to the population contributes to increasing their uncertainties and therefore, their level of trust in the authorities can be lost rather quickly. In this regard, *there is a need to inform people at the outset about what has happened and prepare them for what they might expect* is critical.

4. Conclusions and recommendations

Overall the "Study on good practices in implementing the requirements on public information in the event of an emergency, under the Euratom Basic Safety Standards Directive and Nuclear Safety Directive" provides useful insights into the common and often innovative public information practices in place to ensure informed decision-making, effective public response, openness and transparency in case of a nuclear or radiological emergency. NROs and other authorities or organisations responsible for the implementation of public information and transparency requirements are significantly challenged as information-communication technology continues to advance and as the public's expectations for engagement continue to rise.

Good practices have been identified and highlighted based on desk study and stakeholder consultation. Lessons learned from nuclear and non-nuclear emergencies regarding public information and transparency have provided a substantial foundation for identifying good practices and developing subsequent recommendations. Some of the most relevant lessons learned concern the use of social media, training and exercises and stakeholder engagement.

It should be noted that generalising good practices in specific settings may run the risk to underestimate the challenges involved in communication prior to and in the event of an emergency. However, it is still possible to point out some general practices which may be applicable to different contexts. The intention behind this “good practice collection” is to be used as an inspiration for the implementation of the new and amended directives by the MS and not as an obligation to be applied in any emergency context or any Member State. It is important to bear in mind that the collected good practices are strongly related to the context of each specific event and the political-societal-communication culture in each Member State.

The conclusions and recommendations (in italics) set out below represent the views of the project team and are based on the findings and conclusions from all the thirteen deliverables, workshops and meetings undertaken as part of this project (Annex A to M). The recommendations are directed at organisations with a responsibility for, or an interest in nuclear or radiological emergencies in Europe, either at national or European level. Where appropriate, an indication is given of which organisation appears best placed to take the lead in responding to a recommendation. The order in which the conclusions and recommendations are written has no implications for their relative priority or importance in further enhancing public information in nuclear or radiological emergencies.

4.1. European legislation and international requirements

This study analyses legal requirements on public information and transparency prior to and in the event of an emergency under the new EURATOM BSS Directive and NSD in view of international practice and standards and identifies good practices in EU Member States, in accordance to the study objectives, related to information provision, transparency, communication and engagement in the event of an emergency. In the new BSS Directive and NSD, information provision and transparency requirements have changed only slightly compared to the previous legal texts. Therefore, most requirements should have been already implemented by Member States. However, the provisions of the Directive do not limit additional measures that go beyond the minimum requirements, as stated in the text of the BSS Directive as follows: “As the BSS Directive "provides for minimum rules, Member States should be free to adopt or maintain more stringent measures in the subject-matter covered by the Directive" (L13/1, (5)). In the absence of a common understanding of and “lack of clarity” (as stated by the project stakeholders) about the terms ‘public information’ and ‘communication’ in the Directive, MS can refer to international guidance, like IAEA, 2015 GSR. However, in some cases, the terms appear also in international guidance to refer to the same idea, are used interchangeably and are not explicit enough. Most of the MS to some extent already exceed the EURATOM minimum obligations in alignment with international guidance and good practice (Annex A, B).

The consultation with Reference Group members pointed to the fact that the EU legal basis does not seem to respond to the rapid societal changes (e.g; social media, citizen science, citizen journalism) and there may be a gap between the requirements for public information and transparency in legal documents, conventions (e.g. Aarhus Convention) and practice (as identified in the PREPARE, ENGAGE and CONFIDENCE, SHAMISEN and SHAMISEN-SING projects) suggesting the need for engagement with all stakeholders, including NGO’s, local communities, citizen scientists, media etc. in emergency preparedness (Annex F).

Recommendations

a) *The EC should involve experts in communication in drafting European legislation related to information and communication on radiological and nuclear emergencies in order to* *incorporate the terminology and mindset of communicators and engagement experts.*

b) *The EC and MS in particular should consider more ambitious international guidance and conclusions from European projects on engagement in emergency preparedness as a basis for developing legal documents.*

c) *International organisations and the EC should clearly define some of the key terms used in the legal texts and international guidance – e.g. public information, communication, transparency, stakeholders – in order to be understood unambiguously and consistently across MS.*

4.2. Information, communication and transparency for emergency preparedness and response

All countries which responded the survey undertaken in the framework of this study (n=26) include aspects of communication with the public in their respective Emergency Preparedness and Response plans (Annex B). These aspects can be included as part of a general public information strategy (i.e. not in a specific public information or communication strategy for radiological or nuclear emergencies), in the annex of general National Disaster Plans, as specific arrangements for crisis situations, in Emergency Preparedness and Response plans, or in a specific act (e.g. Strategy for informing the public and media in a radiological emergency). Revision and improvement of the public information or communication plan or strategy is carried out in some countries on a regular basis, once a year (AT, EE, FI, HU, LV, LT, SK) or at least once in five years (CZ, HR, DK, IE, PL, RO, SI) and also after specific events, e.g. after exercises and drills or real events. NGO representatives in the project expressed that there is still a substantial lack of communication practices by authorities and that communication should be improved. There is a discrepancy in the viewpoints regarding communication with public in EP&R between NGOs and authorities (national and local).

Rumours that appear during a nuclear or radiological accident can be systematically collected and can also be responded by using the same communication channel that published the rumour. Eleven out of 26 MS (AT, BE, DK, FI, FR, EL, LV, ML, PL, SE, NL) indicate that they have a mechanism in place that would allow them to systematically collect rumours during an emergency, some MS (CY, DE) have planned to implement the system to collect rumours. In some countries, like in France, rumours are systematically monitored in real-time through “Radarly” and they can be replied through the same type of social media used.

Eight out of 26 MS indicate that they report directly to the parliament on duties concerning transparency related to nuclear emergencies: parliamentary questions (AT, EL, LT), emergency plan (BU) and annual reports (DE, HU, IE, LT, RO and ES). In addition, seven out of 21 MS indicate that there are committees or governing bodies that are responsible for the oversight of transparency related to emergency preparedness and response e.g. oversight is done by stakeholders (AT), general transparency bodies (HR, FR, ES) or specific governing bodies (CY, FR, LT and ES).

Examples of nuclear and radiological events in Europe and neighbouring countries (Annex D) have shown that the communication of no safety significant events allows to build institutional trust in public institutions at critical moments. It may also help to raise awareness about the NRO and ionizing radiation. Depending on the context, it might be better to communicate first on social media because it is faster than traditional media and rumours of lack of transparency in releasing information may be avoided (Annex F).

Recommendations

a) The European Commission should develop European level guidance, for instance in the form of a guidebook, on the interpretation and implementation of the BSS and NSD requirements in the area of public information and transparency in line with international guidance. This EU guidebook should contain practical advice on the procedures and methods for the implementation of good practices collected in this study.

b) Member States should communicate to the public also insignificant events as soon as possible in order to be recognized as a honest, transparent, trustful and high speed source of information and avoid speculation and rumours.

c) Countries should establish mechanisms to systematically collect rumours related to a nuclear or radiological accident and respond by using the same communication channel. This mechanism should be tested during non-nuclear emergencies.

d) Member States should have a communication strategy in place with the two-fold aim to provide information on radiation in general and a radiological or nuclear event as well as protective measures in particular and engage early enough in a two-way communication with the public.

e) Member States with NPPs should conduct participatory public communication campaigns on ionizing radiation where the use and purpose of iodine tablets is explained and the information needs of specific population groups are met. These aspects should also be included in educational curricula in schools with the primary aim to increase public awareness regarding radiation issues. Public communication campaigns should address all protective measures foreseen in a MS as well as in neighboring countries.

f) The EC should undertake systematic evaluations of public information and transparency practices in MS in order to improve recognised pitfalls as well as to provide recommendations on how to adapt to the evolving communication landscape. This kind of evaluation would support MS in applying good communication practice.

g) Countries should assess the effectiveness of public information and transparency arrangements in the preparedness and response phase based on feedback from the public. These should be also assessed during emergency exercises.

h) The EC and MS should organize and support the organization of conferences and workshops related to public information and transparency on a regular basis. This type of events empowers practitioners, academics and stakeholders, including journalists, to learn from each other's findings, share lessons learned, experiences, state-of-the-art, challenges and solutions in the evolving media landscape and build a radiological communication network at European level.

i) Member States should empower a body or committee with the oversight of transparency related to emergency preparedness and response.

4.3. National provisions versus local practice and the point of view of civil society

The study findings show that current arrangements and procedures for information and transparency regarding nuclear and radiological emergencies in EU MS appear, on paper, to be broadly compliant with EU legislative requirements, based on the responses provided by the NROs (Annex B). Emergency preparedness plans are based on administrative scientific approaches. However, these findings need to be carefully assessed by a more in-depth review of arrangements in practice at national and local levels, as suggested by the Reference Group members and from lessons learned from recent nuclear and radiological events in Europe and neighbouring countries (Annex D). The study from the NTW (Zeleznik and Klemenc, 2015) already points at the gaps in implementation of emergency preparedness provisions. Thus, it demonstrates the existence of large gaps between the announced provisions and the reality and/or the absence or poor implementation of planned activities in practice. The lack of preparation of many regional and local authorities for a nuclear accident and the poor preparation of feasible evacuation of large urban areas are also mentioned. This study conducted a public opinion survey in Belgium (Annex C), a limited survey with local representatives (Annex I), Reference Group discussions (Annex J) and Final workshop (Annex F) which also point towards similar findings. A more in-depth study would help to point out to the gaps and inconsistencies between arrangements on paper and in practice.

Recommendations

- *The European Commission should carry out a regular, systematic and detailed assessment of how the arrangements of public information and transparency during nuclear and radiological emergencies are implemented in practice at local level by consulting elected politicians, civil society organizations' representatives, local NGOs, stakeholders involved in emergencies (first responders, measurement teams, etc) through public opinion polls and discussions. This should be systematically followed-up at regular intervals due to fast evolving technological innovations and societal - social changes. The changing society and communication environment should be reflected in evolving arrangements of public information and transparency.*

4.4. The role of media in communicating exercises

Mass media, new and traditional, have an important role in public communication during a nuclear event and in the post-event phase. On the one hand, mass media communication offer great opportunities for emergency management since it is by definition capable of reaching a large number of people simultaneously. In the early phase of an emergency, mass media can increase awareness and understanding of protective actions and improve the response of affected populations. In the medium and long term, media can facilitate the remediation process and the return to normal life. Effective media communication can support implementation of protective measures, reduce public fears, thus minimize the chance of negative psychological effects and help sustain public confidence in the organizations that are responsible for emergency management. Moreover, emerging and evolving communication technologies, such as social media, offer the possibility of improved nuclear emergency communication, as these technologies have the potential for increased information capacity, dependability, and interactivity. On the other hand, mass media communication is a challenge for the emergency management since communication has evolved into a multiple-way process where information is disseminated at an, often, uncoordinated incredibly rapid pace, and is able to easily reach all kinds of audiences: affected, indirectly affected and not affected by radiological risks. Social media provide a virtual platform to all users to express themselves and share information. An overload of (miss)information coming from all kinds of sources (e.g. government, expert organisations, traditional media, individuals, inhabitants, NGOs, etc.) can make it difficult for people to differentiate the correct information. Moreover, the rise of social media has enabled users to demand more transparent, high-speed communication and accountability from governments, public institutions and emergency managers. It is therefore of paramount importance that nuclear emergency communicators keep track of all the parties that might be interested in the nuclear emergency and to correct any incorrect information or add information that is incomplete. Besides their obvious advantages, social media can potentially become a tool for misinformation and manipulation, as well as spread anxiety. These actions cause high time pressure and an additional personnel burden for an emergency management, as well as the need of the competent skills, training and resources (Annex C, D, I).

The results of this study indicate that traditional media is the most often used channel for the provision of information for the general protection measures to be applied and steps to be taken in the event of a nuclear emergency. The second most used channel is the internet including authority websites, online newspapers and social media. Early warning systems are the third most often used channel of communication (Annex B).

Most MS, 24 out of 26 (exceptions are IT and MT) who answered the survey in this study indicate that they have a specific policy regarding the staff speaking to the media. In seventeen countries (AT, CY, CZ, DK, EE, FI, FR, DE, EL, IE, LV, LT, LU, PL, SK, SI, ES) a dedicated and trained spokesperson(s) is available to speak to media. In Hungary and Poland, it is the Director General or his/her Deputy who are appointed to address the media, although in Poland it can also be the division/section head, like in Austria, Finland and Slovenia. For instance, in Slovenia, the emergency director is the person appointed for communication with the media. A different approach is followed in Finland, where STUK, the nuclear regulatory organization has developed a social media policy through which all 340 employees are encouraged to use social media in their relations with journalists and the public: "At STUK, communicating about radiation and nuclear safety is everyone's responsibility."[33].

A good practice is to share responsibility for speaking to media between more trained and responsible people due to the high information demand during and after an emergency. Personnel responsible for public information regularly participate at educational and networking activities organised at international level, where they can learn from other countries' experience. In 23 out of 25 (all except Luxembourg and Malta) who responded the questionnaire, the staff of the public information office had attended a meeting and/or educational programmes related to communication aspects in the last three years. Luxembourg indicated that this information is not available to them whereas Malta stated that they do not have a public information office. On

[33] Kaisa Raitio (2018); "From shouting to dialogue" – use of social media (slide, 3-4); http://ricomet2018.sckcen.be/-/media/Files/Ricomet2018/Presentations/Monday/7_Kaisa-Good-practice-from-Finland.pdf?la=en&hash=4461E43A2BEE4E58593CA2918F98546A1F3764CE (last accessed 20 February 2019).

average, five educational activities were attended in the last three years, mostly at international level organized by IAEA (in 16 out of 23 countries) or by the OECD NEA (in 9 out of 23 countries).

The organization Atomic reporters, the project reference group member representing this organisation (Annex J) and journalists and editors participating at the project final workshop (Annex F) recommend that local, national, and international authorities incorporate the “Recommendations for Improving Communication with Journalists to Enhance Public Safety in the Event of a Nuclear or Radiological Emergency” [34] into radiological emergency preparedness response plans in order to keep the public informed and enhance public safety:

• Acknowledge journalists have an indispensable role to play in swiftly communicating factual information to the public about details of a radiological emergency as well as the protective behaviors the public should observe.

• Provide emergency response managers and their teams the resources and authorization to ensure journalists are privy to the salient details of an event as soon as possible after an incident occurs.

• Avoid the dangers of an information vacuum by keeping channels with journalists open and maintaining a steady stream of information.

• Share with journalists, even when the precise nature, cause, or scope of an incident is not fully understood or verified, information about the incremental steps being taken in response to the incident and update frequently (for example, setting up evacuation zones, investigation and analysis, engagement of specialists, modeling, estimating levels of radiation, health/safety checks, and clean-up procedures). In other words, provide an unfolding road map that explains the emergency response for journalists to report back to the public.

• Provide, or direct journalists to, a safety guide to protect themselves when reporting on significant radiation incidents. Journalists could also use this guide to convey basic safety information to the public to limit the risk of radiation exposure.

• Acknowledge the need for plain speaking. In a radiological emergency, there will be journalists assigned to cover the story whose knowledge about the effects of ionizing radiation will be limited. Use common terms and integrate visual infographics to express technical details and provide information in all the languages represented in multicultural communities, as well as in English and other regional languages for uptake by international media.

• Assume that journalists will pitch stories that speak to the dominant psychological and emotional concerns of the public. Offer direct and continuous advice regarding self-protection, the urge to unite with family members, the urge to flee, the anxiety related to immediate and delayed health effects, and fears that mass destruction may follow.

In preparation for possible incidents journalists recommend to authorities to:

• Engage credible experts and risk communication specialists to develop responses that can be delivered via multiple channels to news media in the immediate aftermath of a radiological emergency.

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[34] “Recommendations for Improving Communication with Journalists to Enhance Public Safety in the Event of a Nuclear or Radiological Emergency”, Atomic reporters and Stanley Foundation http://www.atomicreporters.com/wp-content/uploads/2016/06/RotterdamJournalistsRecommendations616LR2.pdf

• Develop ahead of time clear infographics and information checklists to assist journalists in more comprehensively and accurately covering an event.

• Develop relationships with generalist and specialist reporters, for example, through periodic workshops, to ensure there is a cohort of informed journalists who understand, and can give feedback on, the emergency response process.

• Develop and continuously update a list of contacts and other resources for journalists to access quickly and easily in the event of an emergency.

Recommendations

a) *Member States should develop integrated strategies for the use of social media prior to and during an emergency and should include a variety of mechanisms for information provision (traditional media, social media, warning systems) in the event of a nuclear or radiological emergency.*

b) *Member States should also have in place a specific policy regarding staff speaking to the media and train their personnel for its effective use.*

c) *The European Commission should develop practical guidance and training on media communication regarding nuclear or radiological emergencies, prior to, during and after an event.*

d) *The European Commission should support and stimulate the national authorities to implement the "Recommendations for Improving Communication with Journalists to Enhance Public Safety in the Event of a Nuclear or Radiological Emergency" from Atomic Reporters in collaboration with Stanley Foundation.*

4.5. Communication in exercises

Exercises, trainings and drills are an important aspect of the emergency preparedness stage. They can provide unique insight in the state of preparedness of nuclear emergency response organizations. They can also be the basis for continued improvement programs for the over emergency response infrastructure including public information and transparency. Exercises are conducted to ensure that all specified functions required to be performed for a nuclear emergency response and all organizational interfaces for facilities are tested at suitable intervals. Exercises should include the participation of as many as possible of the organizations concerned (IAEA, 2005).

As reported in D1.2. (Annex B), nearly all MS indicate that they include aspects of communication with the public in nuclear or radiological emergency exercises/drills. The frequency by which aspects of communication in exercise or drills are included varies from once every five years to several times a year. Experiences gained during exercises indicate challenges and pitfalls related to public information, not only on paper but also in practice, e.g. use of templates, use of preapproved messages, use of key messages, expressing empathy, etc. Contrary to the responses from NROs surveyed in 26 EU MS, representatives from local communities (Annex I) involved in taking part in emergency management on the municipality level and emergency experts[35], state that the communication aspects about protective actions in exercises and drills is not regularly trained and depends on the country considered. In France, CLIs can participate in exercises only as observers but in the UK, local communities have been

[35] https://youtu.be/keC-xkDodZM

involved in evacuation exercises (Annex F).

The case of Fleurus in Belgium and Tricastin in France reported in D2.1 (Annex D) shows that communication aspects are currently included in exercises on a regular basis and they provide valuable opportunities to identify and overcome communication challenges during nuclear or radiological emergencies.

Familiarisation of journalists with reporting on nuclear or radiological emergencies through participation in exercises, specific trainings and seminars is on-going in eight out of 25 countries (AT, BU, CZ, FI, FR, EL, IE, PL). Most countries, 21 out of 26, indicate that their communication personnel are included in regional exercises, but the regularity by which they are included varies among MS (Annex B). Furthermore, in some countries, like Belgium, students of journalism are occasionally involved in nuclear emergency exercises (Annex F).

Communication related to radiological risks touches on multiple psycho-societal aspects, not only health risks for the population and biological effects, but also social attitudes (e.g. stigma), psychological effects (e.g. distress, depression), values and economic threats (e.g. decrease of property value). The complexity of emergency communication starts already at an individual level (mental process, awareness and risk perception) and continues at the societal level with an interaction of many views, values and motivations. These values need also to be addressed in exercises, trainings of first responders, spokespersons and any person who will have a role in communication during an emergency.

Recommendations

a) *Public information and transparency aspects of emergencies should be included in regular exercises. Countries should involve not only communication personnel in regular exercises but also train first responders in their communication with the affected people (e.g. during decontamination, measurement), communication with journalists and the medical profession should be exercised. Students from relevant degrees and local communities should be included in the preparation and conduction of exercises and drills as an essential part of all emergency preparedness and response plans.*

b) *The European Commission should encourage Member States to conduct systematic regular and frequent exercises and drills where the effectiveness of public information and communication is tested and improved to respond to future emergencies. The EC should provide the platform for MS to share the lessons learned from exercises conducted in different European countries and at regional level.*

c) Countries should organize training in risk communication for any professional who will have to communicate face-to-face with the affected people, with groups or public during an emergency. This training should also address the consideration of ethical and moral values.

4.6. Engagement before and during an emergency

The European Commission aims at fostering stakeholder engagement in radiological protection research, policy and practice in ways that enhance responsiveness to societal needs and concerns. Stakeholder engagement is an evolving principle in nuclear emergency preparedness, response and recovery. By "stakeholder" we denote anyone who has a stake in nuclear or radiological emergency, its development or applications and/or is potentially affected by emergency, plans and/or protective measures and the outcomes they generate. For instance, the base for the NERIS approach and stakeholder engagement activities are the experiences gained in EURANOS, NERIS-TP and PREPARE projects. Fundamental working principles and aims of NERIS include collaboration with concerned parties of different governmental levels, science, NGOs, policy in emergency and recovery preparedness and response, dialogue, partnership, networking and training (Annex G). The Reference Group member from the H2020 project ENGAGE recognised the following challenges for engagement in nuclear or radiological emergencies: insufficient involvement of local population and non-institutional stakeholders in emergency preparedness; social and technological change; and effective communication with local populations about protective actions in case of an emergency. These challenges can be addressed and solved (Annex F).

As described in D1.2 (Annex B) Member States use different tools to engage with stakeholders, like formal consultations (n=17), public meetings by local authorities (n=16), written inquiry points (emails, letters…) (n=15) and telephone enquiry points (n=15), communication campaign material (n=13) and public meetings hosted by others (n=13), public meetings hosted by NRO (n=12), public meetings hosted by nuclear or radiological installations (n=12), local information committees (n=11), regional information committees (n=11) and experiences of public participation in emergency exercises (n=11), then informal or drop-in meetings in the vicinity of the site (n=9) or blogs (n=1). Besides these engagement methods, several interactive online tools are applied including twitter, a dedicated page on the NRO website, Facebook, SMS, other software or apps or other online tools. Recent nuclear and radiological events in Europe and neighbouring countries (D2.1., Annex D) have pointed out to the need of nuclear safety authorities to engage early enough in a two-way communication, rather than only providing one-way information. Thus, different actors, apart from the regulatory body, the government and the operator, may have a role to play in emergencies and should be involved early on in emergency issues. For instance, radiation protection societies, teachers, health professionals, volunteers, etc.

In relation to the stakeholder involvement in EP&R in Europe, the NTW claims that "citizens are insufficiently informed" and involved, and "in most countries civil society can neither participate nor observe EP&R exercises" (Zeleznik and Klemenc, 2015, pp. 14). NTW states that current EP&R is in practice "*at best a bureaucratic list of good intentions since plans are not realistic because the public is not involved and the requests of concerned citizens are not taken into account or simply ignored "*and they are not tested with those for whom they are prepared. The NTW recommends that the top-down approach should be changed and the local populations and interested civil society organisations should be involved in the development of emergency plans. Public participation would also reduce limits of administrative handling that creates EP&R systems based on false or outdated presumptions and/or data and incapable for fast learning and overcoming of cross-border obstacles[36] (Annex F).

The study has shown that there are citizen science initiatives (e.g. SAFECAST) for radiation measurements on-line which prove to be useful communication and engagement tools between experts, policy-makers and the public, during preparedness, response and recovery phases. Indeed, further interaction between experts publishing research results from European projects on public information and engagement in emergencies and experts publishing research in ionising radiation science and measurements should be sought to ensure their operational use (Annex F). Also, FP 7 projects EAGLE and PREPARE recommended to nuclear emergency authorities to enable citizens to perform measurements and support citizens to collect and share measurement data with authorities[37, 38]. EAGLE recommendation states: "*Support citizen science and citizen journalism, and facilitate the activity of civil society organizations responding to citizen needs "on the ground". Whether part of organizations or acting independently, civil society volunteers are engaged persons, they render a service to their fellow citizens and can act as channels between authorities and the population – in both directions. Authorities can be responsive to them, engage and support them with information, material resources, public-interest partnerships and events, including bar camps, hackathons, and other crowd-sourced endeavours." (EAGLE recommendations, p. 4)* Citizen science, as part of preparedness, response and recovery, is also strongly supported by NERIS (Annex G and the NERIS workshop, 2018[39]).

Recommendations

a) *Member State should foster participatory practices such as citizen science initiatives and citizen-led social media which create opportunities for people to monitor radioactivity in their environment with the help of scientists, through the development of public online platforms.*

b) Member States should involve a wide range of stakeholders (e.g. local councillors, health service, police, radiation protection societies, etc) who have a major role to play in decision-making processes related to the emergency response situation, in order to take decisions in a democratic way.

c) The EC should review the results, conclusions and recommendations of European research projects addressing public communication and engagement in nuclear and radiological emergencies and ensure that these are taken up in new practical guidance document to assist Member States in public information arrangements in nuclear and radiological emergencies.

[36] https://youtu.be/keC-xkDodZM

[37] The Eagle recommendations: http://eagle.sckcen.be/-/media/Files/EAGLE/EAGLE_recommendations.pdf?la=en&hash=0F6757D218EE7FD448B440F62BA0FED0EF19A8A7 (last accessed 20 February 2019).

[38] Citizen science and monitoring by the public (2018), NERIS, Dublin, Ireland: https://eu-neris.net/activities/workshops/dublin-2018.html (last accessed 20 February 2019).

[39] NERIS workshop, special panel on citizen science: https://www.eu-neris.net/activities/workshops/148-4-neris-workshop-25-27-may-2018-dublin.html (last accessed 20 February 2019).

4.7. Cross-border arrangements

Approximately half of the countries surveyed in this study collaborate with public information officers from other countries involved in emergency management, directly or indirectly, via e-mail exchange, bilateral meetings, working group, regional exercises, etc. Six countries out of 24 (HR, HU, IT, LU, MT, SK) indicate that they do not have specific arrangements in place to collaborate with public information officers from other countries indicating room for improvement in the cross-border collaboration involving emergency management. In addition, 19 out of 22, indicate that they will not publish public information in the official language of neighbouring countries in the event of an emergency (Annex B). However, most countries will publish in English. This may help to reach out to international newswires and correspondents identified at the preparedness stage to ensure that international media use the primary source (Annex D). During the round table[40], some countries stated that the translation of press releases and any documents for public information is undertaken by embassies or using professional translation tools like the TRADOS tool used by the IAEA in order to publish swift information.

Recommendations

a) *The European Commission should encourage Member States to conduct regional and cross-border exercises in which they involve communication personnel in order to promote a common understanding, coherent and consistent communication at European level and internationally.*

b) *The European Commission, in cooperation with Member States, should build on the HERCA-WENRA approach to support early information exchange (through ECURIE as the interface to the EU early notification and information exchange system for radiological emergencies or other channels) in the preparedness stage between public information officers of neighbouring territories as well as consistency of recommendations issued by the radiation protection and safety authorities for the protection of populations during the accident.*

c) *Member States should publish all information about radiological or nuclear emergencies in English and in the language of their neighbouring countries.*

[40] https://youtu.be/keC-xkDodZM

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Annexes

Annex A

DG Energy project: *"Study on good practices in implementing the requirements on public information in the event of an emergency, under the Euratom Basic Safety Standards Directive and Nuclear Safety Directive"*

Project Ref. Ares(2016)7037963

D1.1. Analysis of legislative provisions and review of standards and guidance supporting the implementation of EU legislation in Member States

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Foreword

This report represents Deliverable D1.1 of the "*Study on good practices in implementing the requirements on public information in the event of an emergency, under the Euratom Basic Safety Standards Directive and Nuclear Safety Directive."* It shows the results of Task 1.1. *Analysis of national legislative provisions and review of standards and guidance supporting the implementation of EU legislation in Member States with a focus on the legal framework.* Thus, the present document analyses legal requirements on public information prior to and in the event of an emergency under the new EURATOM Basic Safety Standards and the Nuclear Safety Directive taking account of requirements and guidance from the International Atomic Energy Agency (hereinafter referred to as IAEA) and the Organisation for Economic Co-operation and Development (hereinafter referred to as OECD). To this end, this report aims at clarifying terms and concepts behind the provision of information to the public in an emergency based on an analysis of the applicable legislation on the basis of the Treaty Establishing the European Atomic Energy Community (hereinafter referred to as EURATOM) [1], as well as a review of existing and latest international guidance available.

By reviewing and evaluating relevant binding and non-binding documents, this report analyses the differences between the legal obligations arising from EURATOM legislation and current international guidance on public information in the event of a nuclear emergency. Moreover, it entails identifying the applicable international guidance in the area within and beyond the minimum rules provided for by the EURATOM Directives. The document provides a basis for discussion for an effective and efficient implementation of the new EURATOM legislation. Member States are encouraged to consider the recommendations in the transposition and implementation of the recently adopted Directives.

NOTE: To avoid confusion and to ensure consistency with the EURATOM terminology (i.e. "provision of information to the public"), this publication uses the term "*public information"* in general to describe "*any activity that communicates (NOTE: i.e. transfers, provides) information to the public and the media during an emergency*" [15]. In IAEA publications, the meaning of the terms public communication and public information shift according to the respective context.

Contents

1. Introduction

The European Union has developed an advanced legally binding and enforceable framework for nuclear energy grounded on the Article 2(b) and Title II, Chapter 3 of the Euratom Treaty [1]:

- Council Directive 2011/70/Euratom of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste OJ L 199, 2.8.2011, p. 48–56, [7],
- Council Directive 2013/59/Euratom of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation, OJ L 13, 17.1.2014, p. 1–73, [8] and
- Council Directive 2009/71/Euratom of 25 June 2009 establishing a Community framework for the nuclear safety of nuclear installations, OJ L 172, 2.7.2009, p.18, [6], as amended by Council Directive 2014/87/Euratom of 8 July 2014, OJ L 219, 25.7.2014, p. 42–52 [9].

Council Directive 2014/87/Euratom [9] was adopted in the context of the review of the EU framework on nuclear safety in the light of the Fukushima accident in 2011 and took account of the findings of the EU stress tests[41]. Member States had to transpose this Directive into national legislation by 15 August 2017. Additionally, Member States had to transpose the new Basic Safety Standards Directive into national legislation by the 6 of February 2018. The transposition and implementation of these Directives provide opportunities amongst the EU Member States to review existing procedures and improve implementation measures in the area of public information and transparency requirements in the event of an emergency. Furthermore, Council Decision 87/600/Euratom on Community arrangements for the early exchange of information in the event of a radiological emergency stipulates the arrangements that apply regarding the notification and provision of information whenever a Member State decides to take measures of wide-spread nature in order to protect the general public in case of a radiological emergency.

Communication during and after the accident in Fukushima was confronted with several challenges:

- emergency management failure by emergency management groups to communicate protective actions to the public during the Fukushima accident (e.g. evacuation or intake of potassium iodide),
- failure to communicate uncertainties related to the on-going emergency (e.g. inadequate information related to radioactive release),
- inability of experts to admit uncertainties related to health effects of radiation (e.g. low radiation doses effects),
- inability to deal with public fears (e.g. how the contamination from the accident will

[41] In response to the 2011 Fukushima nuclear accident, risk and safety assessments ('stress tests') were carried out on all EU nuclear power plants to check whether the safety standards used were sufficient to cover unexpected extreme events. Related documents, see: https://ec.europa.eu/energy/en/topics/nuclear-energy/nuclear-safety/stress-tests

affect children's health, including thyroid abnormalities) and

- lack of stakeholder involvement in decision-making at a later stage (e.g. lack of involvement of women in decisions related to the return to evacuated villages).

This resulted in improper public response and difficulties in the recovery from the Fukushima accident. The communication failures contributed to citizens' anxiety and distrust in emergency management, the government, the safety regulators, the experts and the nuclear industry worldwide (Figueroa, 2013 [25]; Kim. Younghwan, Kim. Minki, & Kim. Wonjoon, 2013 [32]; NAIIC, 2012 [33]; Ropeik, 2011 [36]; Siegrist & Visschers, 2013 [37]) and had a negative impact on stakeholder involvement processes for the remediation and recovery of contaminated villages (Hobson, 2015).

According to Janssens (2013) [30] "*The accident also prompted further reflection on the capacity of the EU and of Member States to respond to a nuclear emergency. This reflection concerns information exchange, response to remote accidents with implications on trade, communication, and the adequacy of the legislation on the placing on the market of food and feeding stuffs".*

Due to Fukushima, national and international authorities, various organisations and NGOs worldwide - for instance IAEA (IAEA, 2013, 2017) [27] [28], the Red Cross (IFRC, 2015) [39] and the International Radiation Protection Association (Coates, Webb, & Lazo, 2012) [24]- reviewed risk communication plans and improved strategies for communication in nuclear emergency preparedness and response. Nuclear emergency authorities acknowledged the need to include communication aspects in emergency preparedness exercises and trainings (Perko, Raskob, & Jourdain, 2016) [34]. Open-source, citizen-science-centred radiation mapping solutions were developed through a process of collaborative open innovation. Thus, citizen’s science entered the radiation protection field. Safecast in Japan (Brown, Franken, Bonner, Dolezal, & Moross, 2016) [23] provides an example. In addition, investments in risk communication research and improvements in the coordination of risk communication before, during and after nuclear emergencies were approved (e.g., FP7 projects EAGLE, PREPARE, OPERRA and H2020 projects CONFIDENCE, ENGAGE, TERRITORIES supported by European Commission and EURATOM).

The results from European funded projects point to a big difference between public perception regarding ionising radiation risks (Turcanu et al., 2014 [40]; Železnik et al., 2015) [41] and the intentions of those who are providing the information on nuclear emergency (Železnik et al., 2015) [41]. On the one hand, communication about emergencies and emergency preparedness are currently still interpreted as a one directional transfer of information from a source to a receiver (Železnik, Marega, & Koron, 2014), while international guidance shows that what the population needs would be a multiple-way communication taking into account expectations, views, concerns and questions from different stakeholders. Currently, those using ionising radiation and those in positions of authority seem mainly inspired by the idea that the general public should be ‘educated’ by ‘explaining the facts’. In only very few situations are citizens considered simply as competent stakeholders whose own questions and needs could guide the approach to emergency communication (Železnik et al., 2014).

Differences between individuals, groups and authorities in their motivation, values, goals, level of knowledge, interests, perceptions, beliefs about the objectivity and efficacy are often taken as justification for avoiding involving stakeholders in decision-making process in nuclear emergency preparedness. In addition, arguments over the objectivity, validity, credibility and relevance of scientific findings are common in debates related to health effects of radiation, especially related to scientific uncertainty and effects of low doses. These differences should be seen as a drawing factor for stakeholder involvement and not as caveats. Sound communication and participative processes may lead to effective, democratic, ethical and transparent decisions important for radiological risk governance.

The new Basic Safety Standards (BSS) introduces new requirements for the coordination of emergency response measures and information of the public, which, according to the feedback to the EURATOM "stress tests", were clearly missing in the past. As recognized by the Court of Justice of the European Union in its case-law the BSS provides for minimum rules, Member States may adopt or maintain more stringent measures in the subject-matter covered by the Directive[42]. Thus, the provisions of the Directive do not limit additional measures that go beyond the minimum requirements and Member States could use more ambitious non-binding international texts as guidance for an efficient and effective implementation.

The present document analyses the legal requirements on public information prior to and in the event of an emergency under the new EURATOM Basic Safety Standards and the Nuclear Safety Directive in view of the latest international standards and guidance with a view to provide a basis for discussion for an effective and efficient implementation of the new EURATOM legislation.

2. Context and legal background

On 25 March 1957, the leaders of Belgium, The Netherlands, Luxembourg, France, Germany and Italy decided to create the next legal framework and extend their collaboration to nuclear energy with the Treaty establishing the European Atomic Energy Community (EURATOM) [1]. After the war, the European economy was in dire need of clean and affordable energy. The expectations on the research and progress of nuclear technology were very high, almost euphoric, technology had a positive connotation in the public perception and the promotion of the peaceful use of nuclear energy was clearly a new European goal.

On 10 October 1957 - only a couple of months after the signing ceremony of the EURATOM Treaty, an accident occurred at a nuclear power plant in Cumberland (now Cumbria), United Kingdom. Windscale Unit 1's core caught fire and melted, which led large amounts of radioactivity to be released. Radiation contaminated the surrounding area and reached as far as mainland Europe.

While the EURATOM founding fathers thought about the establishment of uniform basic safety standards to protect the health of workers and the general public from the dangers of ionizing radiation it did not specifically address terms like "emergency", "disaster", "incident", "accident", "preparedness" or "response", let alone "information of the public". These issues were included later in a progressive way with the adoption of the BSS Directives.

[42] Council Directive 2013/59/EURATOM, Recital 5.

While the European Economic Community (EEC) evolved to the European Union, formally established in 1992 with the Treaty on European Union, known as the Maastricht Treaty, the European Atomic Energy Community (EURATOM) Treaty remained unchanged in substance since its signature.

Decades and a series of smaller and bigger nuclear events later, public pressure for more transparency and cross-border information increased significantly for the first time after Chernobyl. In addition, industry perceived transparency as the key to gain public acceptance for new technologies. The Convention on Nuclear Safety increased the peer pressure on Contracting Parties, to publish their national reports on nuclear safety. Press releases and public reports were the first signs of publicly available information on nuclear safety. EURATOM and all Member States eventually published their reports, setting benchmarks for other countries to increase transparency and public confidence.

Later on, with the Fukushima accident in March 2011, public attention emerged all around the globe during and long after the nuclear accident, among not only the directly affected population or the population likely to be affected. The Fukushima accident has made it clear, once again, that the existing national resources are reaching their limits, both human and

Text extracted from A. Janssens, EU Basic Safety Standards and European response to the Fukushima accident (2013)

The Fukushima accident also highlighted an important change in society, for instance since the time of Chernobyl, in the access to and dissemination of information. People in Europe watched the events in Japan not only through television and newspapers but also through internet and social networks. Inversely, citizens of Japan were well aware of the response in other parts of the world. Overreaction elsewhere sometimes provoked distrust of the Japanese information channels. It also proved to be very difficult to explain the rationale of radiation protection, the distinction between activity concentration and dose, the difference between normal acceptance criteria and those in case of an emergency, etc. This represented a huge challenge for national sources of information and official spokesmen. The workload of information collection and dissemination soon came to saturation both in national institutes and in international bodies. The workload was further enhanced by solicitations from the press to authorities not only to explain decisions within their remit, but also to comment on other sources of information. A better definition of the responsibilities of different communication channels should be pursued; also better links between these channels, and possible ways for translating the information in understandable language should be explored and exercised.

Among those lessons learned, the accident in Fukushima also highlighted the need to address the consequences of nuclear accidents in remote parts of the world, even if the exposure to the EU population is negligible and the fraction of imported goods, e.g. food, with potential contamination is so small that it is of no radiological significance (Janssens, A. (2013), p. 25) [31].

technically to meet the increased 24/7 public information needs for a longer period.

Nuclear accidents with severe consequences have been few and distant in time from one another, but due to the real and potential consequences and public concerns arisen, it became apparent that progress needed to be made in terms of further harmonisation of off-site emergency response, information exchange and coordination among Member States and with third countries. Finally, after the Fukushima accident, EU Member States, third countries and international organizations like the International Atomic Energy Agency (IAEA) realized that working together to release consistent, accurate and timely information not only to the public "likely to be affected" but globally is crucial during a nuclear and radiological emergency, wherever it might occur. This includes monitoring the mass media to identify relevant sources of information, identifying inconsistencies against information from public authorities and rumours and requesting clarification from the relevant State, if appropriate. It is now commonly recognised that timely, factually correct, open, transparent, objective and easily understandable information (including analysis of available official information, assessment of possible consequences and prognosis of possible emergency progression) has to be published on websites and made available to the news media. While the IAEA takes over the task of internationally coordinating public information with relevant Member States and international organizations, the European Commission fulfils this role within the European Union based on EURATOM law.

The accident also prompted further action, in particular a Community-wide comprehensive review ("stress test") of the risk and safety assessments of nuclear installations and of the capabilities for onsite emergency response [9]. The results identified a number of improvements, which should be implemented in nuclear safety approaches and industry practices in the participating countries. The lessons learned from the Fukushima nuclear accident in Japan in 2011 together with the experiences from the "stress tests" were taken into account in the review of Council Directive 2009/71/Euratom [6], which was amended by Council Directive 2014/87/Euratom [9], and in the finalisation of the review of the BSS Directive 96/29/Euratom [4]. The BSS review had already started in 2005 and led to the consolidation of five radiation protection Directives into one single Directive, the Council Directive 2013/59/Euratom of five December 2013 laying down basic safety standards for protection against the dangers from exposure to ionizing radiation [8]. The recasting of the new BSS Directive also had benefitted from the new ICRP Recommendations (Publication 103) in 2007 [10].

3. EURATOM law

3.1.EURATOM Treaty

In light of the historical background explained above, in terms of "information", the EURATOM Treaty establishes only what was perceived necessary at the time: the mutual dissemination of technical information to foster research within the Community (Chapter II) and the dissemination of environmental monitoring data from Member States to inform the European Commission about "*the level of radioactivity to which the public is exposed*".

While the Treaty does not mention *emergency preparedness*, *emergency response* or *public information*, Article 2(b) and Title II, Chapter 3 of the Euratom Treaty, "*establish uniform safety standards to protect the health of workers and of the general public and ensure that they are* *applied*", is still clearly the legal basis for the legislation below .

3.2. Council Decision 87/600/Euratom on Community arrangements for the early exchange of information in the event of a radiological emergency

The accident at the nuclear power station at Chernobyl in the Soviet Union demonstrated that the Commission, in the event of a radiological emergency, needs to receive promptly all relevant information in an agreed format in order to fulfil its tasks.

Council Decision 87/600/Euratom of 14 December 1987 [2] establishes a framework **for notification and provision of information to be used by the Member States** in order to protect the general public in case of a radiological emergency. It is based on Article 31 of the Euratom Treaty [1], which specifies the procedure to establish uniform safety standards to protect the health of workers and of the general public.

The Decision requires from the EU Member States that they promptly notify the European Commission (EC) and all the Member States **potentially affected** when they intend to take measures of widespread nature in order to protect their population against the effects of a radiological or nuclear accident. Council Decision 87/600/Euratom is implemented by technical means through the European Community Urgent Radiological Information Exchange (ECURIE) system. The EC immediately forwards this notification to all Member States via the ECURIE system. Following this first notification, all Member States are required to inform the Commission at appropriate intervals about the measures they take and the radioactivity levels they have measured. The ECURIE system has two message types: an ECURIE Alert message, which implies an emergency notification under EURATOM and an ECURIE Information message, which is a voluntary notification of smaller events and incidents. The Agreement between the European Atomic Energy Community (Euratom) and non-member States of the European Union of 2003 [6] did not yet enter into force. In the meantime, the arrangements cover all Euratom Member States, Switzerland, Montenegro, Norway and the Republic of Macedonia[43].

While the Decision does not contain any direct provisions regarding the information of the general public, it provides the respective legal basis to gather and disseminate information between Member States and the European Commission as "information hub".

In theory, these Community arrangements should ensure that all 28 Member States are promptly informed and have the same status of information in the event of a radiological emergency. This should allow for a harmonised application of uniform standards for protection of the population throughout the Community. In practice, however, experiences like in the case of Krško in 2008 showed that an efficient, rapid and effective information exchange is needed beyond ECURIE. With the new Article 99 paragraph 3 of the BSS, cooperation of Member States with other Member States and third countries is required using bilateral or international information exchange and coordination systems, which could include tools other than ECURIE.

In accordance with the "*International Action Plan for Strengthening the International*

[43] According to DG ENER website, https://ec.europa.eu/energy/en/topics/nuclear-energy/radiation-protection, accessed on 21 August 2018.

Preparedness and Response System for Nuclear and Radiological Emergencies" [26] enhanced cooperation between international organisations and Member States, especially regarding an efficient, rapid and effective information exchange and a fast and effective coordination of public information should be a priority.

3.3. Council Directive 89/618/Euratom

Based on the Euratom Treaty, the first details on informing the general public were established by Council Directive 89/618/Euratom on informing the general public about health protection measures to be applied and steps to be taken in the event of a radiological emergency [3], supplementing the BSS Directive [4], which has been replaced and repealed by the new Basic Safety Standards Directive 2013/59/Euratom [9].

The Directive 89/618/Euratom obliged Member States to inform the general public about health protection measures to be applied and steps to be taken in the event of a radiological emergency. It defines the term *radiological emergency*. The information for the general public also had to be notified to the European Commission and, in case of a radiological emergency, to the Member States likely to be affected. Articles 5 to 7 established the obligations related to prior information, information in the event of an emergency and the information of persons who might be involved in the organization of emergency assistance as well as information procedures. Member States should determine the procedures for circulating the information (Art. 9).

3.4.Council Directive 96/29/Euratom

Council Directive 96/29/Euratom of 13 May 1996 laying down basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionizing radiation (BSS Directive) [4] was adopted following the publication of ICRP recommendations (ICRP Publication 60) in 1991 [12]. Title IX of Interventions contained in Article 50 to 53 the basic obligation for emergency preparedness and response, including intervention preparation, implementation of intervention, emergency occupational exposure and intervention in cases of lasting exposure to be provided for at national level.

It required the coordination of preparedness and response between neighbouring Member States (Article 50) without any requirements regarding the information of the general public. This Directive has recently been replaced and repealed by new Basic Safety Directive 2013/59/Euratom.

3.5.New Basic Safety Standards Directive 2013/59/Euratom

The new Basic Safety Standards Directive 2013/59/Euratom (hereinafter referred to as BSS Directive) includes slightly enhanced requirements for Member States, who - in the event of a pre-alarm phase - are now legally obliged to inform also members of the public likely to be affected ("shall" instead of "should"). In any case, the new BSS contains strengthened requirements regarding the coordination of public information through bilateral or international agreements.

The BSS Directive includes a new definition of the term emergency in Art. 4 para 26, which shall be understood as a "non-routine situation or event involving a radiation source that necessitates prompt action to mitigate serious adverse consequences for human health and safety, quality of life, property or the environment, or a hazard that could give rise to such serious adverse consequences."

What remained essentially unchanged, however, are the public information requirements about health protection measures to be applied and steps to be taken prior to and in the event of such an emergency, and the obligation to provide at regular intervals updated information to the population likely to be affected in the event of such an emergency (**Article 70**). This information includes the health protection measures applicable to them and the action they should take in the event of such an emergency referring to Section A of Annex XII. This information shall be permanently available to the public and not upon request.

When an emergency occurs, Member States have to ensure that the members of the public actually affected are informed without delay about the facts of the emergency, **Article 71** establishes the steps to be taken and, as appropriate, the health protection measures applicable to these members of the public referring to Section B of Annex XII of the new BSS Directive (which are relevant to the type of emergency). This Annex enlists the relevant information that has to be disseminated to members of the public about health protection measures to be applied and steps to be taken in the event of an emergency as referred to in the revised Articles 70 and 71.

Below you find the amended Articles 70, 71 and Annex XII as well as Article 99 of the BSS, the repealed text is displayed as *~~strikethrough~~* and the new text in ***bold underlined*:**

*Article ~~5~~**70***

1. *Member States shall ensure that the ~~population~~ **members of the public** likely to be affected in the event of a**n** ~~radiological~~ emergency ~~is~~ **are** given information about the health protection measures applicable to ~~it~~ **them** and about the action ~~it~~ **they** should take in the event of such an emergency.*

2. *The information supplied shall at least include the elements set out in **section A of** Annex ~~I~~ **XII**.*

3. *~~This~~ **The** information shall be communicated to the ~~population~~ **Members of the Public** referred to in paragraph 1 without any request being made.*

4. *Member States shall **ensure that** ~~update~~ the information ~~and circulate~~ ~~it~~ **is updated and distributed** at regular intervals and whenever significant changes ~~in the arrangements that it describes~~ take place. This information shall be permanently available to the public.*

*Article ~~6~~**71***

Information to the members of the public actually affected in the event of an emergency

1. *Member States shall ensure that, when ~~a radiological~~ an emergency occurs, the ~~population~~ members of the public actually affected is are informed without delay of about the facts of the emergency, of the steps to be taken and,-as ~~appropriate~~ ~~to the~~ ~~case~~ ~~in point, of~~ the health-protection measures applicable to it these members of the public.*

2. *The information provided shall cover the points ~~contained~~ <u>listed</u> in <u>Section B of</u> Annex XII which are relevant to the type of ~~radiological~~ emergency.*

From the comparison above between the old and the new BSS, it is clear that the changes in the new Articles 70 and 71, are merely linguistic as compared to the wording of Articles 5 and 6 as well as Annex I and II of the Directive 96/29/Euratom; basically, the content of Member States obligations in terms of public information has not been revised in the new BSS. Also the changes made in the Annexes are not fundamental. The biggest change, compared to the Annex I of Directive 89/618/Euratom, is that according to the new Annex XII of Directive 2013/59/Euratom, it is now compulsory in the event of a pre-alarm phase ("shall" instead of "should") to give members of the public mandatory some information and advice during that phase (see below).

ANNEX XII

Information to members of the public about health protection measures to be applied and steps to be taken in the event of an emergency as referred to in Articles 70 and 71

<u>A.</u> *Prior information **<u>to the members of the public likely to be affected by an emergency as</u>** ~~r~~eferred to in Article**<u>s</u>** ~~5~~ **<u>70 and 71</u>***

1. *Basic facts about radioactivity and its effects on human beings and on the environment.*

2. *The various types of ~~radiological~~ emergency covered and their consequences for the ~~general~~ public and the environment.*

3. *Emergency measures envisaged to alert, protect and assist the ~~general~~ public in th~~e~~ ~~e~~vent of **<u>an</u>** ~~radiological e~~mergenc~~y.~~*

4. *Appropriate information on action to be taken by the ~~general~~ public in the event of an ~~radiological~~ emergency.*

~~ANNEX II~~

<u>B.</u> *Information **<u>to be provided to the affected members of the public</u>** in the event of an ~~radiological~~ emergency ~~referred to in Article 6~~*

1. *On the basis of the ~~intervention~~ **<u>emergency response</u>** plans previously drawn up in the Member States, the ~~population~~ **<u>members of the public</u>** actually affected in the event of an ~~radiological~~ emergency <u>shall</u> rapidly and regularly receive:*

(a) *information on the type of emergency which has occurred and, where possible, its characteristics (e.g. its origin, extent and probable development);*

(b) *advice on protection, which, depending on the type of emergency, ~~might~~ **<u>may</u>**:*

- *cover the following: restrictions on the consumption of certain foodstuffs **<u>and water</u>** likely to be contaminated, simple rules on hygiene and decontamination, recommendations to stay indoors, distribution and use of protective substances, evacuation arrangements,*

- *be accompanied, where necessary, by special warnings for certain ~~population~~ groups of **<u>the members of the public</u>**<u>;</u>*

(c) *announcements recommending cooperation with instructions or requests by the competent authorities.*

2. *If the emergency is preceded by a pre-alarm phase, the ~~population~~* ***members of the public*** *likely to be affected ~~in the event of a radiological emergency should~~* ***shall*** *already receive information and advice during that phase, such as:*

- *an invitation to the ~~population~~* ***members of the public*** *concerned to tune in to ~~radio or television~~* ***relevant communication channels,***
- *preparatory advice to establishments with particular collective responsibilities,*
- *recommendations to occupational groups particularly affected.*

3. *This information and advice* ***shall*** *be supplemented****,*** *if time permits****,*** *by a reminder of the basic facts about radioactivity and its effects on human beings and on the environment.*

SECTION 5

Emergency exposure situations

Article 99

International Cooperation

1. *~~Each~~ Member State**s** shall ~~seek to~~ cooperate with other Member States ~~or~~* ***and with*** *~~non-Member States~~ third countries in ~~relation to~~ addressing possible ~~radiological~~ emergencies ~~at installations~~ on its own territory which may affect other Member States or ~~non-Member States~~ third countries, in order to facilitate the organisation of radiological protection in ~~these States~~* ***those Member States or third countries****.*

2. ***Each Member State shall, in the event of an emergency occurring on its territory or likely to have radiological consequences on its territory, promptly establish contact with all other Member States and with third countries which may be involved or are likely to be affected with a view to sharing the assessment of the exposure situation and coordinating protective measures and public information by using, as appropriate, bilateral or international information exchange and coordination systems. These coordination activities shall not prevent or delay any necessary actions to be taken on a national level.***

3. *Each Member State shall promptly share information and cooperate with other relevant Member States, relevant third countries and relevant international organisations regarding the loss, theft or discovery of high-activity sealed sources, other radioactive sources and radioactive material of concern and regarding related follow-up or investigations, without prejudice to relevant confidentiality requirements and relevant national legislation.*

4. *Each Member State shall, where appropriate, cooperate with other Member States and with third countries in the transition from an emergency exposure situation to an existing exposure situation.*

ANNEX XI

Emergency management systems and emergency response plans as referred to in Articles 69, 97 and 98

A. Elements to be included in an emergency management system

1. Assessment of potential emergency exposure situations and associated public and emergency occupational exposures;

2. Clear allocation of the responsibilities of persons and organisations having a role in preparedness and response arrangements;

3. Establishment of emergency response plans at appropriate levels and related to a specific facility or human activity;

4. Reliable communications and efficient and effective arrangements for cooperation and coordination at the installation and at appropriate national and international levels;

5. Health protection of emergency workers;

6. Arrangements for the provision of prior information and training for emergency workers and all other persons with duties or responsibilities in emergency response, including regular exercises;

7. Arrangements for individual monitoring or assessment of individual doses of emergency workers and the recording of doses;

8. Public information arrangements;

9. Involvement of stakeholders;

10. Transition from an emergency exposure situation to an existing exposure situation including recovery and remediation.

B. Elements to be included in an emergency response plan

For emergency preparedness:

1. *Reference levels for public exposure, taking into account the criteria laid down in Annex I;*
2. *Reference levels for emergency occupational exposure taking into account Article 53.*
3. *Optimised protection strategies for members of the public who may be exposed, for different postulated events and related scenarios;*
4. *Predefined generic criteria for particular protective measures;*
5. *Default triggers or operational criteria such as observables and indicators of on-scene conditions;*
6. *Arrangements for prompt coordination between organisations having a role in emergency preparedness and response and with all other Member States and with third countries which may be involved or are likely to be affected;*
7. *Arrangements for the emergency response plan to be reviewed and revised to take account of changes or lessons learned from exercises and events.*
8. *Arrangements shall be established in advance to revise these elements, as appropriate during an emergency exposure situation, to accommodate the prevailing conditions as these evolve throughout the response.*

For emergency response:

The response to an emergency exposure situation shall be undertaken through the timely implementation of preparedness arrangements, including but not limited to:

> *1. Promptly implementing protective measures, if possible, before any exposure occurs;*
>
> *2 .Assessing the effectiveness of strategies and implemented actions and adjusting them as appropriate to the prevailing situation;*
>
> *3. Comparing the doses against the applicable reference level, focusing on those groups whose doses exceed the reference level;*
>
> *4. Implementing further protection strategies, as necessary, based on prevailing conditions and available information.*

By comparison between Article 50 of Directive 96/29/Euratom and Articles 97 to 99 of the Directive 2013/59/Euratom, it can be established that the new provisions have been substantially enhanced concerning the cooperation and information exchange **between Member States.** Not only the cooperation with Member States and third countries has become mandatory; also, the obligation to "*promptly establish contact with all other Member States and with third countries which may be involved or are likely to be affected with a view to sharing the assessment of the exposure situation and coordinating protective measures and public information by using, as appropriate, bilateral or international information exchange and coordination systems*" is new. This new obligation to coordinate intervention measures and the information of the public with all Member States and third countries, likely to be affected, shows that the BSS takes account of good international practices drawn up from the lessons learned after the Fukushima accident. Member States will have to include new national implementing measures to transpose this obligation.

The comparison between the old and the new BSS shows, that the obligation in Article 70 of the new BSS "*to provide at regular intervals updated information to the population likely to be affected in the event of such an emergency*" has only been slightly changed in view of linguistic adaptations. Neither does Annex XII of the new BSS contain fundamental changes. Except for slightly enhanced requirements to inform now also the public likely to be affected in the event of a pre-alarm phase ("shall" instead of "should") in Annex XII of BSS, the content of relevant information basically remains the same for the affected and likely affected population. The list of relevant information in Section A and B of Annex XII of BSS, which has to be disseminated (health protection measures to be applied and steps to be taken prior to and in the event of a radiological emergency) includes also merely linguistic adaptations.

Conclusion: Annex XI para A.8 of the BSS goes slightly beyond international obligations: "public information arrangements" and stakeholder involvement have to be included in emergency management systems and emergency response plans including the involvement of stakeholders. The BSS here does not distinguish between the public affected, likely to be affected or the general public; yet it clearly does not request (two-way) communication arrangements with the public. Member States are free to exceed the minimum requirements of the Directive in implementing international guidance.

Conclusion: Both Articles 70 and 71 of the BSS as well as Annex XII clearly establish the obligation of Member States to ensure that the necessary information (see below, Chapter 6.4,

p. 34) is promptly given to or received by the public affected or likely to be affected. Since public i**nformation requirements, have not been changed** or updated substantially and involve only the information of the public affected or likely to be affected (not the concerned public, which is neither affected nor likely to be affected), it can be concluded that the obligation of Member States according to the Articles 70 and 71 BSS could be understood as a one-way communication (i.e. provision) of information to the public and not as a two-way communication (i.e. dialogue) with the public.

Conclusion: A distinction should be made between what is practically feasible in the preparedness and what in the response phase. In particular, the effectiveness of communication in the response phase demands that the public are given clear, unambiguous information and instructions in order that they take the necessary rapid actions for their protection. Although it may be desirable, some situations may not allow "two-way communication", as it would be impractical and may indeed take up resources of civil protection authorities that could delay and prevent necessary rapid actions to protect the public. Whilst some feedback is necessary for authorities to know that the information and messages are being correctly understood and acted on the scope and resources of the authorities to engage in dialogue or two-way communication with the public in the early response phase will be quite different to the preparedness phase. However, two-way communication (in the sense of a dialogue) might not be required or appropriate in each and every phase.

Conclusion: Member States should have already implemented Articles 70 and 71 in their national legislation since in terms of public information their content has not been substantially revised. But as the BSS Directive "*provides for minimum rules, Member States are encouraged to adopt or maintain more stringent measures in the subject-matter covered by the Directive*". Thus, the provisions of the Directive do not limit additional measures that go beyond the minimum requirements and the authors encourage the Member States, to use more ambitious non-binding international good practice as guidance for the transposition into national law and an efficient and effective implementation practice.

3.6. Council Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear installations (as amended by Council Directive 2014/71/Euratom of 8 July 2014)

As one of the first worldwide, the Member States implemented the Convention on Nuclear Safety [5] and the IAEA Safety Fundamentals, IAEA, 2006 [12], through a Community framework. The Euratom nuclear safety legislative framework reflects the main principles of the CNS and the IAEA Safety Fundamentals. This framework took the form of the legally binding and enforceable Council Directive 2009/71/Euratom [6], amended by Council Directive 2014/87/Euratom [9], establishing a Community framework for the nuclear safety of nuclear installations. As one of the basic requirements of the former Directive, all 28 Member States needed to have procedures in place to inform the general public.

The initial wording of Article 8 of the Directive 2009/71/Euratom on the “Information to the public” - obliged Member States in the past only to ensure "*that information in relation to the regulation of nuclear safety is made available to the workers and the general public. This* *obligation includes ensuring that the competent regulatory authority informs the public in the fields of its competence. Information shall be made available to the public in accordance with national legislation and international obligations, provided that this does not jeopardise other interests such as, inter alia, security, recognised in national legislation or international obligations*." [6]

In its Communication to the Council and the European Parliament on the "stress tests", the Commission stated in Chapter 2.2.3: "*Transparency is essential in ensuring that the best possible safety practices are used, as shown by the stress tests. However, the Nuclear Safety Directive contained only generic requirements on public information*" [10]. With its 2014 amendment, the Community reacted to the results of the stress tests and the lessons learnt from the Fukushima accident. A major conclusion from the Fukushima Dai-Ichi accident - in terms of public information - was the need for national regulatory organisations to "think globally" when talking about a crisis. Communication has become global; "*any world citizen has access to news and can be a citizen journalist*", so it is crucial that the public information is consistent between the different national authorities and considers not only the public in the affected countries but worldwide.

Therefore, the revised Nuclear Safety Directive encourages competent authorities in Member States to establish *"close cooperation, coordination and information exchange between competent regulatory authorities of Member States in the vicinity of a nuclear installation, irrespective of whether those Member States operate nuclear installations or not",. In this respect, Member States should ensure that appropriate arrangements are in place to facilitate such cooperation on nuclear safety matters with cross-border impacts." (*Recital 10). Recital 12 recognises the *"importance of enhancing transparency on nuclear safety matters as an important mean of promoting independence in regulatory decision-making. Therefore, the current provisions of Directive 2009/71/Euratom on the information to be provided to the general public should be made more specific as to the type of information be provided. In addition, the general public should be given opportunities to participate in the relevant phases of the decision-making process related to nuclear installations in accordance with the national framework for nuclear safety, taking into account the different national systems*."

The revision of Article 8 focuses on increasing the transparency of the regulatory authorities and operators of nuclear power plants with their obligation to make necessary information available in relation to the safety of the nuclear installations and its regulation, with specific consideration to local authorities, population and stakeholders in the vicinity of a nuclear installation both in times of normal operation and in the event of incidents and accidents.

Please find below the text of Article 8 of the Directive 2009/71/Euratom, as revised by the Directive 2014/87/Euratom (old text in ~~strikethrough~~, new text in **<u>bold underlined</u>**):

Article 8

~~Information to the public~~ ***<u>Transparency</u>***

1. Member States shall ensure that ***<u>necessary</u>*** *information in relation to the regulation of nuclear safety of nuclear installations and its regulation is made available to the workers and the general public, with specific consideration to local authorities, population and stakeholders in the vicinity of a nuclear installation. ~~This~~ That obligation includes ensuring* *that the competent regulatory authority and the licence holders, within their fields of responsibility, provide in the framework of their communication policy:*

(a) information on normal operating conditions of nuclear installations to workers and the general the public in the fields of its competence; and

*(b) **prompt** information in case of incidents and accidents to workers and the general public and to the competent regulatory authorities of other Member States in the vicinity of a nuclear installation.*

2. Information shall be made available to the public in accordance with relevant national legislation and international obligations instruments, provided that this does not jeopardise other overriding interests such as, inter alia, security, which are recognised in national relevant legislation or international obligations instruments."

3. Member States shall, without prejudice to Article 5(2), ensure that the competent regulatory authority engages, as appropriate, in cooperation activities on the nuclear safety of nuclear installations with competent regulatory authorities of other Member States in the vicinity of a nuclear installation, inter alia, via the exchange and/or sharing of information.

4. Member States shall ensure that the general public is given the appropriate opportunities to participate effectively in the decision-making process relating to the licensing of nuclear installations. in accordance with relevant legislation and international instruments.

Conclusion: The requirements of the revised NSD, which include increased transparency and the provision of information to the workers and the general public, are complementary to those of the revised BSS, which includes information requirements for the public affected and likely to be affected by an emergency[44]. Both Directives introduce the obligation to inform the public during normal operation and in the event of an emergency (regulated by the NSD) and the information of the public affected and likely to be affected prior and in the event of an emergency (regulated by the BSS). Both Directives require the cooperation with competent authorities of other Member States and third countries (NSD) and the coordination and centralised communication of information through authorities (BSS). Member States public information and transparency framework should therefore consider the public affected and likely to be affected in an emergency (BSS) as well as workers and public, not likely affected (NSD).

Conclusion: The BSS and the NSD Directives are complementary to the information obligations between Member States and the European Commission under Council Decision 87/600/Euratom "*in case of an emergency on their territory resulting in measures of wide-spread nature"*. The revised NSD, in its Article 8 paragraph 3, obliges Member States' competent regulatory authorities to engage in cooperation activities on the nuclear safety of nuclear installations, including the exchange and/or sharing of information with competent regulatory authorities of other Member States in the vicinity of a nuclear installation. This information exchange is complementary to the exchange through the ECURIE System based on Council

[44] The BSS with its Article 77 on transparency requires that "***Member States shall ensure that information*** *in relation to the justification of classes or types of practices, the regulation of radiation sources and of radiation protection* ***is made available to undertakings, workers, members of the public, as well as patients and other individuals subject to medical exposure****. This obligation includes ensuring that the competent authority provides information within its fields of competence.*"

Decision 87/600/Euratom. While the obligation to cooperate in in relation to possible radiological emergencies at installations on its own territory was already contained in Article 50 para 4 of the former Council Directive 96/29/Euratom, the Article 8 paragraph 3 of the revised NSD covers also the information exchange during normal operations. In case of incidents and accidents, the NSD specifically requires license holders and competent authorities to **directly and promptly** inform workers and the public (Art. 8). This might result in a situation where the license holders inform the public at the same time as or even earlier than the competent authorities who actually should promptly contact other Member States and third countries to coordinate the public information. Member States should use this opportunity to improve prompt information to the affected population.

From comparison of the new BSS and the NSD, it is clear that they do not explicitly address the need for Member States to develop public communication programmes, strategies or plans in case of an emergency. However, Article 8 of the NSD refers to the need of competent regulatory authorities and licence holders to develop a communication policy framework to inform the workers and general public on normal operating conditions of nuclear installations and in case of incidents and accidents.

While the NSD in Article 8 paragraph 4 establishes clear participation rights in licensing procedures, there are no such participation rights in emergency preparedness or during an emergency under Article 8 paragraph 1. Neither the BSS nor the NSD establishes two-way communication obligations with the public in the case of an emergency. According to Article 8 para 1 of the NSD the transparency requirements include a (one-way) provision of information on normal operating conditions to workers and the general public and prompt information in the case of incidents and accidents to workers, the general public and to the competent regulatory authorities of other Member States in the vicinity of a nuclear installation.

4. International Conventions

4.1. Convention on Early Notification of a Nuclear Accident

The Convention on Early Notification of a Nuclear Accident [44] was adopted by the General Conference at its special session, 24-26 September 1986, and entered into force on 27 October 1986. It obliges States to provide to other affected or likely affected States *relevant information* about nuclear accidents as early as possible in order that transboundary radiological consequences can be minimized.

In Article 2 it obliges State Parties to (a) *forthwith notify, directly or through the IAEA those States which are or may be physically affected* [by a transboundary release that could be of radiological safety significance] *and the Agency of the nuclear accident, its nature, the time of its occurrence and its exact location where appropriate; and (b) promptly provide the States referred to in sub-paragraph (a), directly or through the Agency, and the Agency with such available information relevant to minimizing the radiological consequences in those States, as specified in Article 5.*

Such information to be provided shall comprise the following data (as then available to the notifying State Party):

(a) *the time, exact location where appropriate, and the nature of the nuclear accident;*

(b) *the facility or activity involved;*

(c) *the assumed or established cause and the foreseeable development of the nuclear accident relevant to the transboundary release of the radioactive materials;*

(d) *the general characteristics of the radioactive release, including, as far as is practicable and appropriate, the nature, probable physical and chemical form and the quantity, composition and effective height of the radioactive release;*

(e) *information on current and forecast meteorological and hydrological conditions, necessary for forecasting the transboundary release of the radioactive materials;*

(f) *the results of environmental monitoring relevant to the transboundary release of the radioactive materials;*

(g) *the off-site protective measures taken or planned;*

(h) *the predicted behaviour over time of the radioactive release.*

Such information shall be supplemented at appropriate intervals by further relevant information on the development of the emergency situation, including its foreseeable or actual termination. Except when such information is provided in confidence by the State Party, this information can be used without restrictions and thus also be made available to the public.

While the Early Notification Convention establishes legal requirements for States Parties to inform each other and the Agency on the information to be provided, it does not detail any obligations to inform the general public.

4.2. Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency

In its Article 6 Paragraph 1, the Convention on Assistance in the case of a nuclear accident or radiological emergency [45] states "*The requesting State [Note: the State requesting assistance] and the assisting party shall protect the confidentiality of any confidential information that becomes available to either of them in connection with the assistance in the event of a nuclear accident or radiological emergency. Such information shall be used exclusively for the purpose of the assistance agreed upon."*

Article 6 paragraph 2 establishes a legal obligation: "*The assisting party shall make every effort to coordinate with the requesting State before releasing information to the public on the assistance provided in connection with a nuclear accident or radiological emergency*."

This means that the requesting State legally has the right to keep (some or all) information, which is being exchanged between requesting and assisting parties confidential. Only non-confidential information, may be included in public statements provided the assisting party sought out the prior agreement from the requesting party.

4.3. Convention on Nuclear Safety (IAEA)

In its Article 16 on emergency preparedness, the Convention on Nuclear Safety - for the first time - establishes a legal obligation for Contracting Parties to ensure that the population likely to be affected by a radiological emergency are provided with appropriate information for emergency planning and response: "Each Contracting Party shall take the appropriate steps to ensure that, insofar as they are likely to be affected by a radiological emergency, its own population and the competent authorities of the States in the vicinity of the nuclear installation are provided with appropriate information for emergency planning and response." However, the text of the Convention does not provide specific definitions and does not answer the question of what is meant by "the provision of appropriate information".

Article 16 (2) of the Convention on Nuclear Safety [46] obliges each Contracting Party to "*take the appropriate steps to ensure that, insofar as they are likely to be affected by a radiological emergency, its own population and the competent authorities of the States in the vicinity of the nuclear installation are provided with appropriate information for emergency planning and response*". The Convention does not stipulate any right to participate in the preparation of emergency preparedness plans.

At the 7th Review Meeting of the Contracting Parties to the Convention on Nuclear Safety [47] which was held, pursuant to Article 20 of the Convention, at the Headquarters of the International Atomic Energy Agency (IAEA) in Vienna, Austria from 27 March to 7 April 2017, Contracting Parties acknowledged that open and transparent communication with the public can enhance trust in the regulatory body. This can include involvement of the public in development of policy and regulations regarding nuclear safety infrastructure. Contracting Parties further noted that communication of understandable, accurate and transparent information to the public and decision-makers during emergency situations needs to be planned and carefully considered at a time where rapid access to social media information, which may be of questionable provenance, is now widely available.

Conclusion: In essence, the three relevant Emergency Preparedness and Response Conventions do not provide sufficient legal requirements to inform the public prior or in the event of a radiological emergency. Neither do they offer help in the interpretation of the main terms related to the information of the public in an emergency. They, if at all, only require the population likely to be affected to be provided with appropriate information for emergency preparedness and response or establish confidentiality provisions for information exchange between States. EURATOM law goes definitely further in establishing legally binding obligations for Member States, especially regarding the content of information to be provided. For the transposition and implementation of these obligations, Member States are encouraged to take into account the latest international guidance, such as IAEA Safety Standards and Safety Requirements (see next chapters).

5. Selected International Recommendations and Guidelines

5.1.IAEA General Safety Requirements, Standards and Guides

Each Member State is responsible for the application of the highest standards of nuclear safety and for providing a timely, transparent and adequate response to nuclear emergencies.

The IAEA regularly issues practical guidance on how to prepare and train for emergency communication and provides several principles and tools for communication to assist Public Information Officers in their work. In the area of public information in an emergency, the International Atomic Energy Agency (IAEA) establishes high standards. In this regard, the following major documents have been published (in chronological order):

- IAEA (1994) Nuclear Communications: A Handbook for Guiding Good Communications Practices at Nuclear Fuel Cycle Facilities, Vienna, Austria: IAEA [49].
- IAEA (2002) IAEA Safety Standards Series No. GS-R-2, *Preparedness and response for a nuclear or radiological emergency*, IAEA, Vienna, 2002, [50] **superseded by GSR Part 7** [16]
- IAEA (2012), Emergency Preparedness and Response EPR-Public Communications 2012, Communication with the Public in a Nuclear or Radiological Emergency [15]
- IAEA (2015) Preparedness and Response for a Nuclear or Radiological Emergency, General Safety Requirements Part 7 (hereinafter referred to as IAEA (2015) GSR Part 7) [16].
- IAEA (2015) Method for Developing a Communication Strategy and Plan for a Nuclear or Radiological Emergency. Vienna, Austria: IAEA (hereinafter referred to as IAEA EPR Public Communication Plan (2015)) [17]

Due to the increasing demand to further guidance on public information to and communication with the public for emergency preparedness and throughout a nuclear or radiological emergency, the IAEA proposed a new Draft Safety Guide DS475. This Safety Guide supports Part 7 of the General Safety Requirements on emergency preparedness and response (GSR Part 7) on Preparedness and Response for a Nuclear or Radiological Emergency (2015), which supersedes GS-R-2). This new Safety Guide DS475 will be called "*Arrangements for Public Communications in Preparedness and Response for a Nuclear or Radiological Emergency*"[45] and has not yet been published. The Draft Safety Guide DS475 (publication expected in 2018) will directly support the requirement in GS-R Part 7 to provide "*useful, timely, truthful, consistent, clear and appropriate information to the public in the event of a nuclear or radiological emergency; responding to incorrect information and rumours; and responding to requests for information from the public and from the news and information media*.") and seek to harmonize public information and media communications arrangements during nuclear and radiological emergencies, irrespective of the initiator of the emergency, whether due to a natural event, human error, mechanical or other failure or a nuclear security event.

The objectives of the Draft Safety Guide DS475 are to provide guidance to IAEA Member States in developing arrangements for communicating with the public and media and coordinating with all sources of official information in preparedness and response for a nuclear or radiological emergency, including the transition to an existing exposure situation. These arrangements will facilitate the successful implementation of protective actions and the delivery of consistent messages. It will be applicable to the full range of nuclear and radiological emergencies, regardless of the cause, including specific consideration for the particularities that may arise when dealing with emergencies instigated by a nuclear security event. It will provide

[45] See http://www-ns.iaea.org/downloads/standards/dpp/dpp475.pdf, accessed on 22 August 2018.

guidance to a specialized target audience: those responsible for communicating with the public and the media in a nuclear or radiological emergency (generally called "Public Information Officers") within all organizations involved in emergency preparedness and response at facility, local, national and international levels.

Conclusion: Until the publication of the new Safety Guide DS475, the authors encourage Member States to take the following General Safety Requirements GSR Part 7 into account for the transposition and implementation of their obligations under the BSS and the Nuclear Safety Directive:

Requirement 2, para 4.10 *Coordinating mechanism lit. i)*

(i) *To coordinate effective communication with the public in preparedness for a nuclear or radiological emergency.*

Requirement 10 - Providing instructions, warnings and relevant information to the public for emergency preparedness and response: The government shall ensure that arrangements are in place to provide the public who are affected or are potentially affected by a nuclear or radiological emergency with information that is necessary for their protection, to warn them promptly and to instruct them on actions to be taken.

Requirement 13 - Communicating with the public throughout a nuclear or radiological emergency: The government shall ensure that arrangements are in place for communication with the public throughout a nuclear or radiological emergency.

Requirement 18: Terminating a nuclear or radiological emergency: The government shall ensure that arrangements are in place and are implemented for the termination of a nuclear or radiological emergency, with account taken of the need for the resumption of social and economic activity.

Requirement 20: Authorities for emergency preparedness and response: The government shall ensure that authorities for preparedness and response for a nuclear or radiological emergency are clearly established.

Requirement 22: Coordination of emergency preparedness and response

Requirement 25: Training, drills and exercises for emergency preparedness and response

Conclusion: Member States are strongly encouraged to interpret their public information obligations under the NSD and the BSS Directive in line with the requirements 5.69 to 5.75 of the IAEA General Safety Requirements (GSR) Part 7 [16]:

- to provide useful, timely, true, clear and appropriate information to the public in a nuclear or radiological emergency,
- to ensure that information [...] is well coordinated and consistent,

- to provide information [...] in plain und understandable language,
- to put radiological health hazards into perspective,
- to explain to the public any changes in the protective actions,
- to identify and address, to the extent practicable, misconceptions, rumours and incorrect and misleading information [...] and,
- to respond to enquiries from the public and from news media, both national and international, including enquiries received from or through the IAEA.

5.2.OECD-NEA Publications

In June 2011, the Working Group on Public Communication of Nuclear Regulatory Organisations (WGPC) of the Nuclear Energy Agency (NEA) Committee on Nuclear Regulatory Activities (CNRA) adopted the first Roadmap for Crisis Communication of Nuclear Regulatory Organisations which focused on national aspects [20]. The document, which was based on a survey on national crises to which 17 countries responded, aims to help nuclear regulatory authorities improve the effectiveness of crisis communication management, by providing some guidance to be used before, during and after crises.

The document was mostly completed before the Fukushima Daichi accident (Japan) occurred in March 2011 and therefore, it did not take into account the necessary analysis of national practices derived from international crisis communication management. For this reason, the CNRA decided to organise a workshop on the topic of "Crisis communication: facing the challenges" which was held on 9-10 May 2012 in Madrid, Spain. The workshop aimed "*to address the international dimension of the communicative responses to crises by assessing the experience of Nuclear Regulatory Organisations of the NEA member countries and their stakeholders*". [21]

The reports mentioned above focus on the role of the regulator regarding communication in the case of an accident or incident in nuclear facilities. Depending on the country, the nuclear regulatory organisation may or may not be the primary communicator during a national emergency. The central government, the licensee or the national crisis centre may assume the lead for public communication. Generally, the plans and procedures for public information in cases of emergency are stated in acts or legal documents.

In its publication *"Five Years after the Fukushima Daiichi Accident. Nuclear Safety Improvements and Lessons Learnt"* (2016), OECD-NEA refers to the different lessons learnt and challenges identified since the accident in 2011. One of the challenges identified for future consideration refer to the need to enhance stakeholder involvement and public communication. The document states that: *"Involvement of stakeholders (local authorities, industry, non-governmental organisations, government officials and the public) in decision making is appropriate and advisable to enhance the credibility, legitimacy, sustainability and final quality of regulatory and off-site emergency management decisions. In addition, proactive outreach to stakeholders in regular communications (i.e. in non-accident situations) is highly desirable to improve their understanding in times of crisis. Some member countries have further developed their policies on transparency, openness and involvement of stakeholders in the regulatory process, providing a window into the regulatory decision-making process. Different country-specific practices and regulatory requirements reflect more general practices within each individual country. Experience during the Fukushima Daiichi Nuclear Power Plant (hereinafter referred to as NPP) accident highlighted the need to reconsider approaches to information sharing and assessment, both domestically and internationally. The experience reaffirmed that regulators and governments should be effectively communicating with their stakeholders to ensure that all aspects of safety in relation to nuclear facilities are understood. To achieve this goal, regulators need to continue improving their communication strategies, as well as the* *implementation of such strategies."*

Other relevant OECD-NEA International Guidance Documents include:

- NEA/SEN/NRA/WGPC(2006)5, OECD-NEA Working Group on Public Communication of Nuclear Regulatory Organisations, Public Communication During Abnormal Situations 6 July 2006, Nuclear Energy Agency Committee on Nuclear Regulatory Activities, OECD, 2006.
- NEA/CNRA/R(2008)4, Achievements and Challenges in Nuclear Regulatory Communication with the Public: Outcome from the CNRA Workshops held in 2000, 2004 and 2007.
- NEA/CNRA/R(2011)3, Commendable Practices on Transparency in Nuclear Regulatory Communication with the Public.
- NEA/CNRA/R(2011)11, Road Map for Crisis Communication of Nuclear Regulatory Organisations - National Aspects, 7 July 2011, OECD 2007.
- NEA/CNRA/R(2012)8, Crisis Communication of Nuclear Regulatory Organisations: Towards global thinking.
- NEA/CNRA/R(2014)6, Nuclear Regulatory Organisations, the Internet and Social Media: The What, How and Why of Their Use as Communication Tools.
- NEA/CNRA/R(2015)2, Nuclear Regulatory Organisations and Communication Strategies.

6. Analyses of EURATOM provisions in the light of international guidance

There are several terms used in the EURATOM provisions, which may not explicitly defined and their interpretation may lack clarity. To better interpret and define the obligations under Art 70, 71 and 99 of the Basic Safety Standards Directive (BSS) as well as Article 8 of the Nuclear Safety Directive (NSD), displayed above, the present chapter provides an overview of existing definitions of key words related to public information requirements. In particular, the definitions of the following general concepts are analysed below, based on EURATOM provisions and international guidelines: public information, communication, communication policy, necessary information, emergency and radiological emergency, steps to be taken, members of the public likely to be and actually affected, vicinity, stakeholders and prompt/promptly.

6.1. Public information (Art. 99 and Annex XI of BSS), public communication (IAEA) and crisis communication (OECD)

6.1.1. Public information (NSD, BSS)

The Nuclear Safety Directive neither uses the terms "*public information*" as such nor "*public communication*" in any of its articles.

The Basic Safety Directive refers to "*public information*" with regards to international cooperation (Art. 99) and in Annex XI para A.8 with regards to "*public information arrangements*" as an element to be included in an emergency management system without any further definition.

Article 99 of the BSS establishes an obligation for all 28 EU Member States to co-ordinate public information: "Each Member State shall, in the event of an emergency occurring on its territory or likely to have radiological consequences on its territory, promptly establish contact with all other Member States and with third countries, which may be involved or are likely to be affected with a view to sharing the assessment of the exposure situation and coordinating protective measures and public information by using, as appropriate, bilateral or international information exchange and coordination systems". The coordination of public information with the authorities of other Member States and third countries is a key provision to ensure well coordinated and consistent information of the public. Since the BSS Directive does not regulate how information is provided (except of promptly) to the public, this term rather refers to the requirement to coordinate the content of the information that is communicated to the public. Here both one-way information (through information channels like TV and radio, and two-way information (new media, requests for information) could be meant. This requirement intends not to exchange information with the public in the sense of a two-way communication process, but to establish arrangements for a one-way communication of information to the public. This interpretation is in line with the notion that "public information about emergencies and emergency response is currently being interpreted as a one directional transfer of information from a source to a receiver (Železnik, Marega, & Koron, 2014).

6.1.2. Public information and public communication (IAEA, OECD)

When analysing how *public information* and *public communication* are defined in IAEA documents, it can be observed that the terms *public information* and *public communication* are often used interchangeably without significant difference. More recent publications use the term communication and the revised Safety Guide use the term "*two-way communication*", while older ones rather use the term "*public information*".

According to a statement in the Foreword of the IAEA Publication EPR Public Communication Plan (2015) [17] the term *public communication* is defined by "*any activity that communicates information to the public and the media during a nuclear or radiological emergency*". In this IAEA publication, the term *public communication* has been used rather than public information, because the latter may be used in other IAEA publications and documents to ensure consistency with the terminology used to describe the command and control system. IAEA (2015) EPR Public Communication Plan [17] tend to use the term “public communication” instead of “public information”, while at the same time they refer to documents regarding command and control systems, which use the term "information". If used, the terms "public information” and “public communication” are to be understood – in the relevant context – mostly as a one-way transfer or communication of information to the public. However, we note that in some instances in IAEA GSR Part 7 the different terms are used to give different meanings: compare Requirement 10 on *Providing information to the public* and 13 on *Communicating with the public*, IAEA GSR Part 7. Despite the apparent trend to use 'public communication', some recent IAEA documents continue to preferentially use the term public information, e.g the GSR Part 7 Preparedness and Response for a Nuclear or Radiological Emergency (IAEA, 2015).

The IAEA Handbook on Nuclear Law (2003) [51] states in Chapter 2.3.6 on page 30 on public information "*Although it is not referred to in the Convention on Nuclear Safety or the Joint Convention, most regulatory bodies have programmes for the* ***provision of information*** *to other stakeholders (the public, the media, the legislature, local government and industry) about issues and activities relevant to nuclear and radiation safety. Indeed, public confidence that nuclear material and techniques are being used safely is closely linked to the regulatory body's track record of providing prompt, accurate and complete information on such issues and activities. Independence is also relevant in this context. National legislation should make it clear that the regulatory body is authorized to communicate its requirements, decisions and opinions, and the basis for them, to the public independently. Furthermore, it should enable the regulatory body to* ***communicate directly with high-level governmental authorities*** *when communication with them is considered necessary for the effective exercise of the regulatory body's functions. Finally, legal authority is needed in order to ensure that the regulatory body can make available, to other governmental bodies, international organizations and the public, information on incidents and abnormal occurrences, and other information, as appropriate.* "

*In addition, OECD/NEA defines the term "crisis communication" as the "*Design, planning and implementation of communicative actions in order to satisfy the obligations and demands regarding public information and transparency in a situation of media pressure and reputational risk for the NRO. This term includes both one- or two-way communication with the public. These will take into account the different phases of pre-during and post-crises." [20]. In three out of five cases the BSS uses the term "communication" with the intention to connect the sender and the recipient to establish a two-way communication path (but not with the public). In the other two cases and in case of the NSD the term "*communication*" is used in the sense of informing the public (one-way). It appears that when the public is involved the BSS speaks about information or one-way communication, if other authorities or individuals are involved the BSS uses "communication" in the sense of a two-way communication.

In the analysed standards and guidance, the term "*communication with*" is often used to express the exchange of information between authorities (and not with the public) and the term "*provision of information*" is often used to describe the information of the public.

6.1.3. Effective communication of information

It is essential that the information provision has to be effective, i.e. that the message is clear enough to be understood and acted upon quickly if necessary. In this sense, the quote from Sydney J. Harris[46] illustrates the slight differences in the concepts of information and communication and offers a third approach towards an improved interpretation of the BSS requirements on public information in Articles 70, 71: for the provisions to be effective, the information needs to be understood and correctly acted upon. Such an interpretation implies that some means of feedback or assurance should be ensured and therefore **effective information** provision may extend in some cases to a form of two-way communication. This of course cannot be interpreted as always requiring a dialog.

The "**effectiveness**" could be assessed based on some feedback from the target audience to ensure that the information is received/ clearly understood and that the goal of public protection is achieved. Such a feedback could be seen as a form of exchange, or basic two-way communication between the authorities responsible and the public. This approach illustrates a possible way in which the relevant legal requirements of the Euratom legislation, which has been adopted by and is binding to EU Member States, could be interpreted and implemented using non-binding international texts as guidance".

This would mean - similarly to the enhanced transparency requirements for license holders of the Nuclear Safety Directive Member States are required to provide for an "effective communication" with the public prior and in the event of an emergency also on the basis of the BSS. However, to date, there is no legal obligation in BSS or NSD to establish a two-way communication with the public, as it is the case between authorities of Member States. The legal obligations in Article 70, 71 BSS and 8 NSD therefore still refer to a one-way communication of information to the public while noting that there is room for improved interpretation in the Member States.

Conclusion: Currently, there is neither a legal definition of the term "public information" in the EURATOM legal framework nor in binding international law. In the IAEA Guidelines, the term *communication* is defined, but the terms "*public communication*" and "*public information*" are used interchangeably. IAEA Guidance documents do not answer the question of how these terms should be interpreted in general, it depends on the context and content of the requirements and recommendations. International guidance could therefore benefit from a clear explanation of these terms so that they can be used consistently and understood unambiguously. Therefore, from todays' point of view, Member States should interpret the term "information to the public" as far as possible as "effective communication" in the sense of exchanging information to ensure a successful transfer of information as a "one and two-way

[46] "The two words 'information' and 'communication' are often used interchangeably, but they signify quite different things. Information is giving out; communication is getting through." These words of Sydney J. Harris, a British author born 1917, are found in numerous quotation sites on the Internet, including www.thinkexist.com,www.brainyquote.com, and www.quoteopia.com, accessed on 27 August 2018

communication with the public". Therefore, Member States should take this opportunity for improved interpretation of the legal obligations and their implementation based on international guidance. The interpretation of the Directives' provisions as well as their implementation in Member States can be improved significantly in view of latest international guidance. Member States should assess the effectiveness based on feedback from the public and to ensure that the information is correctly understood and acted upon. Such a feedback could be seen as a form of exchange, or basic two-way communication between the authorities responsible and the public.

6.2.Communication (Art. 76, 88, Annex XI, Annex XII and Annex XVIII BSS, IAEA)

The term "*communication*" is used five times in the BSS and only once in Article 8 of the NSD in relation to the "communication policy" (see below). Communication is used as part of other terms in different articles of the Basic Safety Standards Directive and refers to "communication channels (Annex XII), "communication links" (Art. 88), "reliable communications" (Annex XI) and "rapid" communication (Art. 76)". In most cases these terms refer to provision of information to the public, or they describe a two-way communication between authorities. Only once in Annex XII Chapter B2 regarding communication channels, the concept seems to include both a one-way provision of information to and communication with the public (see below).

6.2.1. "Point of contact for communication with the competent authorities of other Member States" and "rapid communication (Art. 76 para 2 and 3 BSS)

Article 76 para 2 of BSS states "*Where a Member State has more than one competent authority for a given area of competence, it shall designate one point of contact for **communication with** the competent authorities of other Member States.*" Article 76 para 3 of BSS states "*Member States shall forward to the Commission the name and address of the points of contact and their respective areas of competence to enable rapid **communication**, where appropriate, **with** their authorities*". In both paragraphs, it is clearly the intention to establish a **two-way communication** to send and receive messages to and from other competent authorities. Because these terms do not refer to "communication with the public" but with competent authorities, this reference cannot be used to understand the interpretation of the concept of communication in the BSS.

6.2.2. "Communication links" (Art. 88 (d) BSS),

Article 88 (d) requires the inclusion of "*requirements for emergency procedures and communication links*" in a license that involves a high-activity sealed source".

According to online dictionaries, communication links are "the *communications channels, a digital or analogue data link, that connects two or more communicating devices*".[47][48] Also, here it is clearly the intention to establish a two-way communication - a connection - between the license holder and the licensing authority in case of an emergency; not the communication with the public in case of an emergency. Thus, this reference cannot be used to understand the interpretation of the concept of communication in the BSS.

[47] http://itlaw.wikia.com/wiki/Communication link, accessed on 26 February 2018.

[48] http://www.businessdictionary.com/definition/communication-channel.html accessed on 26 February 2019.

6.2.3. Reliable communications" (BSS, Annex XI on Emergency management systems and emergency response plans, para A.4.)

Annex XI para A.4 requires the inclusion of "*Reliable communications and efficient and effective arrangements for cooperation and coordination at the installation and at appropriate national and international level*". This is to be understood as the means, methods and systems of exchanging information and communication lines between the various authorities and organisations responsible for planning/response to an emergency at the installation, at the national level and at international level and for arrangements to coordination and cooperation between them.

Here the term “communications” means two-way communication between authorities, not communication with the public and therefore this reference cannot be used to understand the interpretation of the concept of communication in the BSS

6.2.4. Communication channels (BSS, Annex XII),

In Annex XII of BSS the term "communication" is only used in chapter B.2 with regard to "relevant communication channels" (instead of only radio or television as in the previous Directive on BSS) to include also social media and internet or other channels as useful information source. Annex XII para B.2a) of the BSS requires in a pre-alarm phase that the members of the public likely to be affected shall already receive "an invitation to the members of the public concerned to tune in to relevant *communication channels*".

The term "communication channel" describes the *"means or media of communication, used by the source”* (IAEA, 2012, p. 53) [15] which may refer to electronic channels (e.g. web pages, TV, radio, web pages, etc), printed (e.g. leaflet, newspapers, fliers, etc) or personal contact (e.g. interviews, public meetings, personal warnings, etc). Therefore, it can involve both one- and/or two-way communication, depending on the channel/s used.

6.2.5. Strategy for communication (BSS, Annex XVII)

Annex XVIII BSS contains a list of elements to be considered by a national action plan to address long-term risks from radon exposures. Number (10) is "*a strategy for communication to increase public awareness and inform local decision makers, employers and employees of the risks of radon*". In literature communication strategy is defined in different - even opposite ways as cooperative and non-cooperative strategies (Wyss-Bühlmann E. (2005) [53], Faerch C./Kasper G (1994) [53], Tarone, E.(1983) [55]) That means that here, both one- and two-way communication could be meant in order to increase public awareness towards the risks of radon exposure, which, however, is outside of the scope of this report.

6.2.6. Communication (IAEA)

The IAEA EPR Public Communication Plan on Communication with the Public in a Nuclear or Radiological Emergency defines *Communication* on page 91 as a two-way process, involving feedback, particularly "*a process of message exchange in a personal, cultural and social context, during which it arouses cognitive activity, emotional states and behaviours. It must be understood that communication is not simply exchange of information but a complex mutual relationship between involved parties, though exchange of information, that is only cognitive aspect, is often emphasized*”.[15]

6.3. Communication policy (Art. 8 NSD) and public communication (IAEA)

6.3.1. Communication policy (Art. 8 NSD).

The NSD refers to "*communication*" only in Article 8 on transparency. Para 1 states "*Member States shall ensure that necessary information in relation to the nuclear safety of nuclear installations and its regulation is made available to workers and the general public, with specific consideration to local authorities, population and stakeholders in the vicinity of a nuclear installation. That obligation includes ensuring that the competent regulatory authority and the licence holders, within their fields of responsibility, provide in the framework of their* ***communication policy****: (a) information on normal operating conditions of nuclear installations to workers and the general public; and (b) prompt information in case of incidents and accidents to workers and the general public and to the competent regulatory authorities of other Member States in the vicinity of a nuclear installation*".

All 28 Member States must have in place adequate system/arrangements intended to ensure that necessary information in relation to the nuclear safety of nuclear installations and its regulation is made available to workers and the general public, both in normal and emergency conditions. The choice of how to do this is left open for Member States. As described below, the term communication policy does not specifically address the communication with the public, but rather the communication of information to the public. It appears from the article that the term communication policy refers only to the communication of information to the public but not the communication with the public. What is meant by **"necessary"** information is not explained in the NSD (see Chapter 6.4, p. 34).

Conclusion: In addition to the mandatory minimum information listed up in Annex XII of BSS for the public affected and likely to be affected it appears to be within the discretion of Member States to decide which information is necessary for the public not likely to be affected and prior of an emergency without prejudice to the provisions of Article 77 of the BSS. Member States are strongly advised to take into account the following interpretation of IAEA General Safety Requirements (GSR) Part 7 on Preparedness and Response for a Nuclear or Radiological Emergency, which includes also the response to public enquiries (see below).

6.3.2. Public communication and communication with the public (IAEA)

The revised IAEA Safety Guide to be published in 2018 does not use the term *communication policy*, but it defines and describes *public communication programme*, *public communication strategy* and *public communication plan*. A "*public communication programme should identify all practical arrangements and logistics necessary to implement a public communication strategy and plan at the preparedness stage*" to support public communication activities during the response to a nuclear or radiological emergency. Following the IAEA Safety Guide, "*the public communication strategy*, and the public communication plan that is formulated from the strategy, should be based on a graded approach". Furthermore, "*A public communication strategy should be developed at the preparedness stage in order to identify key issues, target audiences, prepare appropriate messages and carry out communication activities*". The IAEA also details the specific elements to be included in the public communication strategy and the public communication plan. For the public communication strategy, the elements to be included are the following:

a. A description of all relevant hazard assessment scenarios;

b. Strategic considerations identifying the main challenges for public communication specifically for each scenario;

c. Specific objectives for the public communication response for each scenario, taking into account the strategic considerations;

d. An identification of the key target audiences for each scenario;

e. Specific key messages for each scenario, that can be pre-developed at the preparedness stage, to support the objectives for the scenario;

f. Recommended tactics for the most effective implementation of the public communication tasks and use of the public communication tools.

IAEA General Safety Requirements (GSR) Part 7 on Preparedness and Response for a Nuclear or Radiological Emergency [16] requires the government to *"ensure that arrangements are in place for **communication with the public** throughout a nuclear or radiological emergency*." Although the requirements mainly concern the provision of information, Requirement 13 (Communicating with the public throughout a nuclear or radiological emergency") is included to respond to public enquiries in a timely manner, which, clearly is a two-way form of communication, as described in the specific arrangements which are part of this requirement.

- 5.69 "Arrangements shall be made for providing useful, timely, true, clear and appropriate information to the public in a nuclear or radiological emergency (...)",
- 5.70 "Arrangements shall be made to ensure that information [...] is well coordinated and consistent [...],
- 5.71 "Arrangements shall be made so that [...] information is [...] in plain und understandable language",
- 5.72 "Arrangements shall be made so that [...] a system for putting radiological health hazards into perspective [...],
- 5.73 "Arrangements shall be made to explain to the public any changes in the protective actions [...]",
- 5.74 "Arrangements shall be made to identify and address, to the extent practicable, misconceptions, rumours and incorrect and misleading information [...] and
- 5.75 "Arrangements shall be made to respond to enquiries from the public and from news media, both national and international, including enquiries received from or through the IAEA."

6.4.Necessary information (Art. 8 NSD)

Article 8 of the NSD states that "Member States shall ensure that necessary information in relation to the nuclear safety of nuclear installations and its regulation is made available to workers and the general public [...]". Here the NSD establishes - contrary to the BSS - a requirement to inform not only the public affected or likely to be affected by a radiological emergency, but the general public as "everyone". However, which information is necessary, is not described in the NSD.

In EPR Public Communication (2015) necessary information seems to imply the "*information which is needed to ensure that consistent and timely information is provided to the public" [17]*.

Following the OECD Roadmap, in most countries information includes, for instance, issues of radiation safety, how to handle a nuclear emergency or practical advice on what to do [20].

BSS does not use the term "necessary information", but Annex XII clearly defines minimum information to members of the public about health protection measures to be applied and steps to be taken in the event of an emergency. It distinguishes between and specifies: a) prior information to the members of the public likely to be affected by an emergency and b) information to be provided to the members of the public affected in the event of an emergency. What appears to be missing in BSS - from a public information perspective - are necessary information requirements for the concerned public, who is neither effected nor likely to be affected by an emergency. According to the NSD, emergency management systems have to include "public information arrangements" (see Annex XI para A.8); without a distinction between the public affected, likely to be affected or everybody in general.

In Annex XII, then, the BSS is more concise regarding the content of the information to be provided than the international guidelines consulted in this report.

Conclusion: Lacking a definition of the term "necessary information“, it appears to be logical that at least the information to be provided according to Annex XII of the BSS, as a minimum standard, is necessary for the affected population and the population likely to be affected. In view of the complexity of the different phases of an emergency Member States should take a differentiated approach towards the provision of the specified and relevant information to the members of the public likely to be affected (preparedness phase) and the public actually affected (response phase). There is scope for the European Commission to provide more detailed information on the scope and detail of information to be provided to the general public, who is neither affected nor likely to be affected. It could be useful to establish EURATOM Recommendations on the information, which should be communicated to the public.

6.5.Emergency and radiological emergency (BSS and NSD)

The new BSS Directive introduced a new definition for emergency, replacing the term “*radiological emerge*ncy”, used in Council Decision 87/600/Euratom of 14 December 1987. It is defined as: “A non-routine situation or event involving a radiation source that necessitates prompt action to mitigate serious adverse consequences for human health and safety, quality of life, property or the environment, or a hazard that could give rise to such serious adverse consequences.”

The revised NSD, however, does not define “*emergency*” as such, but links mandatory emergency preparedness measures rather to accidents, defined as “any unintended event, the consequences or potential consequences of which are significant from the point of view of radiation protection or nuclear safety". Information requirements however, apply to accidents and incidents ("prompt information") as well as to normal operation (Art. 8 para 1a). Incidents are defined as "any unintended event, the consequences or potential consequences of which are not negligible from the point of view of radiation protection or nuclear safety".

"*Abnormal operations*", defined as "an operational process deviating from normal operation which is expected to occur at least once during the operating lifetime of a facility but which, in view of appropriate design provisions, does not cause any significant damage to items important to safety or lead to accident conditions" do not to trigger any prompt information obligation according to the NSD.

6.6.Steps to be taken (Art. 71 BSS)

Art. 71 of the BSS provides that members of the public actually affected in the event of an emergency are to be informed about the *steps to be taken.*

"*Steps to be taken*" is not mentioned in IAEA EPR Public Communication (2015), but in its guidance EPR Communication with the Public (2012), IAEA enlists steps to be taken in different scenarios. Below are steps to be taken into consideration in the event of an accidental release.

- Describe the radionuclide and the type of radiation involved in the emergency.
- Describe the possible pathways by which people could be exposed to radiation, and how they can protect themselves.
- If possible, give estimates of radiation doses to people and how they might compare with doses from other sources of radiation, such as natural background radiation or medical practices.
- Explain the possible health implications of the doses received, and symptoms to be aware of.
- Where appropriate, describe how people might be able to reduce radiation doses, sheltering being a prime example.
- Make clear the areas where populations might be affected and those where people are not (or are unlikely to be) affected. (Address as appropriate the possibility of weather conditions changing and dispersing contamination in a different direction.)
- Clearly explain any restrictions on food, milk or water consumption.
- Clearly explain any travel or transport restrictions or advice.
- Provide consistent, concise and clear advice. During a prolonged emergency, issuing information at a regular time will help people cope with the effects.
- Choose spokespersons carefully to deliver information and messages.
- Clearly communicate the rationale for any public health recommendations, including showering, sheltering, evacuation and stable iodine tablets (if appropriate).
- Be clear about any uncertainties related to the precise nature of the release so that the need for precautionary measures can be more easily understood by the public.
- Clearly explain messages containing precautions for children specifically. During an emergency, people naturally have concerns for family members who are involved or they think are affected.

- Clearly explain the risks from radiation exposure, including acute and long-term risks, in straightforward language.
- Clearly explain the need, when appropriate, for people to attend special monitoring centres set up in response to an emergency so that a comprehensive monitoring programme can be carried out effectively.

The term "steps to be taken" is neither to be found in the OECD/NEA publication on Communication During Abnormal Situations (2006) [19] nor in their Roadmap for Crisis Communication (2011) [20] nor on Crisis Communication of Nuclear Regulatory Organisations (2013) [21].

6.7.Members of the public likely to be and actually affected (Art. 70 and 71 BSS)

EURATOM Article 70 BSS states the requirements to inform "*members of the public likely to be affected*" whilst Article 71 BSS establishes information requirements related to "*members of the public actually affected*".

In the traditional understanding, the BSS (along with IAEA EPR Harmonized Assistance Capabilities (2017) [18] distinguishes between "*members of the public*" and "*workers*" in relation to their protection from ionizing radiation. BSS continues to use the term "members of the public" in relation to their information in emergencies, but looking into international guidance on public information, the term "the public" is mostly used regarding their information, distinguishing between population groups with specific information needs (language, etc.) and between different emergency zones, which are defined by the individual country.

A "*member of the public*" is defined in the IAEA GSR Part 3 Basic Safety Standards as follows: "For purposes of protection and safety, in a general sense, any individual in the population except when subject to occupational exposure or medical exposure. For the purpose of verifying compliance with the annual dose limit for public exposure, this is the representative person. [56, p. 403]

IAEA GSR Part 7 does not define the terms "the public" or "members of the public". GSR Part 7 does not recommend which members of the public should receive prior information. According to GSR Part 7 the goals of emergency response are "to keep **the public** informed and to maintain public trust" in a nuclear or radiological emergency without a differentiation. According to Article 4.10. "The government shall [...](i) [to] coordinate effective communication with "**the public"** in preparedness for a nuclear or radiological emergency" without distinction between members of the public, workers, emergency workers and patients. In addition, it explicitly establishes requirements for arrangements to be made to provide promptly a warning and instruction to permanent, transient and special population groups or those responsible for them and to special facilities in the Precautionary Action Zone (hereinafter referred to as PAZ) and the Urgent Protection Action Planning Zone (hereinafter referred to as UPZ) upon declaration of an emergency class. Thus, authorities responsible for emergency communication shall include instructions in the languages mainly spoken in these zones on the immediate actions to be taken. According to this review, most countries inform the public within the emergency preparedness zone (EPZ), some decide who to inform depending on the distance from facility or depending on local or regional government boundaries.

Regarding information requirements, GSR Part 7 indicates that the term "the public" summarizes all groups of individuals:

- "**Special population groups**" are those members of the public for whom special arrangements are necessary in order for effective protective actions to be taken. Examples include disabled persons, hospital patients and prisoners,
- **"vulnerable members of the public":** e.g. children, pregnant women, etc,
- **Members of the public** directly affected by an effluent discharged to the environment and **Members of the public** in the vicinity of a nuclear installation;
- **Emergency Preparedness Zone (EPZ)** comprises the precautionary action zone (PAZ) and the urgent protective action planning zone (UPZ).
- **Precautionary action zone (PAZ):** An area around a facility for which emergency arrangements have been made to take urgent protective actions in the event of a nuclear or radiological emergency to avoid or to minimize severe deterministic effects off the site. Protective actions within this area are to be taken before or shortly after a release of radioactive material or an exposure, on the basis of prevailing conditions at the facility.
- **Urgent protective action planning zone (UPZ):** An area around a facility for which arrangements have been made to take urgent protective actions in the event of a nuclear or radiological emergency to avert doses off the site in accordance with international safety standards. Protective actions within this area are to be taken on the basis of environmental monitoring — or, as appropriate, prevailing conditions at the facility.
- **Emergency Planning Distance (EPD**) comprises the extended planning distance (EPD) and the ingestion and commodities planning distance (ICPD).
- **Extended Planning Distance (EPD)** extended planning distance (EPD). Area around a facility for which emergency arrangements are made to conduct monitoring following the declaration of a general emergency and to identify areas warranting emergency response actions to be taken off the site within a period following a significant radioactive release that would allow the risk of stochastic effects among members of the public to be effectively reduced. The area within the extended planning distance serves for planning purposes and may not be the actual area in which monitoring is to be conducted to identify areas where early protective actions such as relocation are necessary. While efforts need to be made at the preparedness stage to prepare for taking effective early protective actions within this area, the actual area will be determined by the prevailing conditions in an emergency. As a precaution, some urgent protective actions may be warranted within the EPD to reduce the risk of stochastic effects among members of the public.
- **Ingestion and Commodities Planning Distance (ICPD):** Area around a facility for which emergency arrangements are made to take effective emergency response actions following the declaration of a general emergency in order to reduce the risk

of stochastic effects among members of the public and to mitigate non-radiological consequences as a result of the distribution, sale and consumption of food, milk and drinking water and the use of commodities other than food that may have contamination from a significant radioactive release. The area within the ingestion and commodities planning distance serves for planning purposes to prepare for emergency response actions to monitor and control commodities, including food, either for domestic use or for international trade. The actual area will be determined on the basis of the prevailing conditions in an emergency. As a precaution, some urgent protective actions may be warranted within the ingestion and commodities planning distance to prevent the ingestion of food, milk or drinking water and to prevent the use of commodities that may have contamination following a significant radioactive release.

6.8. Vicinity (of a nuclear installation), Art. 8 NSD

The term "*vicinity*" is not mentioned in the BSS but it is mentioned three times in Article 8 of the NSD referring to: competent regulatory authorities, population, local authorities and stakeholders in the vicinity of a nuclear installation.

The IAEA EPR Public Communication Plan Guidelines (2015) do not mention "vicinity" although the earlier version of the report, the IAEA EPR Public Communication Guidelines (2012) include the term "vicinity of an emergency (scene)" without further definition. No definition could be found in OECD guidance documents (OECD/NEA (2006) [19], OECD/NEA(2012) [21]).

It is worth considering here the experience of the US as, in applying the objective for individual risk of prompt fatality, the US Nuclear Regulatory Commission (NRC) defines vicinity as the area within 1 mile of the nuclear power plant site boundary, since calculations of the consequences of major reactor accidents (accidents resulting in substantial core damage) suggests that individuals within a mile of the plant site boundary would generally be subject to the greatest risk of prompt death attributable to radiological causes.[49]

6.9. Stakeholders (Art. 66, Art. 73, Art. 102 and Annex XI of BSS).

In its Article 66 of BSS on estimation of doses to the members of the public, the competent authority is required to make radiation doses also available to *stakeholders,* while Art. 73 establishes consultation with *stakeholders* regarding control of exposure in contaminated areas. Article 102 establishes the involvement of *stakeholders* in decisions regarding the development and implementation of strategies for managing existing exposure situations.

Finally, Annex XI includes *stakeholder involvement* into the emergency management systems and emergency response plans as referred to in Articles 69, 97 and 98. Stakeholders are not mentioned in Articles 70, 71 or 99 of the BSS. The term stakeholder is also mentioned in Article 8 of the NSD and refers specifically to "stakeholders in the vicinity of a nuclear installation". More generally, paragraph 23 refers to how cooperation on nuclear safety between

[49] OECD/NEA, Review, The Structure and Application of High Level Safety Goals (2011).

the 28 Member States can contribute to transparency and openness towards stakeholders at the European and international level.

While the term "*stakeholder*" is neither mentioned in IAEA EPR Public Communication (2015) nor in IAEA GSR Part 7 (2015), IAEA guidance on public communication (2012) highlights their importance without clearly defining the term. Only in its publication on Stakeholder Involvement[50] the IAEA provides an overview of possible stakeholder definitions: *"A broad definition of a stakeholder is anyone who feels impacted by an activity, whether physically or emotionally."* The document acknowledges that this definition makes it difficult to identify all relevant stakeholders in particular circumstances, as some stakeholders may be self-selecting and situational.

The IAEA Handbook on Nuclear Law [51] states that*: "Owing to the differing views on who has a genuine interest in a particular nuclear related activity, no authoritative definition of stakeholder has yet been offered, and no definition is likely to be accepted by all parties. However, stakeholders have typically included the following: the regulated industry or professionals; scientific bodies; governmental agencies (local, regional and national) whose responsibilities arguably cover, or 'overlap' nuclear energy; the media; the public (individuals, community groups and interest groups); and other States (especially neighbouring States that have entered into agreements providing for an exchange of information concerning possible trans-boundary impacts, or States involved in the export or import of certain technologies or material)*".

A useful distinction sometimes used, which touches on the IAEA Handbook on Nuclear Law quotation above, is between 'statutory' and 'non-statutory' stakeholders. This distinguishes between those organizations and bodies that are by law required to be involved in any planning, development or operational activity and those that will be impacted, directly or indirectly, by it. From a facility or programme proponent or operator's perspective, such 'statutory' stakeholders therefore include: the regulator, local or national planning authorities, various service related bodies (power, water and emergency planning) that will service or be impacted by a development and national and local government entities involved in policy making and implementation. 'Non-statutory' stakeholders include those organizations and individuals who feel in whatever way impacted or affected by an activity (thus some stakeholders in this category may be self-selected). Local communities and non-governmental organizations (NGOs) fall into this group, and recognition of their importance cannot be overestimated. Their adequate inclusion or exclusion, for whatever reason, can contribute significantly to the success or failure of a nuclear facility project.

The OECD/NEA Forum on Stakeholder Confidence identifies a stakeholder as: *"any actor-institution, group or individual with an interest in or a role to play in the societal decision-making process".* Also, the OECD/NEA Forum on Stakeholder Confidence Annotated Glossary (2013) provides a large list of possible stakeholders (in no particular order) regarding radioactive waste management processes: the general public, demographic groups (like young people), residents, representatives or elected officials of local communities, national/regional government ministries/departments, regulators, national/local NGOs, local pressure groups, trade unions, the

[50] IAEA, Stakeholder involvement throughout the life cycle of nuclear facilities, Nuclear Energy Series, no. NG-T-1.4, IAEA, Vienna, (2011), p. 4,

media, the scientific research community, implementing organisation, the nuclear industry, contractors, waste producers, international organisations.[51]

6.10. Prompt/promptly (Art. 85, 92, 93, 96 and 99 BSS, Art. 8 NSD)

Article 8 of the NSD states the need for competent regulatory authorities and licence holders to ensure that "prompt information in case of incidents and accidents to workers and the general public and to the competent regulatory authorities of other Member States in the vicinity of a nuclear installation" is included as part of the framework of the communication policy.

The BSS uses the terms *prompt* and *promptly* several times regarding different types of emergencies related to the control of unsealed sources (Art. 85), detection of orphan sources (Art. 92), metal contamination (Art. 93), significant events (Art. 96) and high activity sealed source (Annex XV).

For the specific purpose of international collaboration and co-ordination, Article 99 of the BSS states: *"Each Member State shall, in the event of an emergency occurring on its territory or likely to have radiological consequences on its territory, promptly establish contact with all other Member States and with third countries, which may be involved or are likely to be affected with a view to sharing the assessment of the exposure situation and coordinating protective measures and public information by using, as appropriate, bilateral or international information exchange and coordination systems*". However, the Directive does not define the term *promptly.*

Generally speaking, promptly is a synonym for "*with little or no delay; immediately*". The term is not defined by IAEA either. It is possible that national courts or even the European Court of Justice decided in an individual case which time period promptly involves. But case law is highly circumstantial and should not be applied in the rather specific area of emergency preparedness. For instance, in the USA, the Nuclear Regulatory Commission regulatory requirements of 10 CFR 50.47 specify that procedures need to be in place to notify the public (NUREG/CR-6981 "Assessment of Emergency Response Planning and Implementation for Large Scale Evacuations"). The NPP licensee must have the capability to notify the state and local agencies within 15 minutes of an incident. The state and local officials must have the capability to then notify the public within 15 minutes of their receipt of notification, if urgent. These notification requirements and guidance have driven the development of comprehensive communications systems and plans in USA that are routinely tested and exercised.

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[51] OECD NUCLEAR ENERGY AGENCY, Stakeholder Confidence in Radioactive Waste Management. An Annotated Glossary of Key Terms. NEA №. 6988, Paris (2013).

7. Transposition and Implementation in EU Member States

While international guidelines go further than the recently adopted EURATOM Directives, 28 Member States have to transpose and implement the revised Directives provisions into national law and interpretation can be in a wide sense.

The new EURATOM BSS Directive entered into force on 6 February 2014. Member States had to notify the Commission on their transposition measures by 6 February 2018. Nonetheless, certain BSS provisions, such as the requirements on public information which are being analysed in this report, have not substantially changed. Therefore, the implementing measures should basically already be in place.

The revised Nuclear Safety Directive 2014/87/Euratom entered into force on 29 July 2014.

According to the Report of the Commission of 18 November 2012 [57, p.7] on the implementation of the first Nuclear Safety Directive 2009/71/Euratom, Member States have existing arrangements for information to the public but handle the question of transparency in different ways and to differing extents. The most common practices include information release through the regulatory authority's website, press releases, media interaction and annual reports. Some countries stated that regulatory decisions are published in an official journal.

The types of actions that have been reported include:

- the regulatory authority defined a communication strategy or policy;
- specific communication tools were put in place for use in nuclear crisis situations;
- inspection follow-up letters were published on the regulatory authority's website;
- a consultative body on transparency was set up, bringing together members of parliament, civil society representatives, recognised experts and industrial and institutional stakeholders.

Member States must "*establish a system or systems of inspection to enforce the provisions adopted and to initiate surveillance and corrective action where necessary*" pursuant to Article 104 of the new BSS Directive. Article 105 obliges Member States to "*ensure that the competent authority has the power to require any individual or legal person to take action to remedy deficiencies and prevent their recurrence or to withdraw, where appropriate, authorisation when the results of a regulatory inspection or another regulatory assessment indicate that the exposure situation is not in compliance with the provisions adopted pursuant to this Directive*".

Already now, the provision of information to the public on radiological and nuclear emergencies is mandatory in all EU Member States. The "Review of Current Off-site Nuclear Emergency Preparedness and Response Arrangements in EU Member States and Neighbouring Countries" [25] revealed in Chapter 20.14.2 that "*All countries have defined responsibilities within their EP&R off-site arrangements for informing the public in the event of an emergency. Among nuclear countries, these responsibilities have, in all cases, been defined for more than one of the organisations listed, and, in about half of the cases, they have been defined for all of the organisations listed*." The Review states further, that four countries did not have "arrangements or mechanisms in place to ensure that the information provided to the public by those responsible in the event of an emergency is useful, timely, truthful, consistent and appropriate - a GS-R-2 requirement [IAEA, 2002]" (ENCO (2012), Appendices, p.150).

Again, referring to the EU Review mentioned above "*Most countries used more than one method for communicating prior information, although some rely solely on leaflets or brochures. The latter are most often used for communicating prior information; public meetings are also frequently used as well as websites.*"

As the relevant Euratom legislation has been adopted by and is binding to EU Member States, they could use non-binding international safety requirements and international texts as guidance to implementing Euratom legal requirements. The question "*How to inform the public in* *the event of an emergency*?" stays under the responsibility of the Member States.

Conclusion: Based on the feedback provided by NROs in Deliverable 1.2 (Report on surveying EU Member States) conducted in the context of the study it is observed that most Member States in general have already transposed the relevant legal obligations into national law. However, there are two different levels of implementation of information requirements in the 28 Member States. All countries provide for the information of the affected population and the population likely to be affected in their national legal framework. Nevertheless, some countries updated their communication policy and established more or less detailed national provisions for the information of or the communication with the general public prior and in the event of an emergency.

8. Excursus: The HERCA/WENRA approach

During their joint meeting in 2014, the HERCA and WENRA associations adopted a common position aiming to improve cross-border coordination of protection measures during the first phase of a nuclear accident. The position of HERCA and WENRA aims, in the event of an accident, to promote the rapid transmission of information between the countries concerned and ensure consistency in the population protection recommendations issued by the nuclear safety and radiation protection authorities.

The approach thus recommends:

- outside emergency situations, exchanges between countries to promote improved mutual familiarity with and understanding of their emergency organisations;
- in an emergency situation:
  - if the emergency organisations receive sufficient information to be able to function normally during the first hours of an emergency situation, attempts are made to ensure alignment of the population protection measures in neighbouring countries with those decided on by the country in which the accident occurred;
  - in the even highly improbable situation which would require urgent measures to protect the population but in which very little information is available, predetermined "reflex" measures are defined. In order to implement these principles, a minimum harmonised level of preparation is necessary.

HERCA and WENRA thus consider that in Europe:

- evacuation should be prepared for the local population living in a radius of up to 5 km around the NPPs, with sheltering and ingestion of stable iodine tablets for persons living in a radius of up to 20 km around the nuclear power plants;
- an overall strategy should be defined to ensure the capability, if necessary, of extending population evacuation up to a 20km radius, and sheltering and ingestion of stable iodine tablets up to a 100km radius.

Given the potential repercussions of an accident on other countries, it is important that the information and response by the various countries concerned be as coordinated as possible. IAEA and the European Commission thus propose tools to the Member States for notification and assistance in the event of a radiological emergency. The IAEA tool called USIE (Unified System for Information Exchange in Incidents and Emergencies), is available in ASN's emergency centre and is tested on the occasion of each exercise.

9. Summary and final Conclusions, recommendations and suggestions

The international (IAEA) Convention on Nuclear Safety and the Emergency Preparedness Conventions[52] require that the population affected and likely to be affected be provided with appropriate information for emergency preparedness and response and to establish confidentiality provisions for information exchange between States. They do not oblige Member States to ensure communication with the population (who is neither affected nor likely to be affected) or that this general public is informed prior or in the event of a radiological emergency. To date, the EURATOM legal requirements oblige Member States to "*inform* the public" and do not explicitly require ensuring a two (or multiple)-way *communication* with the public prior or in the event of an emergency. In order to improve public information during an emergency, Articles 70 and 71 of the new Basic Safety Standards Directive (BSS) contain the existing obligation of Member States to provide information (referring to a basically unchanged Annex XII) to members of the public about health protection measures to be applied and steps to be taken in the event of an emergency. With the revised BSS and NSD, EURATOM has established an enhanced legal framework, which contain new requirements in terms of cooperation and coordination of public information in the event of an emergency. Member States to some extent already exceed the EURATOM minimum obligations in alignment with international guidance and good practice. The analysis of EURATOM provisions in the light of international guidelines resulted in the following conclusions which have been grouped under the following topics: definition of public information; transposition and implementation of international guidance and good practice; public, public affected and likely to be affected; coordination of public information; necessary information and stakeholder involvement. For a harmonized implementation, the following recommendations and suggestions could be taken up in the transposition and implementation of the obligations under the BSS and the NSD.

Topic		C: Conclusions R: Recommendations S: Suggestions	Conclusions, Recommendations, Suggestions or Good Practices	Reference in text:
1.	Definition of "public information"	C1	Both Articles 70 and 71 of the BSS as well as Annex XII clearly establish the obligation of Member States to ensure that the necessary information is promptly given to or received by the public affected or likely to be affected. Since public information requirements, have not been changed or updated substantially and (still) involve only the information of the	Conclusion, Chapter 3.5, p. 12

[52] i.e. Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency

			public affected or likely to be affected (not the concerned public, which is neither affected nor likely to be affected), it can be concluded that the obligation of Member States according to the Articles 70 and 71 BSS are to be understood as a one-way communication (i.e. provision) of information to the public and not as a two-way communication (i.e. dialogue) with the public.	
		S1	The public information requirements in Articles 70 and 71 of the revised BSS could be understood as a one-way communication of information to the public affected or likely to be affected.	
		C2	The effectiveness of communication in the response phase demands that the public are given clear, unambiguous information and instructions in order that they take the necessary rapid actions for their protection. Whilst some feedback is necessary for authorities to know that the information and messages are being correctly understood and acted on, the scope and resources of the authorities to engage in dialogue or two-way communication with the public in the early response phase will be quite different to the preparedness phase. Although it may be desirable, some situations may not allow "two-way communication", as it would be impractical and may indeed take up resources of civil protection authorities that could delay and prevent necessary rapid actions to protect the public.	Conclusion, Chapter 3.5, p. 12
		S5	The request for an efficient provision of information through interactive provision of information and reception of feedback requires appropriate communication channels, which support the idea of a "two-way	

			communication". However, a distinction could be made between what is practically feasible in the preparedness and what in the response phase. Especially emergency situations may not always allow "two-way communication", as it could be not efficient and may indeed take up resources of civil protection authorities that could delay and prevent necessary rapid actions to protect the public. Thus suggesting that two-way communication (in the sense of a dialogue) is desirable and in any case appropriate in the preparedness phase, prior to an emergency and later in the response phase.	
		R1	Member States should assess the effectiveness based on feedback from the public and to ensure that the information is correctly understood and acted upon. Such a feedback could be seen as a form of exchange, or basic two-way communication between the authorities responsible and the public.	
		C3	Currently, there is neither a legal definition of the term "public information" in the EURATOM legal framework nor in binding international law. In the IAEA Guidelines, the term *communication* is defined, but the terms "*public communication*" and "*public information*" are used interchangeably. IAEA Guidance documents do not answer the question of how these terms should be interpreted in general, it depends on the context and content of the requirements and recommendations.	Conclusion Chapter 6.1.3, p. 29
		S2	International guidance could benefit from a clear explanation of the terms public communication and public information so that they can be used	

			consistently and understood unambiguously.	
		R2	According to Article 8 NSD the public information requirements include the (one-way) provision of information to the public in the case of an emergency and during normal operation. From todays' point of view, Member States should interpret the term "information to the public" as far as possible as "effective communication" in the sense of exchanging information to ensure a successful transfer of information as a "one and two-way communication with the public".	
2	Transposition and implementation of EURATOM provisions in view of international guidance and good practice	C4	Member States in general have already transposed the relevant legal obligations into national law since in terms of public information their content has not been substantially revised. However, there are two different levels of implementation of information requirements in the 28 Member States. All countries provide for the information of the affected population and the population likely to be affected in their national legal framework. Nevertheless, some countries updated their communication policy and established more or less detailed national provisions for the information of or the communication with the general public prior and in the event of an emergency. The provisions of the Directive do not limit additional measures that go beyond the minimum requirements.	Conclusion, Chapter 3.5, p. 12
		R3	Member States should apply more ambitious non-binding IAEA and OECD-NEA guidance when transposing and implementing the new BSS and NSD into national law. They are encouraged to apply international good practices, which is of particular importance given the Commission's intention to check not only the correct transposition of the Directive but	

			also its effective implementation in practice, exceeding the minimum requirements of the BSS.	
		S3	Since there are no detailed EURATOM provisions or guidance on how to interpret public information obligations, how to achieve an effective information during normal operations or prior to an emergency and how to "promptly" and effectively inform the public in the event of an emergency, it could be useful to establish EURATOM recommendations to ease the practical implementation and execution in line with international best practice in Member States, even if Members of the Reference Group of this project felt, that most organisations already know how to prepare but hardly do it. Euratom recommendations with a politically binding character might have more effect than the non-binding international guidelines. European Commission and Member States could make effective use of results published in the EU, taking into account EU research activities, especially related to communication strategy or plans and the revised IAEA Safety Guide.	
		R4	In the absence of specific EURATOM recommendations, Member States should interpret their public information obligations under the NSD and the BSS specifically in line with the requirements 5.69 to 5.75 (see above, Chapter 6.3.2, p. 34) of the IAEA General Safety Requirements (GSR) Part 7 [16]: • To provide useful, timely, true, clear and appropriate information to the public in a nuclear or radiological emergency, • to ensure that information [...] is well coordinated and consistent, • to provide information [...] in plain und understandable language, • to put radiological health hazards into perspective,	Conclusion, Chapter 5.1, p. 23 at the end.

			• to explain to the public any changes in the protective actions, • to identify and address, to the extent practicable, misconceptions, rumours and incorrect and misleading information [...] and, • to respond to enquiries from the public and from news media, both national and international, including enquiries received from or through the IAEA.	
3	Public, public affected and likely to be affected	C5	The requirements of the revised NSD, which include increased transparency and the provision of information to the workers and the general public, are complementary to those of the revised BSS, which includes information requirements only for the public affected and likely to be affected by an emergency.	Conclusion, chapter 3.6, p. 18
		R5	Member States public information and transparency framework should consider the public affected and likely to be affected (BSS) as well as workers and public, not likely affected (NSD).	
4	Coordination of public information	C6	The revised BSS and the NSD Directives in terms of cooperation and information coordination obligations are complementary with each other and to the information obligations between Member States and the European Commission under Council Decision 87/600/Euratom “in case of an emergency on their territory resulting in measures of wide-spread nature”. Article 99 paragraph 2 of the BSS oblige Member States to "*promptly establish contact with all other Member States and with third countries which may be involved or are likely to be affected with a view to sharing the assessment of the exposure situation and coordinating protective measures and public information by using, as appropriate, bilateral or international information exchange and coordination systems*".	Conclusion, chapter 6.1.1., p.27

			Article 8 paragraph 8 of the NSD requires the competent regulatory authority, to engage*, as appropriate, in cooperation activities on the nuclear safety of nuclear installations with competent regulatory authorities of other Member States in the vicinity of a nuclear installation, inter alia, via the exchange and/or sharing of information* to cooperate with all Member States and third countries, likely to be affected in coordinating intervention measures and the information of the public.	
		R6	Member States should include new national implementing measures to transpose the new obligations in Article 99 paragraph 2 of the BSS and Article 8 paragraph 3 of the NSD.	
		C7	As the scope and detail of public information arrangements have not been detailed in Annex XII of the BSS, it remains upon Member States to decide, which information should be communicated to the public and if and how this information should be coordinated between authorities in Member States, between Member States and/or even with third countries (Article 99 BSS).	Conclusion, chapter 6.1.1., p.27
		S4	It could be useful to establish EURATOM recommendations on how to efficiently and effectively coordinate this public information across borders between authorities in Member States, between Member States and/or even with third countries.	
5	Necessary information	C8	Lacking a definition of the term "necessary information“, it appears to be logical that at least the information to be provided according to Annex XII	Conclusion,

			of the BSS, as a minimum standard, is necessary for the affected population and the population likely to be affected.	Chapter 6.4, p. 34
		R7	In view of the complexity of the different phases of an emergency Member States should take a differentiated approach towards the provision of the specific and relevant information to the members of the public likely to be affected (preparedness phase) and the public actually affected (response phase).	
		S5	There is scope for the European Commission to provide more detailed information on the scope and detail of information to be provided to the general public, who is neither affected nor likely to be affected. It could be useful to establish EURATOM recommendations on the information which should be communicated to the public.	
6	Stakeholder involvement	C9	Lacking clear participation rights in emergency preparedness (as compared to licensing procedures) it can be assumed that neither the BSS nor the NSD establishes two-way communication obligations with the public in the case of an emergency. Annex XI of the BSS places involvement of stakeholders as an element (A.9) to be included in the emergency management system.	Conclusion, Chapter 3.5, p.12.
		R8	Member States should go a step further and involve stakeholders in the emergency management system instead of merely communicate information to them.	

ANNEX I. Acronyms

ALA	Atomic Law Act in Poland
ANVS	Dutch Nuclear Safety and Radiation Protection Authority (Autoriteit voor Nucleaire Veiligheid en Stralingsbescherming)
ASN	Autorité de Sûreté Nucláire (French Nuclear Safety Authority)
ASUNE	Bulgarian Act on the Safe Use of Nuclear Energy
BfS	Bundesamt für Strahlenschutz (Federal Agency for Radiation Protection)
BMUB	Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit (German Federal Ministry for Environment, Nature, Building and nuclear safety)
BNI	Basic Nuclear Installation
CEZAR	Polish Radiation Emergency Centre
CGCCR	Comité Gouvernemental de Coordination et de Crise (Belgian Governmental Centre for Co-ordination and Emergencies)
CEA	Commissariat à l'énergie atomique et aux énergies alternatives (CEA) (French Alternative Energies and Atomic Energy Commission)
CIC	Slovakian Civil Information Commission
CLI	Commission Locale d'Information (Local Information Commission)
CNCAN	Comisia Nationale pentru Controlul Activitatilor Nucleare (Romanian Nuclear Safety Authority)
CNRA	Committee of Nuclear Regulatory Activities (NEA/OECD)
CNS	Convention on Nuclear Safety
CNSSU	County Committees for Emergencies in Romania
COBR	Cabinet Office Briefing Rooms in the United Kingdom
COM	European Commission
COMRSIN	Comissao Reguladora para a Seguranca das Instalacoes Nucleares (Portuguese Regulatory Comission for the Safety of Nuclear Installations)
CONVEX	Convention Exercise (Emergency drills and exercises in the frame of the convention on Early Notification of a Nuclear Accident)
CSN	Consejo de Seguridad Nuclear (Spanish Nuclear Safety Authority)
CSNI	Committee on the Safety of Nuclear Installations (NEA/OECD)
DECC	Department for Energy and Climate Change in the United Kingdom
DEMA	Danish Emergency Management Agency
DHPCLG	Department of Housing, Planning, Community and Local Government (Ireland)
DRP	Luxembourg Department of Radiation Protection within the Directorate of Health (Regulatory Body)
ECURIE	European Community Urgent Radiological Information Exchange

EDF	Energie de France EDF
NGL	Energie de France Nuclear Generation Limited
EEAE	Greek Atomic Energy Commission
ENSREG	European Nuclear Safety Regulators Group
EPA	Irish Environmental Protection Agency
EPD	Extended Planning Distance
EPR	European Pressurised Reactor
EU	European Union
EURDEP	European Radiological Data Exchange Platform
EPR	Emergency Preparedness and Response
EPZ	Emergency Preparedness Zone
EPZ	Elektriciteitsproductiemaatschappij Zuid-Nederland
EPREV	Emergency Preparedness Review
FANC	Federal Agency for Nuclear Control
GDFSPP-MI	General Directorate of the Fire Safety and Protection of the Population of the Ministry of the Interior
GRR-2001	Belgian General Regulations regarding the protection of the public, workers and the environment against the hazards of ionizing radiation, laid down by Royal Decree of 20 July 2001
GSR	General Safety Requirements (IAEA)
HAEA	Hungarian Atomic Energy Agency
HCPN	Luxembourg High Commission of National Protection
HCTISN	Haut Comité pour la Transparence et l'Information sur la sûreté nucléaire (French: High Committee for Transparency and Information on Nuclear Safety)
HERCA	Heads of the European Radiological Protection Competent Authorities
IAEA	International Atomic Energy Agency
ICPD	Ingestion and commodities planning distance
INES	International Nuclear and Radiological Event Scale (IAEA)
INPP	Ignalina Nuclear Power Plant
INSAG	International Nuclear Safety Advisory Group
IRRS	Integrated Regulatory Review Service (peer review of the national regulatory and organisational framework conducted under IAEA auspices)
IRSN	Institute de radioprotection et de sûreté nucléaire (French Institute for Radiation Protection and Nuclear Safety)
NEA	Nuclear Energy Agency (OECD)

NEPNA	National Emergency Plan for Nuclear Accidents (Ireland)
NOST	National Operative Staff in Denmark
NRA	Bulgarian Nuclear Regulatory Authority
NPP	Nuclear Power Plant (including all nuclear power units at one site)
NRWG	Nuclear Regulators Working Group
OBK	Civil Safety Commission in Czech Republic
OECD	Organisation for Economic Co-operation and Development
OECD/NEA	Nuclear Energy Agency of the Organisation for Economic Co-operation and Development
OEIC	Off-site Emergency Information Centre in Bulgaria
ONR	UK Office for Nuclear Regulation
PAA	Polish National Atomic Energy Agency
PAZ	Precautionary action zone
PAGD	Fire and Rescue Department in Lithuania
PEN	Off-site Nuclear Emergency Plan (Plan de Emergencia Nuclear Exterior)
PLABEN	Basic Nuclear Emergency Plan in Spain
REC	Radiological Evaluation Cell
REPPIR	Radiation Emergency Preparedness and Public Information Regulations in the United Kingdom
RNM	Réseau National de Mesures de la Radioactivité de l'Environnement (French: National Network for Measurement of Radioactivity in the Environment)
RSC	Radiation Protection Centre in Lithuania
SELCA	System of exchange and liaison between Cattenom and the authorities
SGDSN	Secrétariat général de la défense et de la sécurité nationale (French General Office of Defence and National Security)
SNSA	Slovenian Nuclear Safety Administration
SORNS	Croatian State Office for Radiation and Nuclear Safety
SSM	Stralsakerhetsmyndigheten (Swedish Radiation Safety Authority)
STUK	Finish Radiation and Nuclear Safety Authority
SÚJB	Czech State Office for Nuclear Safety (Státní úřad pro jadernou bezpečnost)
TECV	French Act on Energy Transition for Green Growth,
VATESI	Valstybine atomines energetikos saugos inspekcija (State nuclear power safety inspectorate)
ÚJD SR	Úrad Jadrového Dozoru Slovenskej Republiky (Slovakian Nuclear Safety Authority)
UPZ	Urgent protective action planning zone
USIE	IAEA Unified System for Information Exchange in Incidents and Emergencies
UK	United Kingdom of Great Britain and Northern Ireland

VATESI	Lithuanian State Nuclear Power Safety Inspectorate
WANO	World Association of Nuclear Operators
WENRA	Western European Nuclear Regulators Association

ANNEX II. Sources and References

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Annex B

DG Energy project: "*Study on good practices in implementing the requirements on public information in the event of an emergency, under the Euratom Basic Safety Standards Directive and Nuclear Safety Directive*"

Project Ref. Ares(2016)7037963

Report D1.2:

Report
on surveying EU Member States

(Responses reported in this document reflect positions and views on practices in public information and transparency in the event of an emergency as seen by authorities or other responsible organisations in 26 EU MS out of 28 EU MS.)

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Date: 13. 12. 2018

D1.2
Work package 1
ENER/2017/NUCL/SI2.756526

Contents

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EXECUTIVE SUMMARY

This report provides a comprehensive overview of current public information settings across the EU Member States (MS) with regard to radiological emergencies. More specifically, it focuses on the administrative and organizational aspects of public information and transparency in emergency situations, within the context of EU legislation. For this purpose, a dedicated on-line survey was conducted involving the relevant national authorities (mainly ministries and regulatory bodies) to gather information on the practices and arrangements at national level. Responses reported in this document reflect positions and views on practices in public information and transparency in the event of a nuclear or radiological emergency as seen by authorities or other responsible organisations, taking into account public information requirements, in 26 EU MS.[53] The following topics have been investigated in-depth: *Public information, Cross-border collaboration, Transparency, Legal position* and *Routine access to information*.

Topic Public information

The new Basic Safety Standards (BSS) Directive 2013/59/Euratom includes enhanced and more detailed requirements for Member States to inform the general public – outside of an emergency situation - about health protection measures to be applied and steps to be taken in the event of a radiological emergency, and to provide at regular intervals updated information to the population likely to be affected in the event of such an emergency (Article 70). This information includes the health protection measures applicable to them and the actions they should take in the event of such an emergency referring to Section A of Annex XII. This information shall be permanently available to the public and not only upon request.

When an emergency occurs, Member States have to ensure that the members of the public actually affected are informed without delay about the facts of the emergency. Article 71 establishes the steps to be taken and, as appropriate, the health protection measures applicable to these members of the public referring to Section B of Annex XII of the new BSS Directive (which are relevant to the type of emergency). This Annex enlists the relevant information that has to be disseminated to members of the public about health protection measures to be applied and steps to be taken in the event of an emergency as referred to in the revised Articles 70 and 71.[54]

Specific questionnaire items have been designed to investigate whether the new Basic Safety Standards Directive and the Nuclear Safety Directive result in new national legislation regarding public information in radiological emergencies, possible difficulties in transposition, potential subsequent changes in communication plan/strategy and inclusion of public information aspects in national emergency response plan. Additional questions are included in the questionnaire to explore public information settings in practice; e.g. use of communication channels, profile of public information officers, approaches to identification of citizen's needs and how these are practically addressed in MS, experiences from exercises and lessons learned surveyed and analysed. Special attention is given to public information in the "event" phase of a nuclear or radiological emergency; e.g. collaboration with public information officers from other organizations/institutions/authorities involved in emergency management, possible settings of rumour control centres, call centres, dark webpages and media relations.

[53] The stakeholder survey was completed by a total of 26 MS. Information is missing for UK and Poland.

[54] A comprehensive overview of legal aspects related to public information is reported in Deliverable 1.1.

The development and implementation of the new Basic Safety Standards Directive and Nuclear Safety Directive results for various countries in an update or change of national legislation. These changes occur or are planned to occur in relation to legislation on radiation protection in general. Specifically, countries that have changed or are planning to change sections of their current legislation, indicate that these changes will occur in subsections of the existing legislation, specifically in relation to international cooperation, public communication and information, and nuclear and radiological emergency management. Most countries do not experience or expect any challenges or direct difficulties related to the transposition of the directives. Some countries, however do expect or have experienced various challenges concerning cross-border communication in the early phase of a radiological or nuclear emergency, identification of relevant stakeholders, and challenges concerning varying understanding or interpretation of concepts such as "reference level". The new Directives have implications for overall public information of communication plan or national strategy in most of the EU MS. These changes have occurred or are expected to occur in the frame of cross-border communication, documentation of arrangements, translation of templates to English, "establishment of an overall communication strategy", or within process refinement.

All 26 EU MS that responded to the survey include aspects of communication in their respective Emergency Preparedness and Response plans. The inclusion of these aspects occurs in a general public information strategy (i.e. not in a specific public information or communication strategy for radiological or nuclear emergencies), in annex of general National Disaster Plans, specific arrangements for crisis situations, Emergency Preparedness and Response plans, or in a specific act: Strategy for informing the public and media in a radiological emergency. The strategies for public information or communication are reviewed and improved on regular time intervals.

Nine out of 26 MS that responded to the survey do not have a central person in charge for public information at the level of a director. Instead, they have dispersed responsibility for public information through authorities and governmental bodies. If public information is centralised, the directors of the public information office of Nuclear Regulatory Organisations are mainly public relations and communication specialists or ex-journalists. Personnel responsible for public information in most of the MS regularly participate at educational and networking activities organised at the international level, most often by the International Atomic Energy Agency (IAEA).

Most MS indicate that they have a specific policy on media training for regulatory staff. A great variety however exists on who receives this training and what this training specifically entails. Most countries indicate that they have a specific policy of staff speaking to the media in the event of an emergency. The responsible person for communication with the media and the content of the specific policy varies significantly, revealing a major diversity across the EU. All 26 MS indicate they have one or more spokespersons at their disposal in the event of a nuclear or radiological emergency. The number of spokespersons available differs between the MS ranging from 1 to 50 persons, depending on the communication policy of a MS. On average 11 spokespersons are available. Collaboration with public information officers from other partners involved in an emergency management is established and maintained in most MS before an emergency.

The position of the communication cell on the organisational chart varies considerably among MS, as do the organisational charts themselves. In most MS the communication cell is in direct contact with the decision makers, in some MS, the cell is located in the crisis centre while in some other MS the organisational chart is currently under review. In almost all MS at least one communication officer is present in the incident command centre during an emergency.

Traditional media is the most often used channel for the provision of information for the general protection measures to be applied and steps to be taken in the event of a nuclear emergency. The second most used channel is the internet including authority websites, online newspapers and social media. Early warning systems are the third most often used channel of communication. Timeliness of communication in the event of a radiological or nuclear emergency is flexible and depends on the event in many MS. When impact of the emergency for a MS increases, the timing for communication decreases and it can go down to optimal communication within 15-30 min. Familiarisation of journalists with reporting on nuclear or radiological emergencies through participation at exercises, specific trainings and seminars for journalists is on-going in some countries. Most MS publish public information primarily in their official languages, followed by English. In most MS (19 out of 26) other languages are used, mainly those of neighbouring countries or second language most often spoken in the respective MS (minority groups, vulnerable groups or tourists).

Some MS identify citizens needs by applying public opinion surveys, analysing lessons learned or social media, or by using any other relevant approach. Most MS indicate that they test whether the communication material they normally use results in people understanding the emergency or protective actions. Testing, evaluation and adjustment of communication materials is in some MS done in various ways e.g.; focus groups, public opinion surveys, meetings with local communities, exercises, etc. Evaluation and adjustment of internet webpage with the emergency preparedness and response related information is in some MS undertaken by external evaluators, public information surveys or stakeholder panels. For the case of a nuclear or radiological emergency a specific website that becomes active in the event is developed in ten MS. This site is used to address high information needs during an emergency and can be also used as a back-up of the official, public website of the authorities. Most MS have online querying tools which may be used for posting online questions during an emergency. These tools include but are not limited to social media, hotlines and Q&A. When querying whether MS have a dedicated person or persons to follow and respond to social media, more than half of the MS indicate that they have one or more persons that are assigned to this task. The number of people involved in this task varies from 1 to 15 persons. It is often the case that this task is not concentrated only on one person but shared between more employees. Eleven MS indicate that they have a mechanism in place that would allow them to systematically collect rumours during an emergency and two MS (Cyprus and Germany) have planned to implement the system to collect rumours. Twelve MS indicate they foresee a call centre in the event of an emergency. The time frame to organise the call-centre is relatively short despite the fact that organisational aspects are demanding and available and trained people are rapidly required.

Nearly all MS indicate that they include aspects of communication with the public in nuclear or radiological emergency exercises/drills. The frequency by which aspects of communication in exercise or drills are included varies from once every five years to several times a year. Experiences gained during exercises indicate challenges and pitfalls related to public information, not only on paper but also in practice, e.g. use of templates, use of preapproved messages, use of key messages, expressing empathy, etc.

Topic: Cross-border collaboration

The new provisions in Articles 97 to 99 of the Directive 2013/59/Euratom have been substantially enhanced compared to the provisions in Article 50 of Directive 96/29/EURATOM concerning cooperation and information exchange between Member States. Not only the cooperation with Member States and third countries has become mandatory; but also, the obligation to "promptly establish contact with all other Member States and with third countries which may be involved or are likely to be affected with a view to sharing the assessment of the exposure situation and coordinating protective measures and public information by using, as appropriate, bilateral or international information exchange and coordination systems" is new.[55]

Specific questionnaire items have been designed to investigate the administrative and organizational aspects of cross-border collaboration in public information: languages used in public information, participation in regional exercises, references to websites of the NRO of the MS in which the emergency takes place and to explore the collaboration with public information officers from a practical point of view.

Several MS indicate they collaborate with public information officers from other countries involved in emergency management. Collaboration occurs either directly or indirectly e.g. e-mail exchange, bilateral meetings, working group, regional exercises, etc. Several countries also indicate that they have planned to either set up collaboration or expand upon existing collaborative practices with other MS. However, most MS indicate that they will not publish public information in the official language of neighbouring countries in the event of an emergency, yet they would refer to the website of the NRO (or crisis centre) of the MS in which the emergency takes place.

Topic: Transparency

The revision of Article 8 of the revised Nuclear Safety Directive focuses on increasing the transparency of regulatory authorities and operators of nuclear power plants with their obligation to make necessary information available in relation to the safety of the nuclear installations and its regulation, with specific consideration to local authorities, population and stakeholders in the vicinity of a nuclear installation both in times of normal operation and in the event of incidents and accidents.

Most of the questions exploring transparency topic in this document are taken or are adapted from the research Commendable practices on transparency in nuclear regulatory communication with the public, NEA/CNRA[56] (2011). The following topics regarding transparency are explored: main challenges associated with transparency during a nuclear or radiological emergency, reporting to the parliament on duties concerning transparency related to nuclear emergencies, monitor and review regulatory processes related to emergency preparedness and response to ensure openness and transparency and committees/governing bodies responsible for oversight of transparency related to emergency preparedness and response.

Respondents from MS brought forward a variety of challenges associated with transparency during a nuclear or radiological emergency. These challenges include: avoidance of rumors, panic, confusion, and unsettlement; and the provision of reliable and proper information. It is challenging to avoid contradictions, to provide information in a timely manner, to balance the provision of secure information, the handle the amount of information, to ensure that sufficient information is available and to present it in plain language. Furthermore, the responses from MS indicate that it is challenging to keep the balance between: the right of the public to be informed and national regulations on emergency planning; the truth and frightening people; and a desired highest level of transparency on the one side and a reliable and deliberate crisis communication on the other side. Several MS indicate

[55] A comprehensive overview of legal aspects related to Cross-border collaboration is reported in Deliverable 1.1

[56] NEA/CNRA/R(2011)3, COMMENDABLE PRACTICES ON TRANSPARENCY IN NUCLEAR REGULATORY COMMUNICATION WITH THE PUBLIC, Report jointly prepared by the CNRA Working Group on Public Communication of Nuclear Regulatory Organisations and by the Working Group on Transparency Activities of the European Nuclear Safety Regulators Expert Group (ENSREG), 17-Jan-2011

that they report directly to the parliament on duties concerning transparency related to nuclear emergencies: parliamentary questions, emergency plan and annual reports. In most MS the responsibility and the authority to draft public information documents are shared among different actors and is not limited to NRO. Monitoring and review of regulatory process related to EP&R to ensure openness and transparency occurs in several manners: intern procedures, internal audits, stakeholder consultation, NRO quality process, feedback, science and technology, experiences. Several MS indicate that there are committees or governing bodies that are responsible for the oversight of transparency related to emergency preparedness and response e.g. oversight is done by stakeholders, general transparency bodies or specific governing bodies.

Topic: Information disclosure and transparency - Legal position

All EU MS have a legal basis for the disclosure of information. In most cases, there is a general Freedom of Information Act (FOI) which requires NROs to follow guidance on the way in which information is made available to the public. In addition to special laws, codes of practice or guidelines relating to environmental information, for instance by amended Environmental Assessment Directive 97/11/EC (European Union, 1997) and further by Directive 2003/35/EC (European Parliament and the Council of the European Union, 2003), the obligations of the Aarhus Convention on access to information, public participation in decision-making and access to justice in environmental matters (UNEC, 1998) also required disclosure of information. However, practices on proactive disclosure of information may vary a great deal among the MS.

This section of the document looks at the national laws and requirements for the disclosure of information, how NROs and industry interact, how information is released and the issue of dealing with disclosure of sensitive information.

There will be no major changes concerning release of information subsequent new BSS Directive and Nuclear Safety Directive. Only three MS indicate specific changes in relation to the aforementioned aspects regarding the release of information. These aforementioned aspects include laws, codes of practice, guidelines or other requirements for the release of information which apply to the NRO; law/codes/guidelines specifying exemptions or exclusions from public information; requirements/laws on the release of information on request or proactively; laws/requirements on release of information on the industry; laws/requirements on certain format or timeframe for the release of information; agreement in advance concerning the release of information; policy on public information and documents other than media (press) releases; explanations for withholding information; release of information in relation to emergency phase; restriction on time spend responding to enquiries; amount of responses on formal 'disclosure' request, queries to enquiry points, and queries from elected officials; correction of erroneous coverage related to emergencies in own countries or in other Members States or third countries.

Most MS state that there are specific laws, codes of practice, guidelines or requirements that apply specifically to their NRO either concerning release of information in general or specifically concerning nuclear or radiological issues/emergencies. Concerning the release of information in the event of an emergency, almost all MS indicate that they release information proactively rather than on request. Several MS indicate that they use a specific format for language as for example the use of simple language. The most often referred to format is that of the IAEA or the European Union. Most countries indicate that there does not need to be an agreement in advance for the release of information with any other organisation such as the industry or other government agencies, however there are exceptions where MS need other messages than the first one (holding statement) to be discussed and agreed upon with other organisations . Several countries provide specific guidelines, laws or acts they refer to when providing an explanation to the public on the rationale for what information must be withheld related to an emergency. These include for example: NRO Safety Guides and Recommendation in the Czech Republic, the Act on the Openness of Government Activities in Finland, Protection of Classified information in Slovakia, or the Public Access to information and security Act in Sweden. Some MS have provisions for the disclosure of information within specific timescales during an emergency. However, most MS indicate that there are no restrictions on how much time the NRO should spend to address a specific request for release of information during an emergency. Only two MS report that that there are specific legal-type judgements to balance between the public's right to know and security restrictions in an emergency situation. Most MS indicate they routinely attempt to correct erroneous coverage related to emergencies by e.g. explanations, press conferences, interviews, press releases, statements on websites, social media, specific media, calls or letters to editors or press agencies.

Topic: Routine access to information

The public information requirements oblige to provide at regular intervals updated information to the population likely to be affected in the event of an emergency (Article 70 of the BSS Directive). This information includes the health protection measures applicable to them and the action they should take in the event of such an emergency referring to Section A of Annex XII. This information shall be permanently available to the public and not only upon request. Furthermore, it is relevant to refer to Article 8 of the Nuclear Safety Directive as it obliges MS to provide information on normal operating conditions of nuclear installations to workers and the general public and prompt information in case of incidents and accidents to workers and the general public and to the competent regulatory authorities of other MS in the vicinity of a nuclear installation.

This section of the document looks at the ways in which NROs in EU MS share information with the public, how they promote their work and specifically how the use of the Internet and social media have influenced the way NROs communicate.

Several types of documents and services related to nuclear emergency preparedness and response are routinely shared with the public using different mass media. Formal consultations, public meetings, meetings with local authorities, written and telephone enquiry points, communication campaigns and public awareness material, local information committees, regional information committees, participation in exercises, blogs, online tools like twitter, Facebook, SMS and informal-drop-in meetings are used to share and implement routine access to information important for EP&R in different MS.

Context of the project and objectives

The European Union has developed an advanced legally binding and enforceable framework for nuclear energy grounded on the Council Directive on the Safety of stablishing a Community framework for the responsible and safe management of spent fuel and radioactive waste (Directive 2011/70/Euratom), a revised Basic Safety Standards Directive (Directive 2013/59/Euratom) and the Nuclear Safety Directive 2009/71/Euratom as amended by the Nuclear Safety Directive 2014/87/Euratom. The Council Directive 2014/87/Euratom takes account of a review of the EU framework on nuclear safety in the light of the Fukushima accident in 2011 and the findings of the EU stress tests. **This Directive had to be transposed into Member States' legislation by 15 August 2017.** The report concerning the implementation of the Directive must be presented to the European Commission by 22 July 2020 at the latest. Additionally, **the new Basic Safety Standards Directive must be transposed into Member States' national legislation and administrative measures by the 6 of February 2018.**

The implementation of these two Directives provides opportunities amongst the EU Member States to review existing procedures and improve implementation measures in the area of public information and transparency requirements in the event of an emergency. Furthermore, Council Decision 87/600/Euratom on Community arrangements for the early exchange of information in the event of a radiological emergency stipulates the arrangements that apply regarding the notification and provision of information whenever a Member State decides to take measures of wide-spread nature in order to protect the general public in case of a radiological emergency.

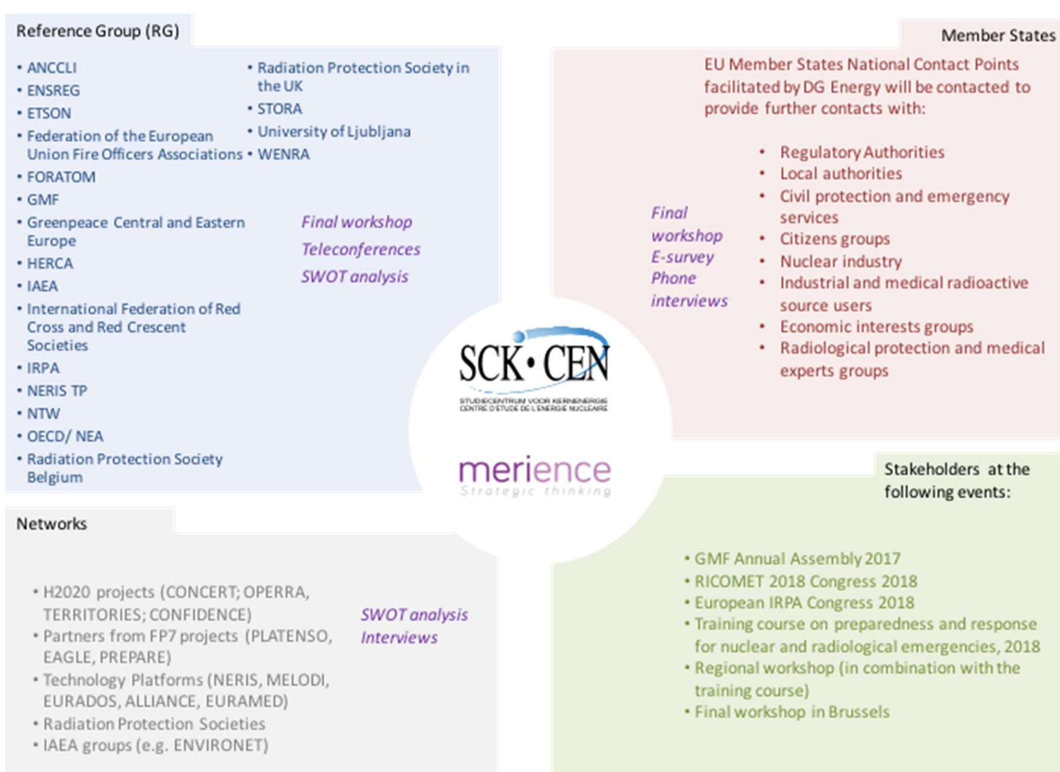
This study assesses the current practices in public information and transparency in 28 EU Member States under the existing legal requirements, and highlights good practices. Furthermore, the study analyses the way and the extent to which the arrangements are implemented at a practical level, taking into account the points of view of various governmental and local authorities, licensees and other stakeholders. In addition, the planned changes and potential improvements for implementation of the recently adopted Directives to be transposed by the Member States in the near future are considered.

This project has the following objectives:

- **Analysis of national legislative provisions and review of standards and guidance supporting the implementation of EU legislation in Member States** (focus on the legal framework): i) A legal analysis of the provisions in the applicable EU legislation ii) a review of existing and latest drafts at international and European level standards and guidance that are available to support the implementation of the legal requirements by interpreting terms and concepts behind the provision of information to the public in emergency situations, iii) a comprehensive survey of the existing legal framework for applying the public information requirements in all the EU Member States.
- **Comprehensive overview of public information settings in the 28 EU Member States from the perspective of EU legislation, including public awareness of protective measures and public satisfaction with information** (focus on the administrative and organizational aspects): Conducting a comprehensive survey of the existing administrative and organisational framework for applying public information requirements in all 28 EU Member States, specifically examining how these systems, procedures and practices have been set up and would work in practice.

- **Lessons learned from nuclear and radiological accidents:** Reviewing different nuclear and radiological accidents worldwide and the way public information needs were managed in order to identify the lessons learnt and their relevance in the European context.
- **Learning from non-nuclear hazard industries, non-nuclear requirements and practices:** Collecting experiences from requirements and practices in the European non-nuclear hazard industries, particularly chemical incidents and emergencies and natural disasters, for illustrative purposes. Extending the analysis to comparative requirements and practices in all hazards emergency communication (including industrial – chemical, nuclear, radiological- and natural disaster management – earthquakes, volcano eruptions, tsunami, etc) for illustrative purposes.
- **Collection of stakeholders' views, needs and recommendations:** Evaluating the effectiveness of the existing systems, procedures and practices in Member States at national and regional levels, particularly from a civil society perspective, pointing out the strengths and weaknesses of different approaches. SWOT analysis and case studies including cross-border arrangements and practices for implementing the requirements on public information in the event of an emergency.
- **Establishment of the Reference group:** The aim is to establish the Reference group as the consultative body to provide advice and expertise to the consortium. It will provide input, will be consulted on the work performed and will review the recommendations.

The following figure presents the interaction among the project partners, stakeholders being consulted during the project and the Reference Group. Additionally, it shows the main methods used for collecting information from stakeholder groups as well as the main events where interaction is foreseen.



Context of this document

Task 1.2 was designed to provide a comprehensive overview of public information settings in the 28 EU Member States from the perspective of EU legislation with focus on the administrative and organizational aspects, **including public awareness of protective measures and public satisfaction with information** (reported in D1.3a**)**

A comprehensive survey of the existing administrative and organisational framework for applying public information requirements in all 28 EU Member States, specifically examining how these systems, procedures and practices have been set up and would work in practice, was conducted. This document reports the results from a dedicated *on-line survey* (with closed and open questions) which was designed to collect additional information to the results collected in Task 1.1. The project Reference Group and National Contact Points were engaged in providing contacts at national level and nuclear safety authorities (or other responsible authorities) to provide information through the survey. Emergency management authorities and other responsible authorities in each EU Member State were encouraged to respond collectively and submit only one filled in questionnaire back to the research team. It should be noted that in some countries more authorities and emergency management organisations were involved in responding the questionnaire (e.g. beside of nuclear safety authorities also crisis centre, civil protection, ministry for internal affairs) while in other countries only one authority was involved in responding the questionnaire. **Responses reported in this document reflect positions and views on practices in public information and transparency in the event of an emergency as seen by authorities or other responsible organisations in 26 EU MS out of 28 EU MS.** Non-governmental organisations, local communities and other stakeholders have been consulted by the project research team by using other means and reported in other project deliverables.

This report complements the Deliverable D1.3: *Public awareness and satisfaction with information about nuclear emergencies potentially occurring in Belgium.*

Method

Design of the questionnaire and formulation of the questionnaire items: The questionnaire for the on-line survey was developed, tested and finalized by the project research team. Most items in the survey were formulated as open questions, some as statements. For the in-depth analysis of the following topics: *Public information, Cross-border collaboration, Transparency, Legal position, Routine access to information*, multiple questions were used. Motivation for the questions on these topics originates from the project analysis of legal documents, analysis of public information guides, consultations of the project stakeholders and results of different project workshops and other events reported elsewhere. Selected questions in topics: *Transparency*, *Information disclosure and transparency - Legal position*, and *Routine access to information* are completely taken or adapted from the research *Commendable practices on transparency in nuclear regulatory communication with the public*, NEA/CNRA[57], (2011). The draft questionnaire with closed and open questions was verified by the project legal experts, project officers from EC DG Energy and by the project Reference

[57] NEA/CNRA/R(2011)3, COMMENDABLE PRACTICES ON TRANSPARENCY IN NUCLEAR REGULATORY COMMUNICATION WITH THE PUBLIC, Report jointly prepared by the CNRA Working Group on Public Communication of Nuclear Regulatory Organisations and by the Working Group on Transparency Activities of the European Nuclear Safety Regulators Expert Group (ENSREG), 17-Jan-2011

Group members (reported in Milestone 2). The final version with an introduction text can be found in Annex 1. The following topics are investigated, each with a battery of more questions: Public information, Cross-border collaboration, Transparency, Legal position and Routine access to information.

Sampling of responders and collecting responses: DG energy provided initial e-mail addresses of national contact points which was later extended by the Chairperson of the Working Group 3 (transparency arrangements of the European Nuclear Safety Regulators Group (ENSREG) who provided national contact points and forwarded the project team's email to all 28 ENSREG members. The research team search all general email addresses from national contact points in order to send the questionnaire to at least two addresses or through the online contact form from the website in some cases. The questionnaire was sent out to 28 Member States, in each MS to minimum one e-mail address of a responsible authority. The questionnaire has been sent to more institutions in most of the EU MS, since the emergency management and public information tasks related to nuclear or radiological emergencies are shared responsibility of different authorities/organisations: e.g. Nuclear safety authority, Ministry of internal affairs, Ministry of health, Federal crisis centre, Civil protection etc. Responders have been encouraged to collaborate in the survey and submit only one survey per MS in order to present the national level. List of contacts persons with individual emails and general emails searched on the regulators' websites has been regularly updated based on the received responses or non-responses from each MS. Reminders have been sent out by the project research team as well as by ENSREG WG Chairperson, a member of the Reference Group of this project.

Responses: Representatives of authorities from 26 Member States out of 28 responded to the questionnaire (information is missing for United Kingdom and Portugal). Most of the questions in the questionnaires were responded completely. No-response on a particular question is in the analysis indicated as an empty place in the table. Blank space in the table also indicates, that the given answer is not related to the question or not specific enough to infer an answer. In some cases, the response is shown as n/a in the table, indicating not applicable, from the point of view of the respondent. The number of empty cells in the case of Belgium is significant and indicates a lack of response. Although the NRO, Federal Agency for Nuclear Control (FANC), provided responses to some of the questions, they referred to the Crisis Centre, under the Ministry of the Interior, as responsible for federal nuclear emergency planning and management, including public communication. Despite the invitations and reminders from the consortium, the Crisis Centre did not send responses. A similar challenge was faced in the responses from the Netherlands which include the views and experiences of the Authority for Nuclear Safety and Radiation Protection (ANVS) only.

Data analysis: Analysis of the received responses consisted of three levels. The first level consisted of reviewing the responses at the moment of the survey reception, pointing out missing responses, inconsistencies etc. and contacting the respondent by e-mail or telephone in order to clarify and give another opportunity to improve answers on the pointed items. The second level of the analysis was to collect responses on the same question from different MS and to group responses in different categories and classify categories. The categories and frequencies (number of responses in the category) are reported in the tables. If there was a response not belonging to any of these categories, the response is specified in the category "other". The last level of the analysis was to deduct relevant information from the table and highlight good practices and interesting exceptions. Good practices are pointed out by generalisation of responses and taking other projects results reported elsewhere into account, if applicable. Good practices indicated in the document connect the survey results with analysis of legal documents, public information guides, consultations of the project stakeholders and results of different project workshops and other events reported elsewhere.

Practical details and timeline:

Date	Description of an action
November	Preparation of the methodology and the first version of the questionnaire
2017-12-12	Comments received by EC on 2017-12-14
2017-12-14	Revised version submitted. Comments by EC received on 2017- 12-22 (EC sends recommendation letter and list of contact points)
December	Revised version discussed with Reference Group Members. Improvement of the questionnaire
2017-12-20	Final version of questionnaire
2017-12-22	Questionnaire sent out
2018-01-20	Reminders + new contact sent out
January to April	Individual reminders e-mails, telephone calls, face-to-face
May	Closing the collection of responses
Jun-August	Analysis
September	Report submitted to DG Energy
November	Second version of the report submitted to DG Energy.

Results

1.1 Topic: Public information

1.1.1 Implications of the New Basic Safety Standards Directive and Nuclear Safety Directive on national Legislation (Q1)

The development and implementation of the new Basic Safety Standards Directive and Nuclear Safety Directive results for various countries (19; n=26) in an update or change of national legislation. These changes occur or are planned to occur in relation to legislation on radiation protection in general. Specifically, countries that have changed or are planning to change sections of their current legislation, indicate that these changes will occur in subsections of the existing legislation, specifically in relation to international cooperation, public communication and information, and nuclear and radiological emergency management.

On the other hand, various countries (7; n=26) indicate that they experience no need for changes in legislation as their legislation already includes the changes foreseen in the new Basic Safety Standards Directive and the Nuclear Safety Directive.

The table below provides an overview of the need for changes in the legislation across the EU MS and in case changes occur, in which domain these can be found. As it can be seen in Table 1 most countries (19 out of 26) have indicated a change of national legislation resulting from the new Basic Safety Standards Directive and Nuclear Safety Directive. Out of these nineteen countries, eight indicate that changes are made (have been made) specifically concerning public information and communication. Austria makes specific mention of changes being made concerning international cooperation regarding public information. Seven counties indicate that general changes concerning radiation protection and nuclear safety will be made. Of these seven, only three (Croatia, Germany and Slovakia) indicate that these general changes will include changes on public information and communication. The remaining four countries either mention that only general changes are made and no changes are foreseen or made concerning public information and communication as these were already foreseen in the existing national legislation, or they do not make specific mention of changes concerning public information and communication. Six countries (Croatia, Germany, Hungary, Ireland, Luxembourg and Spain) specifically mention changes being made concerning public information and communication in Emergency Preparedness and Response legislation.

Table 1 Implications of the New Basic Safety Standards Directive and Nuclear Safety Directive on national Legislation

Will new Basic Safety Standards Directive and Nuclear Safety Directive result in new national legislation regarding public information in radiological emergency?							
MS	Change in national legislation	No change in national legislation	Intended changes				
			Radiation protection and Nuclear Safety	International cooperation	Public communication/ information	Nuclear or radiological EP&R	Articles
Austria	**X**			**X**			
Belgium		**X**					
Bulgaria	**X**		**X**				
Croatia	**X**		**X**		**X**	**X**	*OG 24/18, art 15 and 38*
Cyprus	**X**		**X**				
Czech Republic		**X**					
Denmark	**X**				**X**		*The law of 25 January 2018*
Estonia		**X**					
Finland		**X**					*New act (Public information remains unchanged)*
France		**X**					
Germany	**X**		**X**		**X**	**X**	*Radiation Protection Act (§ 105 of the Radiation Protection Act and § 112 of the Radiation Protection Act)*

Greece	**X**				**X**		
Hungary	**X**				**X**	**X**	*Govt. Decree 165/200 (X.8) Korm. on the rules of public communication in nuclear or radiological emergency*
Ireland	**X**				**X**	**X**	*Q2 2018*
Italy	**X**		**X**				*Legislative Decree n. 137 of the 15th of September 2017 and n. 230 of the 17th of March 1995; Section II of the Title X*
Latvia		**X**					
Lithuania	**X**		**X**				*Law on Nuclear Safety, Chapter 7 and 8*
Luxembourg	**X**				**X**	**X**	*Art. 128, Art. 58, Art. 59*
Malta	**X**						
Poland	**X**						
Romania	**X**						
Slovakia	**X**		**X**		**X**		*Atomic Law Nr. 541/2004 Z. z., § 28 part 20 and 22, Decree Nr. 55/2006 §§ 11 and 20, New Act on Radiation Protection (2018)*
Slovenia	**X**						*Articles 134 and 135 of the new Ionising Radiation Protection and Nuclear Safety Act*
Spain	**X**					**X**	
Sweden		**X**					*New regulation on public information in case of emergency exposure situations*
The Netherlands	**X**						*Dutch Basic Safety Standards (6/02/2018)*

1.1.1.1 *Challenges in transposition of the New Basic Safety Standards Directive and Nuclear Safety Directive (Q2)*

Concerning challenges experienced in the transposition of the New Basic Safety Standards Directive and Nuclear Safety Directive, 21 countries indicate (n=26) that they do not expect any challenges or direct difficulties for transposition. Three countries however have experienced various challenges. These challenges include challenges concerning cross-border communication in the early phase of a radiological or nuclear emergency, the identification of relevant stakeholders, and challenges concerning varying understanding or interpretation of concepts such as “reference level”.

Table 2 provides an overview of the expectations and occurrence of challenges for each county concerning the transposition of the New Basic Safety Standards Directive and Nuclear Safety Directive. Three countries (n=26) indicate having encountered challenges with the transposition of the New Basic Safety Standards Directive and Nuclear Safety Directive in their respective national context. It is important to note here however that the challenges identified relate more to expected challenges (or based on experience) as a result of the transposition rather than with the transposition itself. Challenges mentioned concerning cross-border communication in the early phase of a radiological or nuclear emergency refers directly to challenges expected *during* an actual emergency. Concerning the identification of stakeholders, the same is true; i.e. challenges are expected on an implementation level when identification of stakeholders concerning public information and communication is carried out. Divergence in conceptual interpretation refers to a challenging interpretation of concepts such as “reference level” by the public and possible subsequent misinterpretations or confusion. Thus, indicating that this challenge also occurs on the level of implementation rather than transposition. Most countries (21; n=26) indicate that they have not experienced any challenges during transposition or resulting from transposition not being needed (Table 1). Germany and Luxembourg indicate that challenges are possible and they leave open the option that challenges might still occur in the subsequent transposition process.

Good practice

Recognising in advance a challenge related not only to the transposition of the Directives but also to their implementation is a step towards improving the existing national legal framework.

Table 2 Challenges in transposition of the New Basic Safety Standards Directive and Nuclear Safety Directive

Are there any particular difficulties in transposition of these new regulations related to public information in your national context?						
MS	Challenges encountered	Challenges (possibly) expected	No challenges expected	Identified challenges		
				Cross-border communication in early phase of emergency	Identification of stakeholders	Divergence in conceptual interpretation
Austria	X			X		
Belgium	X				X	
Bulgaria			X			
Croatia			X			
Cyprus			X			
Czech Republic			X			
Denmark			X			
Estonia			X			
Finland			X			
France	X					X
Germany		X				
Greece			X			
Hungary			X			

Ireland			**X**			
Italy			**X**			
Latvia			**X**			
Lithuania			**X**			
Luxembourg		**X**				
Malta			**X**			
Poland			**X**			
Romania			**X**			
Slovakia			**X**			
Slovenia			**X**			
Spain			**X**			
Sweden			**X**			
The Netherlands			**X**			

1.1.1.2 Implications for overall communication plan or strategy (Q3)

Those countries that have indicated that changes will occur in their national legislation after transposition of the new Basic Safety Standards Directive and new Nuclear Safety Directive in their respective countries have mentioned changes being made concerning overall public communication plans and strategies. These changes have occurred or are expected to occur in the frame of cross-border communication, documentation of arrangements, translation of templates to English, or within process refinement. Mention is also made of the “establishment of an overall communication strategy”.

Table 3 presents an overview of the implications for the overall communication strategy or plan. Only those countries that indicate a change in legislation are included in the table (n=19). A cross-check was conducted to verify that no discrepancy exists between possible changes in legislation (Table 1) and changes in overall communication strategy (Table 3). One MS was removed from the analysis as the respondent was not the organisation responsible for/qualified to answer the specific question (n=18). Half of the countries (n=18) that indicated changes in national legislation indicate that specific changes are made concerning the overall communication strategy or plan in their respective countries. Two countries, Germany and Lithuania are still reviewing whether these changes are needed in their respective countries. This implies that a little less than half of the countries indicates that they do not intend to make any changes.

Good practice

Having a robust overall communication plan or strategy for nuclear or radiological emergency serves to communicate with the public before, during and after an emergency and supports national authorities with a view to helping them achieve the overall objective of improving public information and transparency, as required by the new Basic Safety Standards Directive and Nuclear Safety Directive.

Table 3 Implications for overall communication plan or strategy

Will your overall communication plan/strategy change, or has it changed as a result of the new Basic Safety Standards Directive and Nuclear Safety Directive?								
MS	Change concerning public communication plan/strategy			Intended changes				Plans/Strategy
	Affirmative	Possible (incl. Under review)	Negative	Cross-border communication	Documentation of arrangement	Translation of templates to English	Comprehensive changes or creation of overall communication strategy	
Austria	X					X		
Bulgaria			X					
Croatia	X						X	Change of EP&R system (incl. communication strategy (drafted, enacted end 2018)
Cyprus	X						X	
Denmark			X					
Germany		X						
Greece	X							
Hungary			X					

Ireland	X			X	X			
Italy	X				X			
Lithuania		X						
Luxembourg			X					
Poland	X							
Romania	X						X	*Governmental Decision no 584/2008*
Slovakia			X					
Slovenia			X					
Spain			X					
The Netherlands	X						X	

1.1.1.3 Inclusion of communication aspects with the public in Emergency Preparedness and Response plan (Q4)

Concerning the inclusion of communication aspects in Emergency Preparedness and Response plans it can be noted that communication aspects with the public are included in general national emergency plans (not specific to nuclear or radiological emergencies) or are included in specific nuclear and radiological emergency preparedness and response plans (provisionally in need of update or in draft format).

As shown in Table 4, twenty-three countries (n=26) have included communication aspects in Emergency Preparedness and Response plans, whilst the three other countries (Croatia, Estonia and Spain) are currently reviewing their Emergency Preparedness and Response plans or are in the process of drafting an update. Of these three MS, only Estonia indicated that communication aspects are included in a general national Emergency Preparedness and Response plan, i.e. an Emergency Preparedness and Response plan that is not specific to radiological and nuclear emergencies. Spain indicated that communication aspects can also be found in other national regulations.

Good practice

All countries include communication aspects with the public in their respective emergency response plans (either in general emergency plans or specific plans for radiological and nuclear emergencies).

Table 4 Inclusion of communication aspects with the public in emergency preparedness and response plans

Are communication aspects with the public included in your emergency response plan?					
MS	Inclusion of communication aspects				Plans/legislation
	Affirmative		General emergency plan	Other communication rules	
		Draft			
Austria	**X**				
Belgium	**X**				
Bulgaria	**X**				
Croatia		**X**			
Cyprus	**X**				
Czech Republic	**X**				
Denmark	**X**				*Government Order on Protective Measures against Accidents at Nuclear Installations*
Estonia		**X**	**X**		*Public notifying plan within the Ministry of the Environment in case of an emergency*
Finland	**X**				*Article L. 592-32 of the Environment Code*
France	**X**				*Chapter 3.5 of the "Guidelines for emergency protection in the vicinity of nuclear power plants", and Radiation Protection Ordinance*
Germany	**X**				
Greece	**X**				
Hungary	**X**				

Ireland	**X**				
Italy	**X**				
Latvia	**X**				
Lithuania	**X**				*Law on Nuclear Safety, Article 41, 1, 2 paragraph*
Luxembourg	**X**				
Malta	**X**				
Poland	**X**				
Romania	**X**				
Slovakia	**X**				
Slovenia	**X**				
Spain		**X**		**X**	
Sweden	**X**				
The Netherlands	**X**				

1.1.2 Current communication strategies (Q5)

In order to assess the current communication strategies used at national level in EU Member States various questions were designed covering current existing strategies, evaluation and adjustment strategies, profiles of communication offices, training on communication, and specific public communication strategies. These will be respectively addressed in subsequent sub-sections. The assessment of the current communication strategies is initiated by querying the existence of a specific public information plan or strategy for nuclear or radiological emergencies.

As can be seen in Table 4 all countries included aspects of communication with the public in their respective Emergency Preparedness and Response plans. Table 5 shows that the inclusion of these aspects occurs in a general public information strategy (i.e. not in a specific public information or communication strategy for radiological or nuclear emergencies), in annex of general National Disaster Plans, specific arrangements for crisis situations, Emergency Preparedness and Response plans, or in a specific act: Strategy for informing the public and media in a radiological emergency.

Good practice

Communication strategy for nuclear or radiological emergency is designed, evaluated and adjusted in order to respond to an emergency challenges and public information needs in case of an emergency.

Table 5 Specific public information plans or strategies for nuclear or radiological emergencies

Do you have a specific public information plan/strategy for nuclear or radiological emergencies?								
MS	Specific public information plan or strategies		Inclusion in other plans or strategies					Plans/strategies
	Affirmative	Negative	General public information strategy	EP&R plan	Annex	Specific arrangement for crisis situation	Act	
Austria	**X**							
Belgium		**X**				**X**		
Bulgaria		**X**			**X**			*National Disaster Protection Plan, part III: Off-site emergency plan*
Croatia	**X**							*EPR Plan and organizational plans*
Cyprus		**X**		**X**				
Czech Republic		**X**					**X**	*Strategy for informing the public and media in a radiological emergency*
Denmark		**X**		**X**				
Estonia		**X**						
Finland		**X**	**X**					
France		**X**						
Germany		**X**		**X**				

Greece		X	X					
Hungary	X							
Ireland		X		X				
Italy		X		X				
Latvia		X		X				
Lithuania		X		X				*Off-site plan and resolution of Government No. 559 "Method for provision of information to population in case of radiation or nuclear emergency"*
Luxembourg								
Malta		X						
Poland	X					X		
Romania		X		X				
Slovakia		X		X				*Public Protection Plan of each region*
Slovenia	X							
Spain	X							*Specific strategy for nuclear or radiological emergencies*
Sweden	X							
The Netherlands	X							

1.1.2.1 Evaluation and adjustment of communication plan or strategy (Q7)

Table 6 shows that the public information or communication plan/strategy for nuclear emergencies is in a big majority of EU Member States reviewed and improved on regular times intervals. One MS, Spain, stated, that they review and improve it on a daily basis and especially after the exercises when they get lessons learned. Thirteen EU Member States evaluate and adjust it once a year or at least once in five years. They do this also subsequent to specific events or on a needs basis (n=10), after real events with an emergency potential (n=2), after exercises and drills (n=7) or based on the experiences (N=1), new developments (2) and risk and hazard assessment (n=1).

Good practice

Revision and improvement of a public information or communication plan or strategy is carried out on a regular basis and also after specific events, e.g. after exercises and drills or real events.

Table 6 Review and improvement of NROs’ communication plan/strategy

How often do you review and improve your communication plan/strategy?											
MS	No update	Regular time intervals				Subsequent specific events					
		Dail y	Onc e a year	Every three years	Every four-five years	On a needs basis	Exercises and drills	Experiences	Real events	New development	Risk and hazard assessments
Austria			**X**								
Belgium						**X**		**X**		**X**	
Bulgaria							**X**				
Croatia					**X**		**X**				
Cyprus	**X**										
Czech Republic					**X**	**X**					
Denmark					**X**					**X**	
Estonia			**X**								
Finland			**X**		**X**						
France						**X**	**X**		**X**		
Germany							**X**		**X**	**X**	
Greece						**X**					

Hungary			**X**				**X**				
Ireland				**X**	**X**	**X**					
Italy						**X**					
Latvia			**X**			**X**					
Lithuania			**X**			**X**					**X**
Luxembour g							**X**				
Malta	**X**										
Poland				**X**	**X**						
Romania					**X**						
Slovakia			**X**								
Slovenia				**X**	**X**	**X**					
Spain		**X**					**X**				
Sweden						**X**					
The Netherlands	**X**										

1.1.2.2 Professional profile of director of public information office of the Nuclear Regulatory Organisation (Q8)

Table 7 shows that a great number of countries (n=9) do not have a central person in charge for public information at the level of a director, either because they do not have a specific public information office or they do not have any specific position for public information tasks, for instance. Instead, they have dispersed responsibility for public information through authorities and governmental bodies (e.g. members of Strategy Department or managers like Chairperson, Directors of Sections, etc).

If the public information is centralised, the directors of public information office of a Nuclear Regulatory Organisations are mainly public relation and communication specialists (N=9). In Cyprus, Hungary and Latvia the directors are former journalists whilst in the other three countries, the directors have a different background, for instance, law and political sciences in Belgium, philosophy and political communication in France and biochemistry and medical sciences in the Netherlands.

Good practice

The nuclear safety authority establishes a specific position or function in the organisation with responsibility for public information and communication both during the preparedness phase and in case of a nuclear or radiological emergency.

Table 7 Professional profile of the head/director of the public of the Nuclear Regulatory Organisations (NROs)

What is the professional profile of the head/director of the public information office of the Nuclear Regulatory Organisation (NRO)?				
MS	Not applicable	Profile		Other
		Public Relations/Communication	Journalism	
Austria		**X**		
Belgium				Law and political sciences
Bulgaria		**X**		
Croatia	**X**			
Cyprus			**X**	
Czech Republic	**X**			
Denmark	**x**			
Estonia	**X**			
Finland		**X**		
France				Philosophy and political communication
Germany	**X**			
Greece		**X**		
Hungary			**X**	

Ireland				
Italy				
Latvia			**X**	
Lithuania		**X**		
Luxembourg		**X**		
Malta	**X**			
Poland		**X**		
Romania		**X**		
Slovakia	**X**			
Slovenia	**X**			
Spain		**X**		
Sweden	**X**			
The Netherlands				Biochemistry and medical sciences

1.1.2.3 Training on communication

1.1.2.3.1 Educational activities organised on an international level attended by public information staff (Q9)

When inquiring about the amount of international professional conferences, technical meetings and/or educational programmes related to communication aspects the staff of the public information office attended in the last three years prior to the inquiry, it is noteworthy that only two countries (n=25) indicated that none were attended (see Table 8 below). Of these countries Luxembourg indicated that this information was not available to them, whereas Malta indicated that they do not have a public information office. In general, in most countries (n=23) the staff of the public information office attended at least one educational activity in the past three years. On average five educational activities were attended in the last three years. Hungary attended the most activities, with an average of six activities attended per year; totalling 18 activities in the past three years. Firstly, most countries (16 out of 23) attend international educational activities organised by the IAEA. Examples of these activities include *'Regional Workshop on Communication with the Public in a Nuclear or Radiological Emergency*' and *'Technical Meeting on Stakeholder Involvement and Public Communication*', as attended for example by Poland. Secondly, nine countries (n=23) indicated that they attend activities organised by NEA-OECD. Examples include the attendance by Hungary of the *'Working Group on Public Communication of Nuclear Regulatory Organisations'*. Thirdly, five countries (France, Germany, Hungary, Ireland and Italy) (n=23) also make specific reference to activities organised at European level such as the *'EU Scientific Seminar: Risk communication'*, and '*Instrument for Nuclear Safety Cooperation (EU): assistance of the Vietnam and Moroccan authorities in the field of communication'*. Additional several countries (14 out of 23) indicate they attend one or more educational activities organised by other actors. Three countries (Czech Republic, Estonia and Ireland) indicate that they attend meetings on communication aspects at national level. Furthermore, several countries make specific mentions of conferences where the theme of communication is central such as RICOMET (Czech Republic and Germany) or they make notion of communication aspects being included in International Nuclear Emergency Exercises (Belgium and Greece). Besides these, several countries (6 out 23) indicate that in addition to the aforementioned activities they also partake in activities such as courses on communication organised by the national government, as is the case in the Czech Republic. France indicates that they for example attend stakeholder workshops in France, Japan or the USA. The staff of the public communication office in Germany also attended for example the '*International Crisis and Risk Communication Conference'* in Florida (USA) in March 2017. Slovenia and Sweden attend only educational activities that are organised at regional level such as the '*Nordic crisis communication conference'* in Helsinki.

Good practice

Personnel responsible for public information regularly participate at educational and networking activities organised at international level, where they can learn from other countries' experience.

Table 8 Attendance of international professional conferences/technical meetings/education programmes related to communication aspects

How many international professional conferences/technical meetings/education programmes related to communication aspects has the staff of the public information office attended in the last three years?											
MS	None	Amount	IAEA	NEA-OECD	European Union	Others					
						National meetings	Technical meetings	INEX	RICOMET	PIME	Others
Austria		**1**	**X**								
Belgium		**2**		**X**				**X**			
Bulgaria		**6**	**X**	**X**							
Croatia		**5**	**X**								
Cyprus		**7**	**X**								
Czech Republic		**4**	**X**			**X**			**X**		**X**
Denmark											
Estonia		**Once a year**				**X**	**X**				
Finland		**3**	**X**								
France		**3**	**X**	**X**	**X**						**X**
Germany		**8**	**X**	**X**	**X**				**X**		**X**
Greece		**2**	**X**					**X**			
Hungary		**6 per**	**X**	**X**	**X**			**X**			

		year									
Ireland		**Annually**			**X**	**X**					
Italy			**X**	**X**	**X**						
Latvia		**3**	**X**								**X**
Lithuania		**1**	**X**								
Luxembourg	**X**										
Malta	**X**										
Poland		**12**	**X**	**X**							
Romania		**4**	**X**	**X**							
Slovakia										**X**	**X**
Slovenia											**X**
Spain		**6**	**X**	**X**							**X**
Sweden		**2**									**X**
The Netherlands										**X**	

1.1.2.3.2 Policy on media training for regulatory staff (Q20)

Table 9 shows that most countries (n=19) indicate that they have a specific policy on media training for regulatory staff. A great variety however exists on whom receives this training and what this training specifically entails. Five countries indicate that specifically management receives media training. For example, in Belgium all Directors in addition to the communication staff receive media training. Only six countries indicate that a specific spokesperson or Public Relations (PR) expert is trained in media handling. In nine countries, media training is provided to either all or a specific selection of staff members.

Concerning the content of the media training a great diversity exist as well. Specifically, media training entails the inclusion of journalists or persons trained in media handling during exercises or drills. For example, in Bulgaria, those PR experts that are specifically involved in the Regulatory Authority's emergency team during exercises and drills receive specific media training. In Spain for example, specific trainings are provided to ensure that "high-quality, clear and comprehensible information, expressed in plain language" is issued. For this "we train our staff in spoken and written communication and emergency management. All potential spokespersons receive media training and participate in nuclear emergency exercises." More than half of the countries (n=13) specifically provide what is referred to as media training and communication training. For example, in France a large part of the staff of the nuclear regulatory organisation is involved in communication issues and therefore communication training is adapted to the specific needs of each person […] and "tailored to their various responsibilities". A specific section is devoted in the training "to better answer queries from journalists and put across a message clearly".

Good practice

Professionals who may appear in media as spokespersons during a potential nuclear or radiological emergency receive media training on a regular basis.

Table 9 Policy on media training for regulatory staff, including percentage of staff trained in media handling

What is your policy on media training for regulatory staff? Approximately what percentage are trained in media handling during an emergency?

MS	No policy/ none scheduled	Percentage (how often)	Who			Training				
			Management (Chairperson/ director)	Spokesperson /PR expert	Staff members	Exercise/drill	Special courses	Media training	Communication Training	Seminar/ conference
Austria		**2 persons**							**X**	
Belgium		**Once per year**	**X**		**X**					
Bulgaria		**X**		**X**		**X**				
Croatia		**20%**								
Cyprus		**10%**							**X**	
Czech Republic		**10%**			**X**		**X**			**X**
Denmark		**10-20%**		**X**				**X**		
Estonia		**X**	**X**		**X**					
Finland		**X**			**X**			**X**		
France		**X**			**X**			**X**	**X**	
Germany										
Greece	**X**									

Hungary		**X**	**X**					**X**		
Ireland		**25%**						**X**		
Italy	**X**									
Latvia	**X**									
Lithuania		**8-10 people**						**X**	**X**	
Luxembourg	**X**									
Malta	**X**									
Poland		**10 people**		**X**	**X**		**X**		**X**	
Romania		**X**		**X**					**X**	
Slovakia		**X**	**X**	**X**				**X**	**X**	
Slovenia		**45%**	**X**	**X**	**X**			**X**		
Spain		**X**		**X**	**X**	**X**	**X**	**X**	**X**	
Sweden		**5%**			**X**					
The Netherlands										

1.1.2.3.3 Familiarisation of journalists with reporting on nuclear or radiological emergencies Q31)

Table 10 shows that eight countries out of 25 indicate that they invest in familiarising journalists in reporting about nuclear or radiological emergencies. Two countries, Cyprus and Belgium, did not reply as this responsibility lies with the MS's crisis centre. Of these 8 countries, two countries indicate that they carry out this familiarisation process at regular intervals, ranging from one to twice a year. France indicates that they have familiarised journalist with reporting on nuclear or radiological emergencies in the past, but not on a regular basis.

The main forms applied for this familiarisation are the inclusion of journalist in exercises, specific training, seminars and via personal relationships. For example, Bulgaria and Greece indicate that they include journalists in exercises. In Bulgaria this is done on a regular basis, once every two years.

Good practice

Familiarisation of journalists with reporting on nuclear or radiological emergencies through participation in exercises, specific trainings and seminars for journalists is encouraged. Relationships with journalists are developed and maintained before a potential emergency.

Table 10 Familiarisation of journalists in reporting on nuclear or radiological emergencies

Do you invest in familiarizing journalists in reporting about nuclear or radiological emergencies? What does this involve and how frequently is it carried out?										
MS	Yes	No	How often				How			
			Regularly	Once per year	Once per two year	Not regularly	Exercises	Training	Seminars	Personal relationships
Austria	**X**		**X**							
Belgium										
Bulgaria	**X**				**X**		**X**			
Croatia		**X**								
Cyprus		**n/a**								
Czech Republic	**X**								**X**	**X**
Denmark		**X**								
Estonia		**X**								
Finland	**X**			**X**				**X**		
France	**X**					**X**				
Germany		**X**								
Greece	**X**						**X**			
Hungary		**X**								

Ireland	**X**							**X**		
Italy		**X**								
Latvia		**X**								
Lithuania		**X**								
Luxembourg		**X**								
Malta		**X**								
Poland	**X**									**X**
Romania		**X**								
Slovakia		**X**								
Slovenia		**X**								
Spain		**X**								
Sweden		**X**								
The Netherlands		**X**								

1.1.2.3.4 Language of public information (Q33)

Table 11 shows that most countries (19 out of 26) publish public information primarily in their official languages. The second most often language is English. Other languages are related to the official language of neighbouring countries or those second languages most often spoken in the respective MS (minority groups, vulnerable groups or tourists).

> ***Good practice***
>
> Releasing public information in more than only official national languages, as it is currently done in 19 out of the 26 countries surveyed, is a good practice.

Table 11 Language of public information in the event of an emergency

In the case of an emergency happening in your MS, which languages will you use to publish public information?	
MS	Languages
Austria	**German**
Belgium	**Dutch, French**
Bulgaria	**Bulgarian and English**
Croatia	**Croatian, Italian, English and German**
Cyprus	**Greek and English**
Czech Republic	**Czech and English**
Denmark	**Danish**
Estonia	**Estonian, English and Russian**
Finland	**Finnish, Swedish and English**
France	**French and English**
Germany	**German (English under consideration)**
Greece	**Greek and English**
Hungary	**Hungarian and English**
Ireland	**English, Irish sign language, Irish, Polish, Chinese, Russian, Braille and audio**
Italy	**Italian and English**
Latvia	**Latvian**
Lithuania	**Lithuanian and English**
Luxembourg	**French**
Malta	**English and Maltese**

Poland	**Polish, English, German and Russian**
Romania	**Romanian**
Slovakia	**Slovak and English**
Slovenia	**Slovenian and English**
Spain	**Spanish and English**
Sweden	**Swedish and English**
The Netherlands	**Dutch**

1.1.2.4 Public communication strategies

1.1.2.4.1 Policy for NRO staff concerning media communication (Q19)

Table 12 shows that most countries (24 out of 26) indicate that they have a specific policy of NRO staff speaking to the media in the event of an emergency. Even though a great variety exists between countries on who is the NRO responsible for communication with the media and the content of the specific policy, only one MS truly diverges: Sweden has a specific "Freedom to supply information" policy for all staff.

In most countries (n=16) a specific NRO spokesperson is appointed to communicate with the media. Additionally, as is the case in Austria, Finland, Poland and Slovenia the division head or his/her deputy is appointed to address the media. For example, in Slovenia the emergency director is the person appointed for communication with the media. Furthermore, in Hungary and Poland the NRO's General Direct or his/her deputy are allotted to communicate to the media.

The policy itself emphasises that communication with the media needs to be transparent, timely and accurate, and brought across in plain language (understandable). For example, in Belgium, emphasis is placed on transparency and the use of plain language. In Spain for example the importance of an overall strategy included all of the aforementioned characteristics. "Our communication experts play an active role during any type of crisis in the vast majority of cases, supporting the lead authority as a primary source of technical advice and being part of the core emergency team. […] a spokesperson, a reliable senior-level official who during a significant crisis will interact with the public and be "the single voice" of the organisation. The role of this key individual is to ensure that messages are conveyed clearly to the media and are not contradictory."

Good practice

Policy for NRO staff concerning media communication is developed and used as a reference. This policy includes the definition of rules, roles and responsibilities as well as the need to be transparent, timely, accurate and use plain language.

Table 12 Policy on staff speaking with the media in the event of an emergency

What is the NRO's policy on staff speaking to the media in the event of an emergency?												
MS	Staff members			Authorisation			Policy					
	Spokesperson/ PR expert	Division/ section head	(Deputy) Director General	By Director General	By Chairperson	By minister	No policy	Transparency	Timely and accurate	Understandable	"Single voice"	Freedom to supply information
Austria	**X**	**X**										
Belgium								**X**		**X**		
Bulgaria									**X**			
Croatia				**X**								
Cyprus	**X**											
Czech Republic	**X**				**X**				**X**	**X**		
Denmark	**X**											**X**
Estonia	**X**					**X**						
Finland	**X**	**X**										
France	**X**			**X**								
Germany	**X**											
Greece	**X**											

Hungary			X									
Ireland	X											
Italy							X					
Latvia	X											
Lithuania	X											
Luxembourg	X											
Malta							X					
Poland	X	X	X									
Romania												
Slovakia	X											
Slovenia	X	X										
Spain	X							X	X	X	X	
Sweden												X
The Netherlands												

1.1.2.4.2 Public communication channels in the event of a radiological or nuclear emergency (Q6)

Table 13 shows that eleven countries (n=26) specifically mention the use of press releases and press conferences for communication in the event of a radiological or nuclear emergency. Press releases are distributed through various channels. All countries indicate three groups of channels: traditional media, the internet and early warning systems. Traditional media is the most often used channel for the provision of information for the general public on health protection measures to be applied and steps to be taken in the event of a nuclear emergency. Taking all countries into account, with the exception of Sweden who indicate that this is not their NRO's responsibility, the use of traditional media (i.e. television, printed media and radio) is mentioned 46 times. Both television and radio are mentioned 18 times, and printed media is mentioned 9 times.

The second most used channel is the internet including authority websites, online newspapers and social media. Specifically, the internet as a communication channel is mentioned in general 36 times. The authority's website is indicated 21 times, newspapers only once and social media 14 times.

Early warning systems are the third most often used channel of communication with 14 mentions in total of this channel. SMS alert are used most often (6 times), followed by sirens (5 times) and loudspeakers (3 times).

In the case of Sweden, it was indicated that it is the County administrative boards responsibility, whilst Malta states that specific channels for public communication in the event of a radiological or nuclear emergency have not yet been developed.

Good practice

In order to timely inform the public in the event of a radiological or nuclear emergency, all communication channels available can be used, including warning systems, traditional and new media, and specifically targeted to the different audiences.

Table 13 Channels for the provision of information for general public health protection measures to be applied and steps to be taken in the event of an emergency

What channels do you normally use to provide information for the general public health protection measures to be applied and steps to be taken in the event of a nuclear emergency?

MS	Press releases and conferences	Traditional media			Internet			Early warning system		
		Television	Printed media	Radio	Authority website	News papers	Social media	SMS	Sirens	Loudspeakers
Austria		X		X	X		X			
Belgium				X	X		X	X	X	
Bulgaria		X	X	X	X			X		
Croatia		X		X					X	X
Cyprus		X	X	X	X		X			X
Czech Republic		X		X	X		X			
Denmark	X	X		X	X		X		X	
Estonia		X	X	X	X	X	X	X		
Finland	X	X	X		X		X			
France	X				X		X			
Germany					X					
Greece	X	X	X	X	X		X			

Hungary		X		X	X			X		
Ireland	X				X		X			
Italy	X	X		X	X		X	X		X
Latvia		X		X						
Lithuania	X	X		X	X				X	
Luxembourg	X				X					
Malta										
Poland	X	X		X	X			X		
Romania		X	X	X			X			
Slovakia		X	X	X	X				X	
Slovenia	X	X	X	X	X					
Spain	X		X		X		X			
Sweden										
The Netherlands		X		X	X		X			

1.1.2.4.3 Timeliness of communication in the event of a radiological or nuclear emergency (Q16)

According to the responses shown in Table 14, all countries who answered this question (n=25) have specific guidelines for the timing by which they provide information to the public or the media in the event of a nuclear or radiological emergency, except Malta where no timelines have been set. Three countries (Luxembourg, Spain and Croatia) have additional criteria set for timing, namely in Croatia information is communicated without undue delay “when activities are measured”, in Spain communication is initiated as soon as reasonably possible with the “same timing as neighbouring countries”, and in Luxembourg information is communicated as soon as possible, “ideally before the press”. Four countries have similar criteria, although these are more generally described. In Austria, Cyprus, the Czech Republic and Ireland information is communicated “dependent on the type of event, the type of information or other factors”. In case no specific time frame (n= 6) is set (i.e. Within x minutes or hours) various criteria are used, including as soon as possible, as soon as confirmation, as soon as reasonable, or without any undue delay. This is the case for Belgium, the Czech Republic, Italy, Luxembourg, Spain and Sweden. Five countries apply a combination of a specific timeframe and these aforementioned criteria: Croatia, Estonia, Greece, Hungary, and Ireland.

For those countries (n=18) that apply a specific time frame, great variety exists. Nine countries will in the event of a radiological or nuclear emergency reply within a timeframe of 1 hour. Six countries (Austria, Bulgaria, Greece, Romania, Slovakia and Slovenia) indicate that they will communicate within 15-30 minutes.

Specifically depending on the type of the emergency or whether the emergency occurs in a neighbouring MS or MS geographically located further away, the timing for communication changes. When the possible impact for a MS decreases, the timing for communication increases, ranging from within 18 hours, over several days a week, to monthly or annually. For examples, in Germany communication will occur on a monthly or annual basis on occurrence that do not directly affect the MS. Additionally, in case an incident has occurred, after the emergency phase the communication turns to a regular format, comparable to the aforementioned long-term format. The same is true for the provision of additional, verified or updated information (i.e. measurement data) after an emergency phase.

Good practice

Timeliness of communication in the event of a radiological or nuclear emergency is flexible and depends on the event. When the impact of the emergency for a MS increases, the timing for communication decreases and it can go down to optimal communication within 15-30 min.

Table 14 Timing on notification of incidents or emergencies to the public or media

In emergency/incident situations, how quickly are incidents notified to public/ media?										
MS	Dependent on event/ information or other factors	Emergency (Timing)								
		ASAP	As soon as confirmation	As soon as reasonable	Without undue delay	Time	Within 48 hours	Several days a week	Monthly/ Annually	Others
Austria	**X**					**30 min**				
Belgium		**X**								
Bulgaria						**15 min**				
Croatia					**X**	**1 hour**				When I measure activities
Cyprus	**X**					**2-6 hours**				
Czech Republic	**X**	**X**								
Denmark						**30 min – 1 hour**				
Estonia		**X**				**1 hour**				
Finland						**1 hour**	**X**	**X**		
France						**1 hour**	**X**			
Germany						**1 hour**			**X**	
Greece			**X**			**15-30**				

						min to 1 hour				
Hungary				**X**		**1 hour**				
Ireland	**X**			**X**		**1 hour**				
Italy					**X**					
Latvia						**2 hours**				
Lithuania						**1 hour**				
Luxembourg		**X**								Ideally before the press
Malta										No period defined
Poland						**30 min – 3 hours**	**X**			
Romania						**15**				
Slovakia						**15**				
Slovenia						**15-30**				
Spain				**X**						Same as neighbouring countries
Sweden			**X**							
The Netherlands										

1.1.2.4.4 Identification of citizens' needs for public communication in the event of a radiological or nuclear emergency (Q10)

Eight countries out of 25 indicate that they base the identification of citizens needs for public communication in the event of a radiological or nuclear emergency on existing international practices. For example, in Croatia, in a first iteration of analysis, IAEA standards and the EU BSS Directive are consulted. Five countries make specific mention of consulting scientific literature for needs identification such as Croatia, Germany, Greece, Latvia, and Slovenia. Additionally, three countries (Germany, Romania and Slovakia) indicate that they consult any conceptual work that has been done on Emergency Preparedness and Response. In the case of Sweden, it is the County administrative boards' responsibility.

Several methodologies are used to identify citizens' needs. Eight countries indicate that use public opinion surveys; this being the most often used identification methodology. Additionally, five countries indicate they rely on lessons learned. Social media is consulted by three countries for the identification of citizens' needs concerning public communication. And two countries, the Czech Republic and Finland indicate they are members of specific advisory boards dealing with citizens' needs for public communication.

Good practice

Citizens needs of information during an emergency may be identified using different tools, like public opinion surveys, analysing lessons learned or social media, among others.

Table 15 Identification of citizens' needs for public information in the case of an emergency

How did you identify or plan to identify citizens' needs for public information in the case of an emergency?									
MS	Analysis				Lessons learned	Public opinion surveys	Advisory committee	Social media	Other
	International Practices	(Scientific) Literature	Participation at international discussions	Conceptual work on EP&R					
Austria								**X**	**Special protective actions**
Belgium									**Planned**
Bulgaria									**n/a**
Croatia	**X**	**X**				**X**			
Cyprus	**X**								
Czech Republic						**X**		**X**	
Denmark									
Estonia	**X**								
Finland								**X**	
France						**X**			
Germany	**X**	**X**	**X**	**X**	**X**	**X**			

Greece	**X**	**X**			**X**				
Hungary							**X**		
Ireland						**X**			
Italy	**X**								
Latvia		**X**							
Lithuania						**X**			
Luxembourg	**X**				**X**				
Malta									**No plan**
Poland					**X**	**X**			
Romania				**X**					
Slovakia				**X**					
Slovenia	**X**	**X**			**X**				
Spain							**X**		
Sweden									
The Netherlands						**X**			

1.1.2.4.5 Communication tools, mechanisms and materials

1.1.2.4.5.1 Verifying effectiveness of current communication tools and materials for clarity concerning understanding on emergencies or protective actions (Q11)

Table 16 shows that 13 out of 26 MS indicate that they test whether the communication material they normally use results in people understanding the emergency or protective actions. Four countries (Belgium, Hungary, Lithuania and Romania) indicate that have planned to test their communication material.

Testing of communication materials is done in various ways. Six countries indicate that they test their communication material in exercises, whereas four countries indicate they test their material via the use of opinion surveys. Additionally, four countries (Ireland, Lithuania, Luxembourg and the Netherlands) indicate they make use of focus groups. Besides these, six countries indicate that they use other testing methodologies. Croatia for example makes use of unstructured tests and public meetings. Germany also makes use of unstructured tests. Web use testing and stakeholder panels are applied in Ireland, and specific meetings with the municipalities are used sometimes to test public understanding in Spain.

Good practice

Public communication and information material is tested for its clarity concerning understanding on emergencies or/and protective actions. Verification of these materials can be done by using different and complementary methods and approaches e.g.; focus groups, public opinion surveys, meetings, etc.

Table 16 Testing of communication material to inquire whether the material results in people understanding the emergency or the protective actions

Did you test or are you planning to test whether the communication material you normally use results in people understanding the emergency or protective actions?							
MS	Yes	No	Planned tests	Exercises	Opinion surveys	Focus groups	Other
Austria	**X**			**X**			
Belgium			**X**				
Bulgaria		**X**					
Croatia	**X**						**Unstructured tests/ Public meetings**
Cyprus		**X**					
Czech Republic	**X**			**X**	**X**		
Denmark		**X**					
Estonia		**X**					
Finland	**X**				**X**		
France	**X**				**X**		
Germany	**X**						**Unstructured tests**
Greece	**X**				**X**		
Hungary			**X**				
Ireland	**X**					**X**	**Web use testing/ stakeholder panels**

Italy	**X**			**X**			
Latvia		**X**					
Lithuania			**X**			**X**	
Luxembourg		**X**				**X**	
Malta		**X**					
Poland	**X**			**X**			
Romania			**X**				
Slovakia		**X**					**Responsibility of license holder**
Slovenia		**X**					
Spain	**X**			**X**			**Meetings**
Sweden	**X**			**X**			
The Netherlands	**X**					**X**	**Outsourcing**

1.1.2.4.5.2 Evaluation and adjustment of communication material (Q12)

Table 17 shows that almost all countries (24 out of 26) indicate that they review and improve their communication material related to emergencies or protective actions. Only two countries (Cyprus and Malta) indicate that they do not review their material as this falls outside the scope of their responsibilities. Most countries (n=14) review their material on a regular basis, ranging from once a year to continuously.

Additional criteria for review are set by several countries. These include: needs based reviews, new developments in knowledge, projects or communication material, after each exercise, or based on other reviews.

> ***Good practice***
>
> Evaluation and adjustment of public information and communication material is applied on a regular basis. Evaluation and adjustment of the material after exercises is one of the possible options to improve the communication strategy to respond to future emergencies.

Table 17 Frequency of review and improvement of communication material related to emergencies and protective actions

How often do you review and improve your communication material related to emergencies or protection actions?						
MS	Review	Regularly	Needs based	New developments (knowledge, projects, and communication material)	After exercises	Based on other reviews
Austria	**X**	**Once a year**				
Belgium	**X**		**X**			
Bulgaria	**X**			**X**		
Croatia	**X**	**Once in 3-5 years**		**X**		
Cyprus	**n/a**					
Czech Republic	**X**	**Once in 3-5 years**	**X**			
Denmark	**X**	**Once every four years**				
Estonia	**X**			**X**		
Finland	**X**	**Once a year**	**X**		**X**	

France	**X**		**X**		**X**	**X**
Germany	**X**	**Once a year**		**X**		
Greece	**X**		**X**			
Hungary	**X**				**X**	**X**
Ireland	**X**					**X**
Italy	**X**				**X**	
Latvia	**X**	**Once in three years**				
Lithuania	**X**	**Once a year**				
Luxembourg	**X**				**X**	
Malta	**n/a**					
Poland	**X**	**Once in 3-5 years**				
Romania	**X**					
Slovakia	**X**	**Once a year**				
Slovenia	**X**	**Once a year**				
Spain	**X**	**Once a year**				
Sweden	**X**	**Once in 3-5 years**				
The Netherlands	**X**	**Continuously**		**X**		

1.1.2.4.5.3 Online communication

1.1.2.4.5.3.1 Evaluation and adjustment of internet webpage (Q13)

As shown in Table 18, when querying whether internet webpages are evaluated and reviewed in a structured manner by others than NRO employees, eleven out of 26 countries indicate that this is the case for their respective websites. Most countries however indicate that this is not their general practice. The Netherlands indicate that they are planning an external evaluation.

Several types of external evaluation are conducted. For example, the Czech Republic and Greece indicate that this review was part of a research project. Ireland for example makes use of web-user testing, public information surveys, or stakeholder panels.

Good practice

Evaluation and adjustment of the internet webpage of the nuclear regulatory organisation with the emergency preparedness and response related information can be conducted by external evaluators, stakeholder panels or through public information surveys.

Table 18 External evaluation and review of internet webpage

Is your internet webpage evaluated and reviewed in a structured manner by others than NRO employees?										
MS	No	Not systematically	Yes	Type of evaluation						Other
				Research projects	Surveys	Web-user testing	Public opinion	Stakeholder Panels	Website renewal	
Austria		**X**								
Belgium			**X**							
Bulgaria	**X**									
Croatia	**X**									
Cyprus										**Not within responsibilities**
Czech Republic			**X**	**X**						
Denmark			**X**							
Estonia	**X**									
Finland			**X**						**X**	
France			**X**					**X**		
Germany	**X**									
Greece			**X**	**X**	**X**					
Hungary	**X**									

Ireland			**X**			**X**	**X**	**X**		
Italy	**X**									
Latvia			**X**							
Lithuania	**X**									
Luxembourg	**X**									
Malta	**X**									
Poland			**X**					**X**		
Romania	**X**									
Slovakia	**X**									
Slovenia	**X**									
Spain			**X**							
Sweden			**X**							
The Netherlands										**Planned**

1.1.2.4.5.3.2 Dark site (Q17 -18)

Table 19 shows that ten out of 26 countries indicate that they have a specific website (dark site) that becomes active in the event of an emergency. Of these ten, three (France, Poland, Slovakia) indicate that the landing page of the NRO changes in case of an emergency. Finland indicates that they have a dark site in case there would be a problem with the NRO website in the event of an emergency.

Several countries do however make use of alternatives in the event of an emergency. For example, Italy has a specific page on their website dedicated for use in emergency situations. Other countries indicate that they make use of news blogs.

Those countries that have a dark site or a dedicated page indicate that the content on these sites or pages entails press releases, news, social media feeds, contact information, notification of the event, links to further information, timing of the next update, information specific to the emergency, public protective actions, and information related to emergency zoning.

> ***Good practice***
>
> In case of a nuclear or radiological emergency a specific website that becomes active in the event can be developed. This site is used to address high information needs during an emergency and can be also used as a back-up of the official, public website of the authorities.

Table 19 Existence of specific webpage or dark site

Do you have a specific webpage (dark site) that becomes active in the event of an emergency				
MS	No	Yes	Comments	Content
Austria	**X**			
Belgium	**X**			
Bulgaria	**X**			
Croatia	**X**			
Cyprus	**X**			
Czech Republic	**X**			
Denmark		**X**		**Links to most recent information on other sites**
Estonia	**X**			
Finland		**X**	**In case of problems**	**Press releases, news, FAQ, Social media feed, contact information**
France		**X**	**Change of the landing page**	**Press releases, information specific to the emergency, radiological impact**

Germany		**X**		
Greece	**X**			
Hungary		**X**		
Ireland	**X**			**Notification of the event, link to further information, timing of the next update**
Italy	**X**		**Dedicated page**	
Latvia	**X**			
Lithuania	**X**		**News blocks**	**News**
Luxembourg		**X**		
Malta	**X**			
Poland		**X**	**Change of landing page**	
Romania	**X**			
Slovakia		**X**	**Change of landing page**	**Information specific to the emergency, public protective actions, and emergency zoning**
Slovenia	**X**			
Spain		**X**		**Information specific to the emergency**
Sweden		**X**		**Information specific to the emergency**
The Netherlands	**X**			

1.1.2.4.5.3.3 Tools for online querying (Q30)

As shown in Table 20, most countries (18 out of 26) indicate they have tools which may be used for posting online questions during an emergency. Only seven countries indicate that they do not have these tools available for them.

There are four main tools that are applied: social media, contact forms, hotlines and Q&A sections. Social media is the most used form and includes both Facebook and Twitter. The second most used form is Q&A sections, followed by hotlines and contact forms.

Good practice

Online querying tools which may be used for posting online questions during an emergency are available. These tools include but are not limited to social media, hotlines and Q&A.

Table 20 Tools for posting online questions during an emergency

Do you have tools which may be used for posting online questions during an emergency?							
MS	Yes	No	Tools				
			Social media		Contact form	Hotline	Q&A
			Facebook	Twitter			
Austria	**X**						
Belgium							
Bulgaria		**X**					
Croatia		**X**					
Cyprus	**X**				**X**		
Czech Republic	**X**		**X**	**X**			
Denmark	**X**						
Estonia		**X**					
Finland	**X**						
France	**X**		**X**	**X**			
Germany	**X**						
Greece	**X**		**X**	**X**			

Hungary		X					
Ireland	X		X	X			X
Italy	X		X	X			
Latvia		X					
Lithuania		X					
Luxembourg	X					X	X
Malta	X						
Poland	X						X
Romania	X						
Slovakia	X						
Slovenia	X						
Spain		X					
Sweden	X						
The Netherlands	X						X

1.1.2.4.5.3.4 Social media (Q28)

As shown in Table 21, when querying whether NROs have a dedicated person or persons to follow and respond to social media, fifteen countries (n=26) indicate that they have one or more persons assigned to this task. The number of people involved in this task varies from 1 person (Austria, Latvia and Poland) to 15 persons in Ireland. On average, for those countries that have a dedicated person, five persons are responsible for following and responding to social media.

> ***Good practice***
>
> Ensure personnel within the nuclear regulatory organisation trained to use social media for public information in nuclear or radiological emergencies. This task can be the responsibility of only one person or can be shared among different employees.

Table 21 Follow-up and response to social media

Do you have a dedicated person(s) to follow and respond to social media? (How many?)			
MS	Yes	No	How many
Austria	**X**		**1**
Belgium	**X**		**5**
Bulgaria		**X**	
Croatia		**X**	
Cyprus	**X**		**5**
Czech Republic	**X**		**12**
Denmark	**X**		**As needed**
Estonia			
Finland	**X**		**7**
France	**X**		**5**
Germany		**X**	
Greece	**X**		**2**
Hungary		**X**	
Ireland	**X**		**15**
Italy		**X**	
Latvia	**X**		**1**
Lithuania		**X**	
Luxembourg	**X**		

Malta		X	
Poland	X		1
Romania		X	
Slovakia		X	
Slovenia		X	
Spain	X		3
Sweden	X		
The Netherlands	X		

1.1.2.4.5.4 Mechanism for systematic collection of rumours (Q29)

Table 22 shows that eleven out of 26 countries indicate that they have a mechanism in place that would allow them to systematically collect rumours during an emergency. Two countries (Cyprus and Germany) indicate that they have planned to implement such a mechanism. Finland for example specifies that they collect and correct rumours on the channel itself, through press releases, via the NRO website, FAQ or interviews. France indicates that they use a system named Radarly to collect rumours.

> ***Good practice***
>
> Rumours that appear during a nuclear or radiological accident can be systematically collected, as already done in France with "Radarly", and can also be responded by using the same communication channel that published the rumour.

Table 22 Mechanism for the collection of rumours during an emergency

Do you have a mechanism in place that would allow to systematically collect rumors during an emergency?			
MS	Yes	No	Comments
Austria	X		
Belgium	X		
Bulgaria		X	
Croatia		X	
Cyprus			**Planned**
Czech Republic		X	
Denmark	X		
Estonia		X	

Finland	X		**On channel, press releases, NRO website, FAQ, Interviews**
France	X		**Special system to systematically collect rumors: Radarly**
Germany			**Planned**
Greece	X		
Hungary		X	
Ireland		X	
Italy		X	
Latvia	X		
Lithuania		X	
Luxembourg		X	
Malta	X		
Poland	X		
Romania		X	
Slovakia		X	
Slovenia		X	
Spain		X	
Sweden	X		
The Netherlands	X		

1.1.2.4.5.5 Inclusion of communication aspects with the public in exercises and drills (Q14)

As shown in Table 23, nearly all countries (24 out of 26) indicate that they include communication aspects with the public in nuclear or radiological emergency exercises/drills. The frequency by which aspects of communication in exercise or drills are included varies from once every five years to several times a year. Countries indicate that they apply various methods for the inclusion of communication aspects. For example, in France mock conferences and the coordination of messages is applied within exercises. Lithuania makes use of press statements, coordination of message and table top exercises. In Germany, the methods applied include press statements and Frequently Asked Questions.

Good practice

Public information and communication aspects with the public are included and tested in regular exercises and drills to review the effectiveness of public information, identify challenges and pitfalls, not only on paper but also in practice.

Table 23 Inclusion of aspects of communication with the public in nuclear or radiological emergency exercises/drills

Do you include aspects of communication with the public in nuclear or radiological emergency exercises/drills?				
MS	Yes	No	Frequency	Comments
Austria	**X**		**Twice a year**	
Belgium	**X**		**Once a year**	
Bulgaria	**X**			
Croatia	**X**			
Cyprus	**X**		**Once a year**	
Czech Republic	**X**		**Several times a year**	
Denmark	**X**			**CONVEX and RANET exercises**
Estonia	**X**		**Once of year**	
Finland	**X**		**Once to several times a year**	
France	**X**		**Several times a year**	**Mock conferences, coordination of messages**
Germany	**X**			**Press statements, FAQ**
Greece	**X**			
Hungary	**X**		**Once a year**	
Ireland	**X**		**Once a year**	**Press statements, key messages, mock conferences**
Italy	**X**			
Latvia		**X**		
Lithuania	**X**		**Once a year**	**Press statements, coordination of messages, table top exercises**
Luxembourg	**X**			**Press statements**
Malta		**X**		
Poland	**X**			
Romania	**X**		**Once per 5 years**	
Slovakia	**X**		**Twice a year**	
Slovenia	**X**		**Several times a year**	
Spain	**X**			
Sweden	**X**			
The Netherlands	**X**			

1.1.2.4.5.5.1 Lessons learned (Q15)

As shown in Table 24, when asking the question "*What are the most important lessons learned regarding communication with the public from these exercises/drills that you would like to share?"* two categories of lessons learned can be identified: preparedness and language. Concerning preparedness Austria for example indicates that they have learned that preparedness is important as well as the use of templates. The use of templates specifically is brought forward as lessons learned by several countries, for example Estonia and Germany. Other lessons learned concerning preparedness include the use of preapproved messages, key messages, different tools for different needs and the "need to know" system.

Concerning language, the most often expressed lesson learned is the use of simple instructions. Additionally, several countries indicate that verifying the interpretation given to a specific concept is important. In Spain, an additional lesson learned is that one needs to be empathic.

Good practice

Using templates, preapproved messages and simple instructions in the preparedness phase, during exercises and drills, and incorporate lessons learned in the revised communication strategies and plans. Collaboration and coordination of messages among the different emergency management actors (e.g. authorities, first responders, platforms and organisations) is defined, established and practiced on a regular basis.

Table 24 Lessons learned regarding communication with the public from exercises/drills

What are the most important lessons learned regarding communication with the public from these exercises/drills that you would like to share?				
MS	Preparedness	Language	Time	Other (Need for…)
Austria	**Pro-activeness and the use of template**			
Belgium				
Bulgaria		**Use simple instructions**		
Croatia	**Use preapproved messages**	**Use simple instructions**	**Time consuming**	
Cyprus		**Verify the interpretation of concepts**		**Trust**
Czech Republic				**Consistency, openness and transparency**
Denmark				**First communication via media and social media**
Estonia	**Use template**	**Use simple instructions**	**Time consuming**	
Finland				**Coordination of authorities, platforms, and communication**
France				**Citizen centric approach, trust, EP&R and communication**
Germany	**Use template**		**Time consuming**	
Greece			**Time consuming**	**Communication and consultation**
Hungary	**Use key messages**		**Time consuming**	**Coordination of ministries and agencies, platforms**

Ireland			**Time consuming**	
Italy				
Latvia			**Time should be reduced, own channels should be used**	**Use of own channels**
Lithuania				**Coordination of authorities, coordination of messages**
Luxembourg		**Verify interpretation on concepts**		**Coordination between neighbouring countries**
Malta				
Poland		**Use simple instructions**		**Trust**
Romania	**Use different tools for different needs**			
Slovakia	**Use "need to know" system**	**Use simple instructions**		**Monitoring**
Slovenia				**Openness**
Spain		**Be empathic**		**Transparency, clear information, correction of mistakes and rumours, information increase, training, monitoring, and the coordination of organisations**
Sweden				**Coordination of decision makers**
The Netherlands				**Consistency**

1.1.2.4.5.6 Organisation of call-centre in the event of an emergency (Q32)

Table 25 shows that twelve countries indicate they foresee a call centre in the event of an emergency. When it is indicated in what time frame the call-centre can be organised, this time-frame is relatively short. In Poland, the time-frame is dependent on whether the emergency occurs during or after working hours; the maximum time for organisation remains however around 1 hour. The persons available for the call centre also vary with Denmark indicating that it will depend on the specific needs, and other countries indicating around 10 to 20 persons.

Good practice

Organising a call centre in the event of an emergency is a good option to centralise information, although the organisational aspects are very demanding and requires an average of 10 to 20 available and trained people.

Table 25 Existence of call centre in case of an emergency

Do you foresee a call center in the case of an emergency?				
MS	Yes	No	Timing	Persons
Austria	**X**		**Within about 4 hours**	**10-20**
Belgium		**X**		
Bulgaria	**X**			
Croatia		**X**		
Cyprus	**X**		**Reasonably short**	
Czech Republic	**X**			
Denmark	**X**			**As needed**
Estonia		**X**		
Finland		**X**		
France		**X**		
Germany	**X**			
Greece		**X**		
Hungary		**X**		
Ireland	**X**			
Italy	**X**			
Latvia		**X**		
Lithuania		**X**		

Luxembourg	**X**		**Within one hour**	**10**
Malta		**X**		
Poland	**X**		**Immediately during working hours/Within about one hour after working hours**	
Romania		**X**		
Slovakia		**X**		
Slovenia	**X**			
Spain		**X**		
Sweden	**X**			
The Netherlands	Establishing a call centre is not a responsibility of thethe Authority for Nuclear Safety and Radiation Protection (ANVS) (respondent on our questionnaire)			

1.1.2.4.6 Communication staff in the event of a radiological or nuclear emergency

1.1.2.4.6.1 Amount, physical location, backgrounds and training of spokespersons in radiological or nuclear emergencies (Q21-22-23-24)

All countries indicate they have one or more spokespersons at their disposal in the event of a nuclear or radiological emergency (Table 26). The number of spokespersons available differs between the countries ranging from one person in Bulgaria, Malta, Romania and Spain to 50 persons in France. On average, eleven spokespersons are available.

Positions of spokespersons vary from the prime minister in Croatia to PR experts. In Hungary for example spokespersons include nuclear regulatory organization commissioners, directors, regional heads and ministers. Ten countries out of 25 indicate that the spokespersons are located at the crisis centre during a radiological or nuclear emergency. At national level, spokespersons can be located at head Quarters (HQ), Emergency Response Centres, media centres, NRO emergency centres, Civil Protection departments. At local level, countries indicate that their spokespersons are located on site, at local Head Quarters, Local Emergency centres or Public information centres.

Several countries indicate that they provide specific training for spokespersons. These trainings include media training, public speaking, training in crisis communication, or trainings organised by the IAEA or the NRO.

Good practice

During a radiological or nuclear emergency, dedicated and trained spokesperson(s) are available. A good practice is to share this responsibility between more trained and responsible people due to the high information demand during and after an emergency.

Table 26 Amount, position, location and training of spokespersons during an emergency

How many spokespersons in total would be available during an emergency? Where are they located during an emergency (HQ/regions/sites/crisis centre)? And what are their backgrounds? Is there specific training given to employees in order to become spokespersons "specialized" for nuclear or radiological emergencies?							
MS	Amount	Position	Location			Training	
			Crisis centre	National	Local	Yes	Type
Austria	**2-3**	**Minister**	**X**				**Partial training**
Belgium	**4**		**X**			**X**	
Bulgaria	**1**			**HQ**	**On site, local HQ**	**X**	
Croatia	**9**	**Director, Prime minister, ministers, government PR, mayor**		**HQ**	**Local HQ**		
Cyprus	**2-3**		**X**	**HQ**			
Czech Republic	**5**		**X**				
Denmark			**X**				
Estonia	**>3**		**X**				
Finland	**3**			**Emergency Response centre, media centre**		**X**	
France	**50**	**NRO commissioners, directors, regional heads, deputies**		**NRO Emergency centre**	**Local HQ**		**Public speaking**

Germany				**Emergency Response centre**			
Greece	**1-2**			**NRO Emergency centre**			
Hungary	**>4**	**NRO commissioners, directors, regional heads, ministers**		**Emergency Response centre**			
Ireland	**8**			**Emergency Response centre**	**Local Emergency centre**		**Media training**
Italy				**Emergency Response centre**	**Local Emergency centre**		
Latvia		**Directors, government PR**	**X**	**Civil protection department**			
Lithuania	**1-2**				**On site, local Emergency centre, local HQ**		
Luxembourg			**X**				
Malta	**1**						
Poland	**>1**			**HQ**	**Local HQ**		**Training by IAEA or NRO**
Romania	**1**			**NRO Emergency centre**			
Slovakia		**Ministers**		**HQ**	**Public information centre**		
Slovenia	**3-4**	**Directors, deputies**		**Emergency Response centre, NRO Emergency**			

				centre, HQ				
Spain	**1**		**X**					**Public speaking, crisis communication**
Sweden	**7**		**X**					
The Netherlands								

1.1.2.4.6.2 Collaboration with public information officers from other partners involved in EP&R (Q27)

Table 27 shows that most countries indicate that they have some form of collaboration with public information officers from other organisations/institutes/authorities involved in emergency management. However, it is worth noting that seven countries did not provide detailed answers to this question, but general comments like collaboration is efficient, based on information exchange, described in the communication plan, not defined or no procedures in place. The latter for example is the case in Italy or Malta. In Germany, for instance, it is stated that in the future public information officers from other partners will take an active part in exercises.

Most often (n=8) countries indicate they cooperate with other ministries, either directly or via the PR office of these ministries. Also, cooperation is established with other authority bodies/institutes or organisations. Media is the first partner most often cited to cooperate with the NRO, beyond official collaborations. Furthermore, specific attention is paid to collaboration with civil protection actors, regional crisis staff or the PR staff of the facilities involved. Collaboration usually happens via email or telephone or is established in joint workshops.

> ***Good practice***
>
> Collaboration with public information officers from other organisations involved in emergency management (e.g. health ministry, civil protection, regional crisis staff, etc) is established and maintained before an emergency.

Table 27 Collaboration with public information officers from other organisations/ institutions/authorities

Could you describe your collaboration with public information officers from other organizations/institutions/authorities involved in emergency management?			
MS	Integrated Approach	Partners	Methods
Austria		**Media, ministries**	
Belgium	**X**		
Bulgaria			**Email and phone**
Croatia		**Media, civil protection**	**Email and phone**
Cyprus		**Ministries**	
Czech Republic		**Media, authorities, ministries, regional crisis staff, public**	
Denmark			**Workshops**

Estonia			
Finland	**X**		
France		**Regional crisis staff, PR of facility**	**Email and phone**
Germany			
Greece			
Hungary		**Authorities**	
Ireland		**Media, authorities, ministries, civil protection, regional crisis staff**	
Italy			
Latvia		**Media, authorities, ministries, public**	
Lithuania			
Luxembourg		**Ministries**	
Malta			
Poland			**Email and phone**
Romania		**PR of facility**	
Slovakia	**X**		
Slovenia		**Media, authorities, ministries, civil protection, PR of facility**	
Spain		**Ministries**	**Email and phone**
Sweden	**X**		
The Netherlands			

1.1.2.4.7 Communication cell

1.1.2.4.7.1 Position of communication cell on organisational chart and number of communication officers within (Q25-26)

The position of the communication cell in the organisational chart varies across Member States, as do the organisational charts themselves. Table 28 shows that three countries (Austria, Czech Republic and Luxembourg) specifically indicate that the communication cell is located in the crisis centre. Two countries (Germany and Estonia) indicate that their organisational chart is currently under review. Most countries indicate that the communication cell is in direct contact with the decision makers. For example in Greece the communication cell is next to the Greek Atomic Energy Commission (EEAE) Chairman who is the key decision maker for emergencies.

In almost all countries at least one communication officer is present in the incident command centre during an emergency. The number ranges from one as a minimum to eleven as maximum. In countries such as Denmark the number depends on the specific needs of the emergency. On average about four communication officers are present during an emergency.

Good practice

The communication cell is in direct contact with the decision makers on emergencies and the communication officer(s) or liaison(s) are present in the incident command centre during an emergency.

Table 28 Location of communication cell on organisation chart and number of communication officers within

Where is the communication cell located in the Incident command system during an emergency (on organizational chart)? How many communication officers does the communication cell have? (min. and max.)		
MS	Location on organisational chart	Number of communication officers
Austria	**Crisis center**	**2-3**
Belgium	**In direct connection with deciders**	**5**
Bulgaria	**National Headquarter, local headquarter, on sites**	**1-4**
Croatia	**At the same level as situation analysis and environmental monitoring, under the shift commander**	**3**
Cyprus	**On the top, Minister or authorised representative**	**Not defined**
Czech Republic	**Crisis communication centre**	**1**
Denmark	**Next to main staff room**	**As needed**
Estonia	**Under review/reconstruction**	**3**
Finland	**One of five organizational groups in emergency organization under situation commander**	**1-4**
France	**Strategic command post, technical command post, a communication command post, local representative working with and advising the Prefect, inspectors on the damaged site**	**2-5**
Germany	**Under review**	**Under review**
Greece	**Next to EEAE Chairman (key decision-maker for the emergency)**	**2**
Hungary	**Part of the Disaster Management Inter-ministerial**	**1-3**

	Coordination Committee National Emergency Response Centre	
Ireland	**n/a**	**1-11**
Italy	**Emergency facilities of the response coordination authorities, at their emergency centres and on site**	**No communication cell**
Latvia	**Under direct supervision of Incident commander**	**1**
Lithuania	**Under Emergency Response Centre Coordinator**	**2-3**
Luxembourg	**Crisis centre**	**2-10**
Malta		**No communication cell**
Poland	**President's Office**	**1-3**
Romania	**Command and control unit**	**1-2**
Slovakia	**In their ministries or NRO´s**	**3-5**
Slovenia	**Under command of deputy emergency director**	**1-4**
Spain	**Emergency Director and Director of Emergency Operations**	**1-6**
Sweden		**5**
The Netherlands	**n/a**	

1.2 Topic: Cross-border collaboration (Q38)

1.2.1 General description of cross-border collaboration (Q38)

As shown in Table 29, several countries (13 out of 24) indicate they collaborate with public information officers from other countries involved in emergency management. Collaboration occurs either directly or indirectly. Several countries also indicate that they have planned to either set up collaboration or expand upon existing collaborative practices with other countries.

Six countries out of 24 indicate that they do not have specific arrangements in place to collaborate with public information officers from other countries, indicating room for improvement in the cross-border collaboration involving emergency management.

Several methods are given as description of how collaborative practices are set-up. These include e-mails, media text exchange, bilateral meetings, USIE, WebEcurie, Working group, Public communication group, Inter-ministerial communication system, convention on early Notification of Accidents.

Good practice

Public information officers collaborate cross-border with officers from other countries. Collaboration can be in the form of personal communication via e-mails to more formalised collaboration in the form of a working group in the field of public information.

Table 29 Description of collaboration with public information officers from other countries

Please describe your collaboration with public information officers from other countries involved in emergency management?										
MS	Collaboration	Methods								
		e-mail	Media text exchange	Bilateral meetings	USIE	WebEcurie	Working group	Public communication group	Inter-ministerial communication system	Convention on Early Notification of Accidents
Austria	**Direct**		**X**							
Belgium										
Bulgaria										
Croatia	**None**									
Cyprus				**X**						
Czech Republic					**X**	**X**				
Denmark								**X**		
Estonia	**Indirect**									
Finland								**X**		
France				**X**						
Germany	**Planned, indirect**									
Greece	**Indirect**									

Hungary	**None**									
Ireland	**Indirect**									
Italy	**None**									
Latvia	**Indirect**									
Lithuania	**Direct**		**X**	**X**				**X**		
Luxembourg	**None**									
Malta	**None**									
Poland	**Indirect**						**X**	**X**		
Romania	**Direct**			**X**				**X**		
Slovakia	**None**									
Slovenia	**Indirect**		**X**						**X**	
Spain	**Indirect**									**X**
Sweden	**Direct**	**X**								
The Netherlands	**Direct**						**X**	**X**		

1.2.2 Language of communication for cross-border collaboration (Q34-35)

As shown in Table 30, most countries (19 out of 25) indicate that they will not publish public information in the official language of neighbouring countries in the event of an emergency, however Finland, Ireland and Poland would publish the information also in the official language of neighbouring countries. In case countries do publish in another language than their own, the following languages are mentioned: English, Russian and Swedish.

Several countries (n=19) indicate that they will publish information in the official language of potentially affected third countries in the event of an emergency.

Good practice
Public information in the event of emergency is published also in languages of neighbouring countries.

Table 30 Language of public information

In the case of an emergency happening in your MS, will you publish public information in the official languages of neighboring countries? In the case of an emergency happening in your MS, will you publish public information in the official language of potentially affected third countries?						
MS	Neighbouring countries					***The official language of potentially affected third countries***
	Yes	No	Other language			
			English	Russian	Swedish	
Austria		**X**	**X**			**X**
Belgium						**X**
Bulgaria		**X**				**X**
Croatia		**X**				
Cyprus						**X**
Czech Republic		**X**				
Denmark		**X**				**X**
Estonia		**X**	**X**	**X**		
Finland	**X**				**X**	**X**
France		**X**	**X**			**X**
Germany		**X**				
Greece		**X**				

Hungary		X				X
Ireland	X					X
Italy		X	X			X
Latvia		X				X
Lithuania		X	X			X
Luxembourg						
Malta		X				X
Poland	X					X
Romania		X				X
Slovakia		X	X			X
Slovenia		X				X
Spain		X	X			X
Sweden		X				X
The Netherlands						

1.2.3 Cross-border collaboration of communication staff in regional exercises (Q36)

Table 31 shows that most countries (21 out of 26) indicate that their communication personnel is included in regional exercises. The regularity by which they are included varies from not so often to about ten times a year.

Good practice

Communication personnel is included in cross-border and regional exercises.

Table 31 Inclusion of communication personnel in regional exercises

Is your communication personnel included in regional exercises? How often? Could you name the last regional exercises in which your staff participated?			
MS	Yes	No	How often
Austria	**X**		**About once every 2 years**
Belgium	**X**		**Several times a year**
Bulgaria	**X**		
Croatia	**X**		
Cyprus	**X**		
Czech Republic	**X**		
Denmark			
Estonia	**X**		
Finland	**X**		**About every 3-5 years**
France	**X**		**About 10 times every year**
Germany		**X**	
Greece		**X**	
Hungary	**X**		**Not so often**
Ireland	**X**		
Italy		**X**	
Latvia	**X**		**Not so often**
Lithuania	**X**		
Luxembourg	**X**		
Malta		**X**	
Poland	**X**		
Romania	**X**		**Not so often**
Slovakia	**X**		
Slovenia	**X**		**Yearly**
Spain	**X**		**7-8 times every year**
Sweden	**X**		**Yearly**
The Netherlands	**X**		

1.2.4 Cross-border referral to NRO websites (Q37)

Table 32 shows that almost all countries, except Croatia, Estonia, Greece and Luxembourg (22 out of 26) indicate they would refer to the website of the NRO (or crisis centre) of the MS in which the emergency takes place. Those countries that do not directly refer to the website, they do use the information published on the website of the NRO of the MS in which the emergency occurs to publish on their own websites.

Good practice

Using NRO websites of the MS in which the emergency takes place as an additional source of public information is a good practice.

Table 32 Referral to website of the NRO of the MS in which an emergency occurs

In case of an emergency happening in another MS, would you refer to the website of the NRO of the MS in which the emergency takes place?		
MS	Yes	No
Austria	X	
Belgium	X	
Bulgaria	X	
Croatia		X
Cyprus	X	
Czech Republic	X	
Denmark	X	
Estonia		X
Finland	X	
France	X	
Germany	X	
Greece		X
Hungary	X	
Ireland	X	
Italy	X	
Latvia	X	
Lithuania	X	
Luxembourg		X
Malta	X	
Poland	X	
Romania	X	
Slovakia	X	

Slovenia	**X**	
Spain	**X**	
Sweden	**X**	
The Netherlands	**X**	

1.3 Topic: Transparency (Q39-44)

1.3.1 Challenges associated with transparency during a nuclear or radiological emergency in your MS (Q39)

As shown in Table 33, a variety of challenges concerning transparency during a nuclear or radiological emergency are brought forward by the NROs. These challenges include: avoidance of rumors, panic, confusion, and unsettlement; the provision of reliable and proper information. Additional challenges mentioned by the respondents include avoiding contradictions, providing information in a timely manner, balancing the provision of secure information, handling the amount of information, ensuring that sufficient information is available and presenting it in plain language. Furthermore, keeping the balance between the right of the public to be informed and national regulations on emergency planning; the truth and frightening people; the desired highest level of transparency on the one side and a reliable and deliberate crisis communication on the other side are also mentioned as challenges associated with transparency. Some countries, like Slovenia and Slovakia state that they do not see any particular challenges regarding transparency during a nuclear or radiological emergency. Other countries, like Malta, state that this issue has not been explored.

Good practice

Recognising challenges concerning transparency during a nuclear of radiological emergency in advance and developing approaches to deal with these challenges during an emergency is a good practice.

Table 33 Challenges related to transparency during an emergency

What are the main challenges associated with transparency during a nuclear or radiological emergency in your MS?	
MS	Challenges
Austria	**Avoid panic**
Belgium	
Bulgaria	**Avoid panic**
Croatia	**Reliability and security**
Cyprus	**Proper information and timeliness**
Czech Republic	**Controlled, proper, timely and direct provision of information.**
Denmark	
Estonia	**Timeliness**

Finland	**Amount of information**
France	**Balance between truth and frightening people**
Germany	**Avoid panic, confusion, unsettlement, contradictory information and the balance between transparency and reliable communication**
Greece	**Maintain public trust in stress moments and get the main message across**
Hungary	**Proper information**
Ireland	**Proper information**
Italy	**Reliable information**
Latvia	**Availability of information**
Lithuania	**Different framework of understanding and identifying public concerns about safety and security issues**
Luxembourg	
Malta	**n/a**
Poland	**Proper information, amount of information, plain language**
Romania	**n/a**
Slovakia	**No particular challenges**
Slovenia	**No special challenges**
Spain	**Timeliness, and the balance between the right to be informed and regulations**
Sweden	**Avoid Rumours**
The Netherlands	

1.3.2 Reporting to parliament on duties concerning transparency related to nuclear emergencies (Q40-41)

Table 34 shows that several countries (8 out of 26) indicate that they report directly to the parliament on duties concerning transparency related to nuclear emergencies. Reporting to parliament occurs in three manners: parliamentary questions (Austria, Greece, Lithuania), Emergency plan (Bulgaria), and Annual reports (Germany, Hungary, Ireland, Lithuania, Romania and Spain). In some cases, like in France, there is no systematic procedure planned but the NRO can be required to report on this topic through parliamentary hearings.

Good practice

Reporting to the parliament on duties concerning transparency related to nuclear emergencies is a good practice.

Table 34 Reporting to parliament on transparency

Do you report to the parliament on duties concerning transparency related to nuclear emergencies? In case yes, please describe the procedures and their frequency?					
MS	Yes	No	Parliamentary question	Emergency Plan	Annual Report
Austria	**X**		**X**		
Belgium		**X**	**X**		
Bulgaria	**X**			**X**	
Croatia		**X**			
Cyprus		**X**			
Czech Republic		**X**			
Denmark		**X**			
Estonia		**X**			
Finland		**X**			
France		**X**			
Germany	**X**				**X**
Greece	**X**		**X**		
Hungary	**X**				**X**
Ireland	**X**				**X**
Italy		**X**			
Latvia		**X**			
Lithuania	**X**		**X**		**X**
Luxembourg		**X**			
Malta		**X**			
Poland		**X**			
Romania	**X**				**X**
Slovakia		**X**			
Slovenia		**X**			
Spain	**X**				**X**
Sweden		**X**			
The Netherlands		**X**			

1.3.3 Authority for public information documents (Q42)

As shown in Table 35, most countries (15 out of 25) indicate that the NRO does not have the sole authority to draft public information documents it deems appropriate concerning nuclear or radiological emergencies. This indicates that in most countries this responsibility and the authority thereof is shared among different actors.

Table 35 Sole authority of NRO on public information documents

Does the NRO have the sole authority to draft public information documents it deems appropriate concerning nuclear or radiological emergencies?		
MS	Yes	No
Austria		**X**
Belgium		
Bulgaria	**X**	
Croatia	**X**	
Cyprus	**X**	
Czech Republic		**X**
Denmark		**X**
Estonia	**X**	
Finland	**X**	
France		**X**
Germany		**X**
Greece	**X**	
Hungary		**X**
Ireland	**X**	
Italy		**X**
Latvia		**X**
Lithuania		**X**
Luxembourg		**X**
Malta	**X**	
Poland		**X**
Romania	**X**	
Slovakia		**X**
Slovenia		**X**
Spain		**X**
Sweden		**X**
The Netherlands		

1.3.4 Monitoring and review of regulatory process related to EP&R to ensure openness and transparency (Q43)

As shown in Table 36, several countries (12 out of 20) indicate they monitor and review their regulatory processes related to emergency preparedness and response to ensure openness and transparency. Monitoring and reviewing occurs in several manners: intern procedures, internal audits, stakeholder consultation, NRO quality process, feedback, science and technology and experiences.

> ***Good practice***
>
> Monitor and review your regulatory processes related to emergency preparedness and response to ensure openness and transparency

Table 36 Monitoring and review of regulatory process related to EP&R to ensure openness and transparency

Do you monitor and review your regulatory processes related to emergency preparedness and response to ensure openness and transparency? Briefly describe how these are done. Please add a reference.			
MS	Yes	No	Method
Austria	**X**		
Belgium			
Bulgaria	**X**		**Internal procedures**
Croatia		**X**	
Cyprus	**X**		
Czech Republic	**X**		**Internal audit**
Denmark			
Estonia		**X**	
Finland	**X**		**Stakeholder consultation**
France	**X**		**NRO quality process, feedback**
Germany	**X**		**Science and technology, experiences, stakeholder consultation**
Greece			
Hungary		**X**	
Ireland			**Internal audit**
Italy		**X**	
Latvia	**X**		**Stakeholder consultation**
Lithuania	**X**		**Internal procedures**

Luxembourg		X	
Malta		X	
Poland	X		**Experiences**
Romania	X		**Stakeholder consultation**
Slovakia		X	
Slovenia	X		
Spain		X	
Sweden			
The Netherlands			

1.3.5 Responsible committees or governing bodies for oversight of transparency (Q44)

Table 37 shows that several countries (7 out of 21) indicate that in their respective countries there are committees or governing bodies that are responsible for the oversight of transparency related to emergency preparedness and response. Of those countries that indicate that these committees or governing bodies exist, one indicates oversight is done by stakeholders (Austria), three indicate oversight is kept by general transparency bodies (Croatia, France, Spain) and four indicate oversight of transparency is done by specific governing bodies (Spain, Lithuania, France and Cyprus).

> ***Good practice***
>
> A committee or governing body responsible for oversight of transparency related to emergency preparedness and response is established and operational.

Table 37 Responsible committees or governing bodies for oversight of transparency

Are there any committees/governing bodies responsible for oversight of your transparency related to emergency preparedness and response? If Yes, please describe how they operate to achieve this.					
MS	Yes	No	Bodies for oversight of transparency		
			Stakeholders	General transparency Bodies	Specific bodies
Austria	X		X		
Belgium					
Bulgaria		X			

Croatia	X			X	
Cyprus	X				X
Czech Republic		X			
Denmark					
Estonia		X			
Finland		X			
France	X			X	X
Germany	X				
Greece					
Hungary		X			
Ireland		X			
Italy		X			
Latvia		X			
Lithuania	X				X
Luxembourg		X			
Malta		X			
Poland		X			
Romania		X			
Slovakia		X			
Slovenia		X			
Spain	X			X	X
Sweden					
The Netherlands					

1.4 Topic: Information disclosure and transparency - Legal position (Q 45-59)

1.4.1 Laws, codes of practices, guidelines or other requirements for the release of information (Q45-46)

Table 38 provides an overview of the various laws, codes of practice, guidelines and requirements that apply to a MS's NRO concerning the release of information. Most countries state that there are specific laws, codes of practice, guidelines or requirements that apply specifically to their NRO either concerning release of information in general or specifically concerning nuclear or radiological issues/emergencies.

Additionally ten countries indicate that they have specific laws, codes or guidelines that include the regulations for the exemption or exclusion of information.

Table 38 Laws, codes of practice, guidelines or other requirements for the release of information

In the event of an emergency, does your MS have any laws, codes of practice, guidelines or other requirements for the release of information which apply to the NRO? Do any laws/codes/guidelines help define what specifically must be exempted/excluded from public information related to an emergency?		
MS	General laws, codes of practice, guidelines or other requirements	Laws, codes of practice, guidelines or other requirements (exemptions/exclusions)
Austria	**Radiation Protection Act, Intervention Ordinance, Emergency Plans**	**No**
Belgium		
Bulgaria	**DPA, Regulation on emergency planning and preparedness in case of nuclear or radiological emergency, NDPP – Annex for Joint information group responsibilities**	**Yes**
Croatia	**No**	**No**
Cyprus	**Relevant references in the nuclear safety and radiation protection law**	**No**
Czech Republic	**Atomic Law and specific law on free access to the information**	**No**
Denmark		**No**
Estonia	**No**	**No**
Finland	**Ministry of Interior Decree on Public Information in Radiological and Nuclear Emergencies**	**Yes, Act on the Openness of Government Activities**
France	**The Convention on Early Notification of a Nuclear Accident**	**Yes, article L. 592-32 of the Environment Code**

	and the Euratom Decision concerning Community procedures for an early exchange of information in the event of a radiological emergency situation, the convention adopted by IAEA concerning assistance in the event of a nuclear accident or a radiological emergency situation, Two Interministerial Directives specify the procedures for application of these texts in France	
Germany	**§ 112 StrlSchG, in the event of an emergency, the competent authority immediately inform the potentially affected population about the emergency and give them appropriate recommendations for behaving in this emergency based on Annex XII of the BSS, the "Leitfaden zur Information der Öffentlichkeit in kerntechnischen Notfällen"**	**Under review**
Greece	**There are general legal provisions, applying also for the NRO, regarding the release of information.**	**Yes**
Hungary	**Govt. Decree 165/2003. (X. 18.) Korm. on the rules of public communication in nuclear or radiological emergency: The organizations of the National Nuclear Emergency Response System authorized to perform independent public information are: […] d) atomic energy oversight organization, […]** **The National Nuclear Emergency Response Plan contains a Public Information Plan.**	**No**
Ireland	**The Freedom of Information and Access to Environmental Information, the Radiological Emergency Warning To Public Regulations and the Ionising Radiation Order**	**Yes, http://www.epa.ie/pubs/legislation/accessinfo/**

Italy	**Current legislation (See #1 and Annex A) clearly establishes the Authorities having the responsibility to release public information in emergency, and the minimum requirements on the type of information elements to be provided.**	**No**
Latvia	**1) Cabinet Regulation No 152 Requirements for Preparedness for Radiological Emergency and Actions in the Event of Such Emergency (nuclear specific), 2) State Civil Protection Plan (currently under revision) (nuclear specific), 3) Documents for crises management developed by Ministry of Environmental Protection and Regional Development, because State Environmental Service is under its supervision (more general)**	**Yes, Law on emergency situations and state of exception, Freedom of Information law**
Lithuania	**No**	**No**
Luxembourg	**Article 128 , 58 and 59 of the updated draft law to transpose the Basic Safety Standards Directive**	**No**
Malta		**No**
Poland	**The Polish Atomic Law and secondary regulations cover the public information requirements**	**Yes**
Romania	**Public information and communication procedure during the radiation emergency –CNCAN procedure (2017), Public communication guideline for emergencies (2008) and Public communication and information strategy during the emergency-Governmental Decision no 548/2008**	**No**
Slovakia	**Art Nr. 42/1994 on Civil Defense, Decree Nr. 388/2006 describes how to inform in case on nuclear or radiological emergency**	**Yes, Act Nr. 241/ 2001 on Protection of Classified Information**

Slovenia	**General legislation on the access to public information and nuclear-specific new Ionising Radiation Protection and Nuclear Safety Act (see Article 8).**	**Yes, Article 8 of Ionising Radiation Protection and Nuclear Safety Act**
Spain		**No**
Sweden	**Freedom of press**	**No**
The Netherlands	**Article 5 (Provision of information to population and authorities) of the Nuclear Safety Regulation for nuclear installations: 1. The licensee shall provide the population, local authorities and stakeholders in the vicinity of the nuclear installation with the necessary information about nuclear safety of the nuclear installation, 2. The requirement as referred to in paragraph 1 shall in any event include: a. the provision of information about normal operations of the nuclear installation; b. the immediate provision of information about an abnormal event which has taken place in the nuclear installation with consequences that are not negligible from the perspective of nuclear safety or in the event that a radiation incident, accident or radiological emergency has taken place in that facility, 3. In providing information, the licensee shall pay particular attention to the population, local authorities and stakeholders in the vicinity of the nuclear installation, 4. The appropriate information shall be provided in any event by electronic means in a generally accessible manner, 5. The licensee shall not provide the information as referred to in paragraphs 1 or 2, if by doing so the safety of the nuclear installation is, or can be, endangered or if the provision of information is in violation**	**Yes, Article 5 (5): The licensee shall not provide the information as referred to in paragraphs 1 or 2, if by doing so the safety of the nuclear installation is, or can be, endangered or if the provision of information is in violation of other national or international regulations**

	of other national or international regulations. Article 17 (Provision of information by the Authority): 1. The Authority, in the context of crisis preparation, and the Minister, in the context of crisis management, shall immediately furnish information to the competent authorities of other member states in the vicinity of the nuclear installation in the event of an accident, 2. Article 5 (5) applies accordingly.	

1.4.2 Release of information on request and proactively, and concerning industry (Q47-48)

Table 39 shows that concerning the release of information in the event of an emergency, almost all countries (22 out of 24) indicate that they release information proactively rather than on request. Seven countries (Cyprus, Germany, Hungary, Ireland, Romania, Slovenia and The Netherlands) indicate that they release both information proactively and on request.

Concerning information on industry, most countries (13 out of 24) indicate that they release information related to the industry involved in the emergency.

Good practice

In the event of an emergency, it is good practice to release information both proactively and on request, including information related to the industry involved in the emergency.

Table 39 Release of information on request and/or pro-actively, and concerning industry

In the event of an emergency, do such requirements/laws require public organisations to release information only on request "(e.g. freedom of Information acts) or proactively? In the event of an emergency, do any such requirements/laws place duties to release information on the industry?					
MS	General information			Information on industry	
	Proactively	On request	Not applicable	Yes	no
Austria	**X**			**X**	
Belgium					
Bulgaria	**X**				**X**
Croatia			**X**	**X**	
Cyprus	**X**	**X**		**X**	
Czech Republic	**X**			**X**	
Denmark	**No**				
Estonia	**X**				**X**
Finland	**X**			**X**	
France	**X**				
Germany	**X**	**X**			**X**
Greece	**X**				

Hungary	X	X		X	
Ireland	X	X		X	
Italy	X			X	
Latvia	X				X
Lithuania	X				X
Luxembourg	X				X
Malta					
Poland	X			X	
Romania	X	X		X	
Slovakia	X				
Slovenia	X	X		X	
Spain	X				
Sweden	X			X	
The Netherlands	X	X		X	

1.4.3 Format and/or timeframe for release of information as referred to in their national legal requirements (Q49)

As shown in Table 40, ten countries out of 22 indicate that they have certain (legal) requirements to release information in a certain format, using a specific language or in a particular time frame. The most often referred format they have to use is that of the IAEA or the European Union. Concerning the timeframe, nine countries indicate they use a specific timeframe. The most referred timeframe is that set by the IAEA and the European Union, specifically referral is made to USIE and ECURIE.

Additionally, Slovenia provides a format for the content of the information they release in the event of an emergency; this format entails "(a) the source of emergency (initiating event etc.), (b) information on the possible consequences and affected areas, (c) information on how to alert public, (d) roles and countermeasures in case of emergency occurrence, (e) details of where further information related to the public protection plan can be obtained".

Good practice

Requirements related to the format of the released public information are rather flexible to allow public communications to apply the most appropriate format according to the emergency event and emergency context. However, the principles of open, timely and transparent public information are applied.

Table 40 Format for the release of information

In the event of an emergency, do the requirements/laws require the release of information in a certain format e.g. language or using simple language and/or in a particular time frame?		
MS	Language	Timeframe
Austria	**Partly**	**Partly**
Belgium		
Bulgaria	**No**	**No**
Croatia	**No**	**No**
Cyprus	**No**	**No**
Czech Republic	**No**	**No**
Denmark		
Estonia	**No**	**No**
Finland	**Finish and Swedish**	**No**
France	**English: IAEA and EU (USIE and ECURIE)**	**IAEA and EU (USIE and ECURIE)**
Germany	**Yes**	**Yes**
Greece	**No**	**No**
Hungary	**No**	**No**
Ireland	**No**	**No**
Italy		
Latvia	**No**	**Timely**
Lithuania	**No**	**No**
Luxembourg	**No**	**No**
Malta		
Poland	**No**	**No**
Romania	**Yes**	**Yes**
Slovakia	**Information: (a) the source of emergency (initiating event etc.), (b) information on the possible consequences and affected areas, (c) information on how to alert public, (d) roles and countermeasures in case of emergency occurrence, (e) details of where further information related to the public protection plan can be obtained**	
Slovenia	**Yes**	**30 min – 3 hours**

Spain	**IAEA and EU**	**IAEA and EU**
Sweden	**Yes**	**ASAP**
The Netherlands	**Dutch**	**No**

1.4.4 Agreement in advance on the documents for public information (Q50)

As shown in Table 41, most countries (17 out of 23) indicate that there does not need to be an agreement in advance for the release of information with any other organisation such as the industry or other government agencies. In Ireland, this is only true for the initial messages sent in the event of an emergency: other messages need to be discussed and agreed upon with other organisations.

Table 41 Agreement on release of documents for public information

Do the documents for public information related to nuclear emergency have to be agreed in advance with any other organisations e.g. industry, other government agency? If yes, please explain.			
MS	Yes	No	Recommended
Austria		**X**	
Belgium			
Bulgaria		**X**	
Croatia		**X**	
Cyprus			
Czech Republic		**X**	
Denmark			
Estonia		**X**	
Finland		**X**	**X**
France		**X**	
Germany	**X**		
Greece		**X**	
Hungary	**X**		
Ireland	**X**	**X (initial message)**	
Italy	**X**		
Latvia		**X**	
Lithuania		**X**	

Luxembourg		**X**	
Malta		**X**	
Poland		**X**	
Romania	**X(dependent on phase)**		
Slovakia	**X**		
Slovenia	**X**		
Spain		**X**	
Sweden		**X**	
The Netherlands		**X**	

1.4.5 Policy on public information (excluding media - press releases) (Q51)

As shown in Table 42, almost all countries (16 out of 19) indicate that they have a specific policy on the release of public information and documents other than media (press) releases during an emergency. The sources of information that are encapsulated by this policy include texts for broadcasts, homepages, interviews, publication archives (open) and social media. Nine countries indicate they have policies concerning the content of the NRO homepage, in eight countries this policy also included texts for broadcast. Three countries (Austria, France and Sweden) indicate that this policy includes social media, two countries (Slovakia and Spain) refer to texts for interviews, and one MS (Finland) indicates that this policy also includes publication of archives that are open to the public.

Whilst Poland does not provide a clear answer on whether there is a specific policy on the release of public information, the NRO claims that additional documentation could be provided to the public on the webpage when deemed necessary or directly on request. Furthermore, there is a 24/7 National Contact Point in NRO headquarters where people from the general public can receive the needed information.

Good practice:

The nuclear regulatory organisation has a policy on public information that does not rely only on press releases but also makes other documents available during an emergency (e.g. self-initiated interviews, recording and publishing audio-video statements, home webpages, points of contact, etc).

Table 42 Policy on release of information (excluding media - press releases)

What is the NRO's policy on public information and making documents other than media (press) releases available during an emergency?								
MS	No additional policy	Source of information					Policies	Under review
		Text for broadcast	Homepage	Interviews	Publication archive (open)	Social media	Production and dissemination support	
Austria		**X**	**X**			**X**		
Belgium								
Bulgaria							**X**	
Croatia	**X**							
Cyprus								
Czech Republic								
Denmark								
Estonia			**X**					
Finland			**X**		**X**			
France						**X**		
Germany		**X**	**X**					**X**
Greece		**X**						
Hungary		**X**						
Ireland		**X**	**X**					

Italy	**X**							
Latvia			**X**					
Lithuania							**X**	
Luxembourg								
Malta	**X**							
Poland								
Romania			**X**					
Slovakia		**X**	**X**	**X**				
Slovenia		**X**						
Spain		**X**	**X**	**X**				
Sweden			**X**			**X**		
The Netherlands								

1.4.6 Rationales for exclusion of information (Q52)

Table 43 shows that several countries refer to specific guidelines, laws or acts when providing an explanation to the public on the rationale for what information must be withheld related to an emergency. These include for example in the Czech Republic NRO Safety Guides and Recommendation, the Act on the Openness of Government Activities in Finland, Protection of Classified information in Slovakia, or the Public Access to information and security Act in Sweden. Several countries also provided quotes to explicate the explanation they would provide. These quotes include for example “We are not jeopardizing national security issues” in Greece, “Information on the exact details leading to loss of the sources cannot be released pending the conclusion of the ongoing criminal investigation” in Ireland or “security related information cannot be public to prevent even worse possible consequences” in Slovenia.

Other countries claim that they do not need to provide explanations as they are non-nuclear countries or they do not have anything specific prepared or they would deal with this issue on a case by case.

Good practice:

The rationale for which information must be withheld related to an emergency (e.g. aspects of site security plans, threat information, commercial interests, etc) is developed and defined in advance, especially in countries with nuclear installations.

Table 43 Rationales for exclusion of information

What explanations are given to the public on the rationale for what information must be withheld related to an emergency e.g. aspects of site security plans, threat information, commercial interests? Please provide general statements.	
MS	Guidelines and quotes
Austria	
Belgium	
Bulgaria	
Croatia	**Nothing specific prepared.**
Cyprus	**n/a**
Czech Republic	**NRO Safety Guides and Recommendations**
Denmark	
Estonia	**n/a**
Finland	**Act on the Openness of Government Activities**
France	**Priority given to protective actions and impact on health and**

	environment.
Germany	**Under review**
Greece	**"We are not jeopardizing national security issues"**
Hungary	**Not explained in detail.**
Ireland	**"information on the exact details leading to loss of the sources cannot be released pending the conclusion of the ongoing criminal investigation"**
Italy	**Dealt on a case by case.**
Latvia	**Depends on the situation. It could be due to on-going investigation, out of the scope of the NRO work or information to be unveiled after some time.**
Lithuania	**No practice to deal with such requests with the public. In general, there is an obligation to withdraw all sensitive information (e.g. physical security issues).**
Luxembourg	**This would only apply in a radiological emergency with a criminal or terroristic element.**
Malta	**Not work in this area yet**
Poland	
Romania	
Slovakia	**Protection of Classified Information**
Slovenia	**"Security related information cannot be public to prevent even worse possible consequences"**
Spain	
Sweden	**Public Access to Information and Secrecy Act**
The Netherlands	

1.4.7 Timing for release of information (emergency stage) and restrictions (Q53-54)

Following the responses shown in Table 44, three NROs (Denmark, Italy and Romania) out of nine countries who answered this question, believe that they should release the information related to emergency management (e.g. radiation measurement data) in whole or in part already during in the emergency/event phase. Only one MS (Austria) indicates that they release information in the preparedness phase and one MS (Greece) indicate that they release information in the transition phase. Four countries (Cyprus, Hungary, Slovakia and Slovenia) indicate that they release information during all phases. A low response on this question, may indicate that question was not clearly formulated or it may be misunderstood.

The timing of the release of this type of information is done as soon as possible (Croatia), as it is relevant (Cyprus, France, Germany, Italy, and Poland), in real time (Czech Republic, Finland, Ireland and Poland), as it is verified (Luxembourg and

Slovenia), or when it is available (Ireland, Luxembourg, Malta, Romania and Slovenia).

Most countries indicate that there are no restrictions on how much time the NRO should spend to address a specific request for release of information during an emergency. Eight countries indicate that specific restrictions are set. These include a timeframe of "within 2 hours (Bulgaria), within 30 days (Croatia), immediately (Poland), within 30 min (Romania), as soon as possible (Slovenia, Spain and Sweden)". A specific restriction concerning timeframe is placed in Latvia, namely a timeframe for protective actions.

Table 44 Timing of release of information (per emergency stage), including restrictions

At what emergency stage should documents related to emergency management (e.g. radiation measurement data) be released in whole or in part by the NRO? Are there any restrictions on how much time the NRO should spend to address a specific request for release of information during an emergency?						
MS	Preparedness	Emergency	Transition	Any stage	Time	Restriction on timeframe
Austria	**X**					**No**
Belgium						
Bulgaria						**Yes, within 2 hours**
Croatia					**ASAP**	**Yes, within 30 days**
Cyprus				**X**	**As relevant**	**No**
Czech Republic					**Real time**	**No**
Denmark		**X**				**No**
Estonia						**No**
Finland					**Real time**	**No**
France					**As relevant**	**No**
Germany					**As relevant**	**No**
Greece			**X**			**No**
Hungary				**X**		**No**
Ireland					**ASAP, Real time, when**	**No**

					available	
Italy		**X**			**As relevant**	**No**
Latvia						**Timeframe for protective actions**
Lithuania						**No**
Luxembourg					**As verified, when available**	**No**
Malta					**When available**	**No**
Poland					**As relevant, real time**	**Immediately**
Romania		**X**			**When available**	**30 min**
Slovakia				**X**		**No**
Slovenia				**X**	**As verified, when available**	**As soon as possible**
Spain						**As soon as possible**
Sweden						**As soon as possible**
The Netherlands						

1.4.8 Balance between the public's right to know and security restrictions in an emergency situation (Q55-Q56)

As shown in Table 45, two countries out of 26, Bulgaria and Poland, indicate that there are specific legal-type judgements regarding the balance between the public's right to know and security restrictions in the field on an emergency. When queried about how many queries the NRO replies as an average, nine countries (Austria, Cyprus, Estonia, France, Hungary, Ireland, Italy, Poland and Spain) indicate they respond to formal 'disclosure' requests, twelve countries (Austria, Cyprus, Estonia, France, Greece, Hungary, Ireland, Italy, Lithuania, Luxemburg, Poland and Spain) indicate they respond to queries from enquiry points, and twelve countries (Austria, Cyprus, Estonia, France, Greece, Hungary, Ireland, Italy, Lithuania, Luxemburg, Poland and Spain) indicate they respond to queries from elected officials. Concerning formal 'disclosure' requests, the amount of responses ranges from almost none (Estonia) to around 30 (Poland). Queries from enquiry points (telephone, letters and emails) are responded to on average ranging from not common (Cyprus) to about 100 (Poland). Concerning queries from democratically elected officials (congress/parliament) on average, ranging from zero (Greece) to less than 20 (Italy) responses are provided.

Table 45 Legal-type judgements on balance between the public's right to know and security restrictions in an emergency situation

In your MS has there been any legal-type judgements regarding the balance between the public's right to know and security restrictions in the field of an emergency? Are there any lessons learnt? Concerning emergency preparedness and response, how many of the following does the NRO respond to each year on average: Formal 'disclosure' requests, queries from enquiry pints (telephone, letters, emails), queries from democratically elected officials (congress/parliament)?						
MS	Legal-type judgements			Request concerning emergency preparedness and response		
	Not applicable	Yes	No	Formal 'disclosure' request	Queries from enquiry points (telephone etc)	Queries from elected officials
Austria			**X**	**Some**	**Some**	**Some**
Belgium	**X**					
Bulgaria		**X**				
Croatia			**X**			
Cyprus			**X**	**Not common**	**Not common**	**Not common**
Czech Republic			**X**			
Denmark			**X**	**2-5 per year**	**2-5 per year**	**2-5 per year**
Estonia			**X**	**Almost none**	**Almost none**	**Almost none**
Finland			**X**			
France			**X**	**Very few**	**Very few**	**Very few**
Germany			**X**			
Greece			**X**		**5-10**	**0-5**
Hungary			**X**	**1-2 per year**	**1-2 per year**	**1-2 per year**
Ireland			**X**	**Less than 5**	**Less than 5**	**Less than 5**
Italy			**X**	**Few – less than 20**	**Few – less than 20**	**Few – less than 20**
Latvia			**X**			

Lithuania			**X**		**Very few**	**Very few**
Luxembourg			**X**		**Around 10**	**1-2**
Malta			**X**			
Poland		**X**		**About 30**	**About 100**	**Less than 5**
Romania			**X**			
Slovakia	**X**					
Slovenia			**X**			
Spain			**X**	**Less than 5**	**Less than 5**	**Less than 5**
Sweden			**X**			
The Netherlands	**X**					

1.4.8.1 Emergencies in own MS (Q57-58)

1.4.8.1.1 Correction of erroneous coverage related to emergency (Q57)

As shown in Table 46, most countries (13 out of 26) Indicate they routinely attempt to correct erroneous coverage related to emergencies. Various actions are indicated to be undertaken to correct these errors: explanations, press conferences, interviews, press releases, statements on websites, social media, specific media, calls or letters to editors or press agencies.

Concerning emergencies in other countries, when there are erroneous messages, ten countries indicate that these will be corrected as well.

> ***Good practice***
>
> Routinely correct erroneous coverage related to emergencies through different possible means (e.g. interviews, press conferences, press releases, social media, letters to editors, etc).

Table 46 Correction of erroneous coverage related to emergencies

Do you routinely attempt to correct erroneous coverage related to emergencies? Or only on occasions? What action is taken? e.g. statements on NRO website 'For the record', letters to editors, social media, etc. Is this practice also applied for the emergencies in other Member States or third countries?						
MS	NA	Yes	No	Correction measures	Concerning emergencies in other members states	
					Yes	No
Austria		**X**			**X**	
Belgium			**X**		**X**	

Bulgaria		X		**Explanation**		
Croatia		X		**Press conferences, interviews, press releases**		
Cyprus	X				X	
Czech Republic		X		**Statements on websites, to press agency, social media, specific media**		
Denmark						X
Estonia			X			X
Finland		X		**Statements on websites, press releases, social media**	X	
France		X		**Social media, calls**		
Germany			X			
Greece		X		**Statements on websites, social media, letters to editors**		X
Hungary		X		**Statements on websites**	X	
Ireland		X		**Statements on websites, social media, calls**	X	
Italy			X			X
Latvia			X			X
Lithuania		X		**Statements on websites, letters to editors**		X
Luxembourg			X			X
Malta			X			
Poland		X		**Specific media, letters to editors**		
Romania		X			X	
Slovakia			X	**Explanations, statements on websites, interviews, social media, letters to editors**	X	
Slovenia			X		X	
Spain			X		X	
Sweden		X		**Statements on websites**		
The Netherlands			X			

1.4.9 Changes concerning release of information subsequent new BSS Directive and Nuclear Safety Directive (Q59)

As shown in Table 47, three countries, Austria, Greece and Romania, indicate specific changes in relation to the aforementioned aspects regarding the release of information. These aforementioned aspects include laws, codes of practice, guidelines or other requirements for the release of information which apply to the NRO; law/codes/guidelines specifying exemptions or exclusions from public information; requirements/laws on the release of information on request or proactively; laws/requirements on release of information on the industry; laws/requirements on certain format or timeframe for the release of information; agreement in advance concerning the release of information; policy on public information and documents other than media (press) releases; explanations for withholding information; release of information in relation to emergency phase; restriction on time spend responding to enquiries; amount of responses on formal 'disclosure' request, queries to enquiry points, and queries from elected officials; correction of erroneous coverage related to emergencies in own countries or in other Members States or third countries. The identified changes include increase in international cooperation (Austria), changes related to hazard assessment and emergency plans (Greece), and changes in specific requirements regarding public information and communication aspects addressed to the public, authorities and to the licensee (Romania).

Table 47 Changes due to new Basic Safety Standards Directive and Nuclear Safety Directive

Will any of the aspects aforementioned regarding the release of information change due to new Basic Safety Standards Directive and Nuclear Safety Directive (if yes, how?)			
MS	Yes	No	Changes
Austria	**X**		**Increase in international cooperation**
Belgium			
Bulgaria		**X**	
Croatia		**X**	
Cyprus			
Czech Republic		**X**	
Denmark		**X**	
Estonia			
Finland		**X**	
France		**X**	

Germany			**Under review**
Greece	**X**		**As part of the updated hazard assessment and emergency plans**
Hungary		**X**	
Ireland		**X**	
Italy		**X**	
Latvia		**X**	
Lithuania		**X**	
Luxembourg		**X**	
Malta			
Poland		**X**	
Romania	**X**		**Specific requirements regarding public information and communication aspects addressed to the public, authorities and to the licensees**
Slovakia		**X**	
Slovenia		**X**	
Spain		**X**	
Sweden		**X**	
The Netherlands			

1.5 Topic: Routine access to information (Q60-66)

Tables 48 and 49 show that several types of documents and services are routinely shared with the public using different mass media in all countries surveyed, except in Croatia, where they indicate that they do not routinely share any documents / services with the public using mass media. Of these documents, incident reports are shared by most countries (n=20), secondly accident reports (n=18) are shared, thirdly notifications of matters being investigated (n=17) followed by formal disclosure request (n=12) and FAQ (n=10).

The method used by most countries (n=17) is formal consultations, then public meetings by local authorities (n=16), then written inquiry points (emails, letters…) (n=15) and telephone enquiry points (n=15), then communication campaign material (n=13) and public meetings hosted by others (n=13), then public meetings hosted by NRO (n=12) and Public meetings hosted by nuclear or radiological installations (n=12), then local information committees (n=11) and regional information committees (n=11) and experiences of public participation in emergency exercises (n=11), then informal or drop-in meetings in the vicinity of the site (n=9) or blogs (n=1).

Besides these methods and channels, several online tools are applied including twitter, a dedicated page on the NRO website, Facebook, SMS, other software or apps or other online tools.

Good practice

Incident notifications, accident reports and notifications of matters being investigated are routinely shared with the public using different mass media (e.g. formal consultations, public meetings with local authorities, written inquiry points, telephone enquiry points, etc).

Table 48 Type of documents/services and methods or channels of release of information

	Please indicate what type of documents/services are routinely shared with the public by using different mass media? Please indicate what methods/channels your Nuclear Regulatory Organization routinely or during an emergency uses to share or exchange information and views with public/stakeholders related to emergencies (either routine or during emergency)?										
MS		Type of documents/services (routinely shared)					Methods and channels (used routinely or in an emergency)				
	Safety review	Incident Notifications	Accident Reports	Notifications of matters being investigated (site)	Formal 'disclose' requests	FAQ	Public meetings hosted by NRO	Public meetings hosted by nuclear or radiological installations	Public meetings (local authorities)	Public meetings hosted by others	Local Information Committees
Austria		X	X	X		X	X	X	X	X	
Belgium		X	X	X	X			X	X	X	X
Bulgaria	X	X	X		X				X		X
Croatia											
Cyprus			X	X	X		X	X	X	X	X
Czech Republic		X	X	X	X	X	X	X	X	X	X
Denmark		X	X								
Estonia					X						
Finland	X	X	X	X		X			X		
France	X	X	X	X	X	X			X		X
Germany		X	X		X	X	X	X	X	X	X

Greece	X	X	X	X		X					
Hungary	X	X	X	X							
Ireland		X	X	X		X	X		X	X	
Italy		X	X	X			X	X	X	X	X
Latvia										X	
Lithuania	X	X		X	X	X	X	X	X		
Luxembour g	X	X	X	X	X					X	
Malta							X	X	X		
Poland	X	X	X	X	X		X	X	X	X	
Romania											
Slovakia		X		X		X	X	X	X		X
Slovenia	X	X	X	X			X	X	X		X
Spain		X					X	X		X	X
Sweden		X	X	X	X	X			X	X	X
The Netherland s		X	X	X	X					X	

Table 49 Methods and channels for release of information

Please indicate what methods/channels your Nuclear Regulatory Organization routinely or during an emergency uses to share or exchange information and views with public/stakeholders related to emergencies (either routine or during emergency)?									
MS	Regional Information Committees	Experience of public participation in emergency exercise	Informal or drop-in meetings in vicinity of the site	Formal consultations	Written enquiries point (e-mails, letters..)	Telephone enquiry point	Communication campaign material	Blogs	Online methods
Austria				**X**	**X**	**X**	**X**		**Twitter**
Belgium	**X**								
Bulgaria	**X**	**X**		**X**					**Dedicated internet page**
Croatia				**X**					
Cyprus	**X**		**X**	**X**	**X**	**X**	**X**		**Facebook**
Czech Republic	**X**	**X**		**X**	**X**	**X**			**Facebook**
Denmark									
Estonia									**Facebook**
Finland		**X**		**X**	**X**		**X**		**Twitter, facebook, dedicated**

									internet page
France	**X**	**X**		**X**		**X**	**X**		**Twitter, facebook, dedicated internet page**
Germany	**X**			**X**	**X**	**X**	**X**	**X**	**Twitter, Facebook, other software or apps, SMS, dedicated internet page, others**
Greece				**X**	**X**	**X**			**Twitter, facebook, dedicated internet page**
Hungary									
Ireland		**X**		**X**	**X**	**X**	**X**		**Twitter, Dedicated internat page, others**
Italy	**X**	**X**	**X**	**X**	**X**	**X**			
Latvia				**X**	**X**	**X**	**X**		**Twitter**
Lithuania					**X**				**Dedicated internet page**
Luxembour				**X**		**X**	**X**		**Dedicated**

g									**internet page**
Malta				**X**	**X**				
Poland		**X**		**X**	**X**	**X**			**Twitter , SMS, other**
Romania						**X**			
Slovakia	**X**	**X**		**X**			**X**		**Facebook, dedicated internet page**
Slovenia	**X**	**X**		**X**	**X**	**X**	**X**		
Spain	**X**	**X**	**X**				**X**		**Twitter, SMS, dedicated internet page**
Sweden	**X**	**X**			**X**	**X**	**X**		**Twitter, dedicated internet page**
The Netherlands			**X**		**X**	**X**	**X**		**Twitter, SMS, dedicated internet page, other**

Conclusions: good practices

In the context of the "*Study on good practices in implementing the requirements on public information in the event of an emergency, under the Euratom Basic Safety Standards Directive and Nuclear Safety Directive*", a survey of 28 EU Member States was conducted in late 2017 and early 2018. The intention was, among others, to provide a set of useful practices drawn by MS expert knowledge and regulatory experience.

The analysis of the results of the survey has provided the key findings and illustrations of the practices of Nuclear Regulatory Organisations (NRO) and other authorities or organisations responsible for defining and implementing public information requirements in the event of a radiological or nuclear emergency in 26 out of 28 EU MS. The following topics are investigated in-depth: *Public information, Cross-border collaboration, Transparency, Legal position* and *Routine access to information*. The document, in particular, draws out those areas of common practice amongst different MS.

Overall the survey and resulting report provides useful insights into the common and often innovative public information practices in place to ensure informed decision-making, public response, openness and transparency in case of a nuclear or radiological emergency. NROs and other authorities or organisations responsible for defining and implementing public information requirements are significantly challenged as information-communication technology continues to advance and as the public's expectations continue to rise. The new Euratom Basic Safety Standards Directive and Nuclear Safety Directive provide minimum requirements for public information and transparency which are, due to national and socio-cultural differences in MS, applied more ambitiously in routine and non-routine public information practice in EU MS.

Annex 1: Questionnaire

Study on good practices in implementing the requirements on public information in the event of an emergency, under the Euratom Basic Safety Standards Directive and Nuclear Safety Directive

Dear Sir/Madam,

We are contacting you as a representative of a Nuclear Regulatory Organisations (NRO) in charge of implementing emergency response measures and with responsibilities in defining and implementing public information requirements in the event of a radiological or nuclear emergency. You already received a dedicated letter sent by EC, DG Energy in order to announce our study on good practices in implementing the requirements on public information in the event of an emergency public information and transparency requirements in the event of an emergency, based on the new revised Basic Safety Standards Directive and Nuclear Safety Directive (Ref. Ares(2017)4694217 - 26/09/2017).

We would be extremely grateful if you could take some time (approx. 45 min) to answer the following questions together with your colleagues responsible for public information and transparency (e.g. head/director of public information office).

In case you are not the competent person for nuclear or radiological emergency management or public information, we would be grateful if you could share this questionnaire with national regulators, institutions and competent authorities in your MS who hold these responsibilities in order to provide one feedback per MS.

We thank you in advance for your collaboration.

The survey consists of 3 sections:

- Public information

- Cross-border collaboration

- Transparency

The survey will be open until 31st January 2018.

We thank you in advance for your collaboration.

Dr. Tanja Perko, SCK•CEN, Belgium and

Dr. Meritxell Martell Lamolla, MERIENCE, Spain

Topic: Public information

The new Basic Safety Standards (BSS) Directive 2013/59/Euratom includes enhanced and more detailed requirements for Member States to inform the general public – outside of an emergency situation - about health protection measures to be applied and steps to be taken in the event of a radiological emergency, and to provide at regular intervals updated information to the population likely to be affected in the event of such an emergency (Article 70). This information includes the health protection measures applicable to them and the actions they should take in the event of such an emergency referring to Section A of Annex XII. This information shall be permanently available to the public and not upon request.

When an emergency occurs, Member States have to ensure that the members of the public actually affected are informed without delay about the facts of the emergency. Article 71 establishes the steps to be taken and, as appropriate, the health protection measures applicable to these members of the public referring to Section B of Annex XII of the new BSS Directive (which are relevant to the type of emergency). This Annex enlists the relevant information that has to be disseminated to members of the public about health protection measures to be applied and steps to be taken in the event of an emergency as referred to in the revised Articles 70 and 71.

Nº	**Code**	**Question**
1	P30	Will new Basic Safety Standards Directive and Nuclear Safety Directive result in a new national legislation regarding public information in radiological emergency? (If yes, when. Please, provide us link or document related to foreseen changes from public information point of view)
2	PI31	Are there any particular difficulties in transposition of these new regulations related to public information in your national context? (If yes, specify)
3	PI4	Will your overall communication plan/strategy change, or has it changed as a result of the new Basic Safety Standards Directive and Nuclear Safety Directive? (if yes, when and please describe main changes)
4	PI32	Are communication aspects with the public included in your emergency response plan?
5	PI1	Do you have a specific public information plan/strategy for nuclear or radiological emergencies?
6	PI2	What channels do you normally use to provide information for the general public about health protection measures to be applied and steps to be taken in the event of a radiological emergency?
7	PI3	How often do you review and improve your communication plan/strategy?

8	PI5	What is the professional profile of the head/director of the public information office of the Nuclear Regulatory Organisation (NRO)? (please, provide link to on-line profile or CV if available)
9	PI6	How many **international** professional conferences/technical meetings/education programmes related to communication aspects has the staff of the public information office attended in the last three years? (Name them)
10	PI7	How did you identify or plan to identify citizens' needs for public information in the case of an emergency? (describe the method)
11	PI8	Did you test or are you planning to test whether the communication material you normally use results in people understanding the emergency or protective actions? (How?)
12	PI9	How often do you review and improve your communication material related to emergencies or protection actions?
13	PI10	Is your internet webpage evaluated and reviewed in a structured manner by others than NRO employees?
14	PI11	Do you include aspects of communication with the public in nuclear or radiological emergency exercises/drills? (How often?)
15	PI12	What are the most important lessons learned regarding communication with the public from these exercises/drills that you would like to share?
16	PI13	In emergency/incident situations, **how quickly** are incidents notified to public/ media?
17	PI14	Do you have a specific webpage (*dark site*) that becomes active in the event of an emergency?
18	PI15	If yes, what is the content of this page?
19	PI16	What is the NRO's policy on staff speaking to the media in the event of an emergency?

20	PI17	What is your policy on media training for regulatory staff? Approximately what percentage are trained in media handling during an emergency?
21	PI18	How many spokespersons in total would be available during an emergency?
22	PI19	Where are they located during an emergency (HQ/regions/sites/crisis center)?
23	PI20	And what are their backgrounds?
24	PI21	Is there specific training given to employees in order to become **spokespersons** "specialized" for nuclear or radiological emergencies?
25	PI22	Where is the communication cell located in the Incident command system during an emergency (on organisational chart)
26	PI23	How many communication officers does the communication cell have? (min. and max.)
27	PI24	Could you describe your collaboration with public information officers from other organizations/institutions/authorities involved in emergency management?
28	PI25	Do you have a dedicated person(s) to follow and respond to social media? (How many?)
29	PI26	Do you have a mechanism in place that would allow to systematically collect rumours during an emergency?
30	PI27	Do you have tools which may be used for posting online questions during an emergency?
31	PI28	Do you invest in familiarizing journalists in reporting about nuclear or radiological emergencies? What does this involve and how frequently is it carried out?

32	PI29	Do you foresee a call centre in the case of an emergency? If yes, how fast can it be established and how many people can respond on open lines?

Topic: Cross-border collaboration

The new provisions in Articles 97 to 99 of the Directive 2013/59/Euratom have been substantially enhanced compared to the provisions in Article 50 of Directive 96/29/EURATOM concerning cooperation and information exchange between Member States. Not only the cooperation with Member States and third countries has become mandatory; but also, the obligation to "promptly establish contact with all other Member States and with third countries which may be involved or are likely to be affected with a view to sharing the assessment of the exposure situation and coordinating protective measures and public information by using, as appropriate, bilateral or international information exchange and coordination systems" is new.

Nº	**Code**	**Question**
33	CBC1	In the case of an emergency happening in your MS, which languages will you use to publish public information?
34	CBC2	In the case of an emergency happening in your MS, will you publish public information in the official languages of neighbouring countries?
35	CBC3	In the case of an emergency happening in your MS, will you publish public information in the official languages of potentially affected third countries?
36	CBC4	Is your communication personnel included in regional exercises? How often? Could you name the last regional exercises in which your staff participated?
37	CBC5	In case of an emergency happening in another MS, would you refer to the website of the NRO of the MS in which the emergency takes place (e.g.; give a direct link to their website)?
38	CBC6	Please describe your collaboration with public information officers from other countries involved in emergency management?

Topic: Transparency

The revision of Article 8 of the revised Nuclear Safety Directive focuses on increasing the transparency of regulatory authorities and operators of nuclear power plants with their obligation to make necessary information available in relation to the safety of the nuclear installations and its regulation, with specific consideration to local authorities, population and stakeholders in the vicinity of a nuclear installation both in times of normal operation and in the event of incidents and accidents.

Nº	Code	Question
39	T1	What are the main challenges associated with transparency during a nuclear or radiological emergency in your MS?
40	T2	Do you report to the parliament on duties concerning transparency related to nuclear emergencies?
41	T3	In case you responded "yes" to the previous question, please describe the procedures and their frequency
42	T4	Does the NRO have the sole authority to draft public information documents it deems appropriate concerning nuclear or radiological emergencies?
43	T5	Do you monitor and review your regulatory processes related to emergency preparedness and response to ensure openness and transparency? Briefly describe how these are done. Please add a reference.
44	T6	Are there any committees/governing bodies responsible for oversight of your transparency related to emergency preparedness and response? If Yes, please describe how they operate to achieve this.

Topic: Information disclosure and transparency - Legal position

Nº	Code	Question
45	TL1	In the event of an emergency, does your MS have any laws, codes of practice, guidelines or other requirements for the release of information which apply to the NRO? Please provide references. Please specify if **nuclear-specific** or more general?
46	TL2	Do any laws/codes/guidelines help define what **specifically must be exempted/excluded** from public information related to an emergency? Please supply references.
47	TL3	In the event of an emergency, do such requirements/laws require public organisations to release information only **on request** (e.g. freedom of Information acts) or **proactively?**

48	TL4	In the event of an emergency, do any such requirements/laws place duties to release information **on the industry**? Please provide a reference.
49	TL5	In the event of an emergency, do the requirements/laws require the release of information in a **certain format** e.g. in specific languages or using simple language (equivalent to 'Plain English') and/or **in a particular timeframe**? If so, please provide key details.
50	TL6	Do the documents for public information related to nuclear emergency have to be agreed in advance with any other organisation e.g. industry, other government agency? If yes, please explain.
51	TL7	What is the NRO's policy on public information and making documents other than media (press) releases available during an emergency?
52	TL8	What explanations are given to the public on the rationale for what information must be withheld related to an emergency e.g. aspects of site security plans, threat information, commercial interests? Please provide general statements.
53	TL9	At what emergency stage should documents related to emergency management (e.g. radiation measurement data) be released in whole or in part by the NRO?
54	TL10	Are there any restrictions on how much time the NRO should spend to address a specific request for release of information during an emergency?
55	TL11	In your MS has there been any legal-type judgement regarding the balance between the public's right to know and security restrictions in the field of an emergency? Are there any lessons learnt?
56	TL12	Concerning emergency preparedness and response, **how many** of the following does the NRO respond to each year on average? (a) formal 'disclose' requests. (b) queries to enquiries points (telephone, letters, email). (c) queries from democratically elected officials (congress/parliaments).
57	TL13	Do you routinely attempt to correct erroneous coverage related to emergencies? Or only on occasions? What action is taken? e.g. statements

		on NRO website 'For the record', letters to editors, social media, etc.
58	TL14	Is this practice also applied for the emergencies in other Member States or third countries?
59	TL15	Will any of the aspects above regarding the release of information change due to new Basic Safety Standards Directive and Nuclear Safety Directive? (if yes, how)

Topic: Routine access to information

Please indicate what type of documents/services are **routinely shared with the public by using different mass media**

Nº	**Code**	**Question**	**Answering category**	
60	TR1	Safety Reviews (periodic and others)	Yes, No; IF yes specify	
62	TR3	Incident Notifications	Yes, No; IF yes specify	
63	TR4	Accident Reports (involving harm to individuals)	Yes, No; IF yes specify	
64	TR5	Notifications of matters being investigated (site). *How? As part of overview reports or individually?*	Yes, No; IF yes specify	
65	TR6	Formal '**disclose' requests**. (b) queries to enquiries points (telephone, letters, email). (c) queries from democratically elected officials (congress/parliaments) and your **answers**?	Yes, No; IF yes specify	
66	TR7	Frequently asked questions specific for nuclear emergencies (please provide link)	Yes, No; IF yes specify	

Final questions

Nº	**Code**	**Question**	**Answer**

86	FQ1	Full name of the organisation that you represent and MS.	
87	FQ2	Please, list all people participating in answering the questionnaire, their positions and e-mail addresses.	

We thank you very much for your responses. The research results will be presented at the final workshop to be held on 11-12 June 2018 in Antwerp, Belgium. We would like to encourage the national authorities in charge of implementing of emergency response measures, particularly those with responsibilities in defining and implementing public information requirements in the event of a radiological or nuclear emergency, to take part in the workshop which will be announced in the coming months and communicated to you via email.

For additional information feel free to contact Tanja Perko at tanja.perko@sckcen.be or Meritxell Martell Lamolla at meritxell.martell@merience.eu.

ANNEX 2: Reference letter

Ref. Ares(2017)4584217 - 20/09/2017

EUROPEAN COMMISSION
DIRECTORATE-GENERAL FOR ENERGY

Directorate D - Nuclear energy, safety and ITER
D.3 - Radiation protection and nuclear safety

Luxembourg,
ENER.D3 FT-BP/jf

By e-mail only

For the attention of the
Atomic Attachés

Subject: **Study on good practices in implementing the requirements on public information in the event of an emergency, under the Euratom Basic Safety Standards Directive and Nuclear Safety Directive**

Dear Sir/Madam,

As you know, the European Commission (EC) is organising activities to accompany and monitor the transposition and implementation of Council Directive 2013/59/Euratom, laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation (BSS Directive), and of the Council Directive 2014/87/Euratom, establishing a Community framework for the nuclear safety of nuclear installations and amending Council Directive 2009/71/Euratom (NS Directive). The aim is to facilitate discussion amongst Member States – with a view to exchanging experience, identifying good practices and improving the effectiveness of implementing measures.

In this context a new study has been launched which focuses on **good practices in implementing the requirements on public information in the event of an emergency.** Following a tender exercise, the EC has selected the SCK-CEN/Merience consortium[1] to help carry out the above mentioned actions and activities. I would like to seek the cooperation of your services by responding to requests for information from the consortium. I further encourage the national competent authorities in charge of implementing of emergency response measures, particularly those with responsibilities in defining and implementing public information requirements in the event of a radiological or nuclear emergency, to actively take part in related workshops which will be announced later.

[1] SCK-CEN (Belgium) and Merience (Spain) have formed a consortium for this work.

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We would be grateful if you would share the contents of this letter with national regulators, institutions and competent authorities who hold these responsibilities so that they are aware of this work and can prepare in raising issues as well as sharing good practice experience.

We thank you in advance for your collaboration.

Yours faithfully,

Michael Hübel

Annex C

DG Energy project: "*Study on good practices in implementing the requirements on public information in the event of an emergency, under the Euratom Basic Safety Standards Directive and Nuclear Safety Directive*"

Project Ref. Ares(2016)7037963

Report D1.3

Overview of public information settings in EU Member States regarding the implementation of BSSD and NSD

Public awareness and satisfaction with information about nuclear emergencies potentially occurring in Belgium

Authors:
Catrinel Turcanu and Tanja Perko, SCK•CEN, Belgium

Date: 17 May 2018
D1.3/a
Work package 1
ENER/2017/NUCL/SI2.756526

Contents :

I. List of figures

II. List of tables

III. Introduction

The task 1.2: *Comprehensive overview of public information settings in the 28 EU Member States from the perspective of EU legislation, including public awareness of protective measures and public satisfaction with information (focus on the administrative and organizational aspects)* includes a *case study* in Belgium concerning public awareness and satisfaction with information about nuclear emergencies potentially occurring in Belgium or in bordering neighboring countries (Netherlands, France). Different questions related to this topic are included in the SCK•CEN Barometer survey in order to investigate in-depth citizens' views, opinions, needs and expectations related to communication before and during a nuclear or radiological emergency. This document reports the results.

III.1 The SCK•CEN Barometer survey

Starting from 2002, the Belgian Nuclear Research Centre (SCK•CEN) carries out research on the public perception of radiation risks and attitudes towards nuclear energy. The research is developed within the Programme for Integration of Social Aspects into nuclear research (PISA). The main research instrument used for this purpose is the "SCK•CEN public opinion Barometer". This is a large-scale public opinion survey with a sample of the population that is representative for the Belgian adults (18+) with respect to province, region, level of urbanisation, gender, age and professionally active status. The large sample size of the survey allows highlighting general trends, but also in-depth research on causal processes related to societal aspects of nuclear technology.

III.2 Field work

The field work has been carried out in the period of 27 November 2017-26 February 2018 by a company specialised in opinion research (IPSOS-Belgium), with professional interviewers.

The survey was carried out face to face, at the home of the respondent. The questionnaires were administered using CAPI (Computer Assisted Personal Interview). For this, a new platform (iField) was used that integrates data collection, scripting, field management and quality control. In total, 77 interviewers worked on the national survey. On average, an interviewer conducted 14 interviews. Interviews were taken on week days as well as on weekends. The average duration of the full interviews was of approximately 50 minutes.

The sample consists of N=1083 Belgian adults and is representative for the (18+) Belgian population with respect to gender, age, education, level of urbanisation of the living habitat and province.

The timeline of the fieldwork is summarised below:

- Questions designed: August-September 2017
- Pilot study conducted: September 2017

- Marketing company selected: September 2017
- Electronic devices for the survey tested: October
- Introduction to interviewers: October-November 2017
- Field work started: 27 November 2017; field work ended on 26 February 2018.
- Status of the conducted interviews regularly reported by IPSOS to SCK•CEN.

III.3 Sampling

Based on the description of the Belgian population with respect to gender, age, education level, urbanization status of the living environment and province as given in Table 1 below, a representative sample of the general population was drawn using the following procedure.

i) Selection of Primary Sampling Units

To ensure a representative sample, a stratified quota sampling approach was carried out to select the Primary Sampling Units (Communes). The calculation of the number of sampling points (PSUs) to be selected in each stratum was determined by the national statistics on the adult population aged 18 years and older.

The sampling frame was stratified according to urbanization degree (3 strata) and province (11 strata, with Brussels being counted as a province). Random systematic sampling was performed within each stratum to randomly select 103 PSU's.

ii) Selection of starting address and households

For each sampling point, one address was drawn at random. From this starting address, a cluster of households was formed by selecting every n^{th} household with a standard random route procedure.

Table 50 Socio-demographic characteristics of the sampled universe (Source: Technical report IPSOS and Statbel)

Universe - National		
		In thousands
TOTAL		**11.025**
Gender	Male	5.422
	Female	5.603
Age	18-34 years	2.765
	35-54 years	3.083
	55-64 years	3.083
	65+ years	2.095
Urbanity/rurality	City	3.128
	Town and suburb	6.407
	Rural	1.490
Education level	Never or primary	1.776
	Lower secondary	2.804
	Higher secondary	3.583
	Post-secondary or higher	2.862
Province	Antwerp	1.788
	Flemish Brabant	1.100
	West Flanders	1.155
	East Flanders	1.457
	Limburg	845
	Brussels	1.160
	Walloon Brabant	389
	Hainaut	1.304
	Liège	1.074
	Luxembourg	275
	Namur	478

iii) Selection of respondents

The respondent was selected via crossed quota. For each selected PSU, these quotas were defined for gender and age (4 age bins) based on the most recent figures of Statbel. The sampling method used was random walk.

A weighting procedure was carried out, using marginal (RIM) and intercellular weighting (Iterative Proportional Fitting - IPF) based on the universe description, to correct for small differences in gender, age, education and province between the survey sample and the general population in Belgium.

The next table summarises the socio-demographic characteristics of the sample and the outcome of the weighting procedure.

Table 51 Socio-demographic characteristics of the sample and outcome of weighting procedure (Source: Technical report IPSOS)

Weighting outcome - National								
Variable	Weighting criteria	Target (%)	Actual number of respondents	Actual percentage	Difference (actual - target)	Average weight in cell	Weighted number of respondents	Weighted percentage
Gender	Male	49,18	519	47,92	-1,26	1,03	533	49,22
	Female	50,82	564	52,08	1,26	0,98	550	50,78
		100,00	1083	100,00			1083	100,00
Age	18-34 years	25,08	257	23,73	-1,35	1,06	271	25,02
	35-54 years	27,96	378	34,90	6,94	0,8	303	27,98
	55-64 years	27,96	188	17,36	-10,60	1,61	303	27,98
	65+ years	19,00	260	24,01	5,00	0,79	206	19,02
		100,00	1083	100,00			1083	
Education level	Never or primary	16,11	62	5,72	-10,38	2,81	174	16,07
	Lower secondary	25,43	194	17,91	-7,52	1,42	275	25,39
	Higher secondary	32,50	396	36,57	4,07	0,89	353	32,59
	Post-secondary or higher	25,96	431	39,80	13,84	0,65	281	25,95
		100,00	1083	100,00			1083	100,00
Province	Antwerp	16,22	179	16,53	0,31	0,97	176	16,25
	Flemish Brabant	9,98	95	8,77	-1,21	1,07	108	9,97
	West Flanders	10,48	118	10,90	0,42	0,97	113	10,43
	East Flanders	13,21	134	12,37	-0,84	1,06	143	13,20
	Limburg	7,66	96	8,86	1,20	0,91	83	7,66
	Brussels	10,52	124	11,45	0,93	0,9	115	10,62
	Walloon Brabant	3,53	41	3,79	0,26	0,93	38	3,51
	Hainaut	11,83	120	11,08	-0,75	1,08	128	11,82
	Liège	9,74	105	9,70	-0,04	1	105	9,70
	Luxembourg	2,49	30	2,77	0,28	0,9	27	2,49
	Namur	4,34	41	3,79	-0,55	1,11	47	4,34
		100,00	1083	100,00			1083	100,00

Although occupation was not included among the quota variables, the sample is diverse, consisting of 8% self-employed persons, 28% employee (bediende), 14% workers (arbeider), 6% home-caring person, 24% retired, 5% unemployed, 5% students and other non-active 9%.

III.4Content of the questionnaire

SCK•CEN investigated communication aspects related to nuclear emergency management through a survey with the general population in Belgium.

The present survey continues the historical follow-up of topics such as risk perception, confidence in authorities related to management of radiological risks, opinion about nuclear energy, trust in nuclear actors and knowledge about the nuclear domain. These questions are related to different social science and humanities research projects at SCK•CEN for instance the H2020 project CONFIDENCE (graphs below labelled accordingly). This year's edition includes also the nuclear emergency communication aspects in interest for the project BSS information & transparency in radiological emergency.

III.5 Formulation of survey items

Most items in the survey are formulated as questions or statements, with answering categories expressed by means of Likert-scales and/or adjusted to the context of the statement or question. Agreement with a statement is typically measured on a scale ranging from “strongly disagree”, through to “disagree”, “neither agree, nor disagree”, “agree”, to “strongly agree”. The answering category “other” was included for all closed questions with predefined answering options in order to ensure completeness. The option of "no answer" or "I don't know" was also allowed, but not encouraged (interviewers were specifically instructed for this purpose).

To avoid question-order effects, randomisation is applied whenever deemed appropriate (e.g. the items measuring preferable information channel in a hypothetical nuclear emergency etc.).

III.6 Pre-testing of the questionnaire

A pilot study was carried out with 25 respondents as a pre-test of the survey with a paper version of the questionnaire. Respondents were asked to fill in the questionnaire and to write comments next to the questions, if appropriate. Individual discussions with the interviewer were held with each respondent. This helped identifying any problems, e.g. terms or phrases that were confusing or questions that were deemed too difficult to answer. In addition, this allowed verifying that the questions were interpreted in the same way by different respondents.

The interviews were conducted with students and researchers from the University of Antwerp and newly employed personnel of SCK•CEN.

Prior to respondents starting to fill in the questionnaire, the interviewers made an introduction that briefly explained the purpose of the study and also included messages that are known to encourage people to respond: (a) assure the respondents that data will remain anonymous; (b) explain the purpose of the pilot study; (c) explain the selection of the respondents (if requested); (d) communicate the estimated time needed to fill in the questionnaire (initial estimation: 35 min); (e) emphasize that all the respondents' comments will be analysed together with the interviewer in individual discussions. A qualitative analysis of the results obtained was used to produce an improved version of the questionnaire.

Great attention was given to the translation of the questionnaire in French and Dutch language, in order to assure the equal understanding of statements and questions investigated. For this, native speakers were asked to compare the translations from Dutch to French and from French to Dutch.

III.7 Data analysis

Data analysis has been carried out using the statistical package IBM SPSS Statistics 25 and Excel. All data reported correspond to the sample weighed with education, gender, age and province.

Data in figures are reported mostly as percentages rounded to up to integer numbers.

For a sample N>1000 respondents, the error margin for all estimated proportions (e.g. the proportion of people saying they strongly agree with a statement) is 3%. This value is derived from the estimation of the error margin:

$$m = z^{*}\sqrt{\frac{p^{*} \cdot q^{*}}{N}},$$

with m = the error margin in percentage points;

z* = 1.96 (according to the normal distribution if the confidence level equals 95%);

p* = the sample proportion of the category involved, e.g. <strongly agree>;

q* = the complement of p* = (1-p*) = the sample proportion of the categories not involved;

N = the sample size.

IV. Results

IV.1 Perception of radiological and chemical risks

The first question in the survey addressed personal risk perception for the respondent's own health in the next 20 years, for various radiological, chemical or environmental risks.

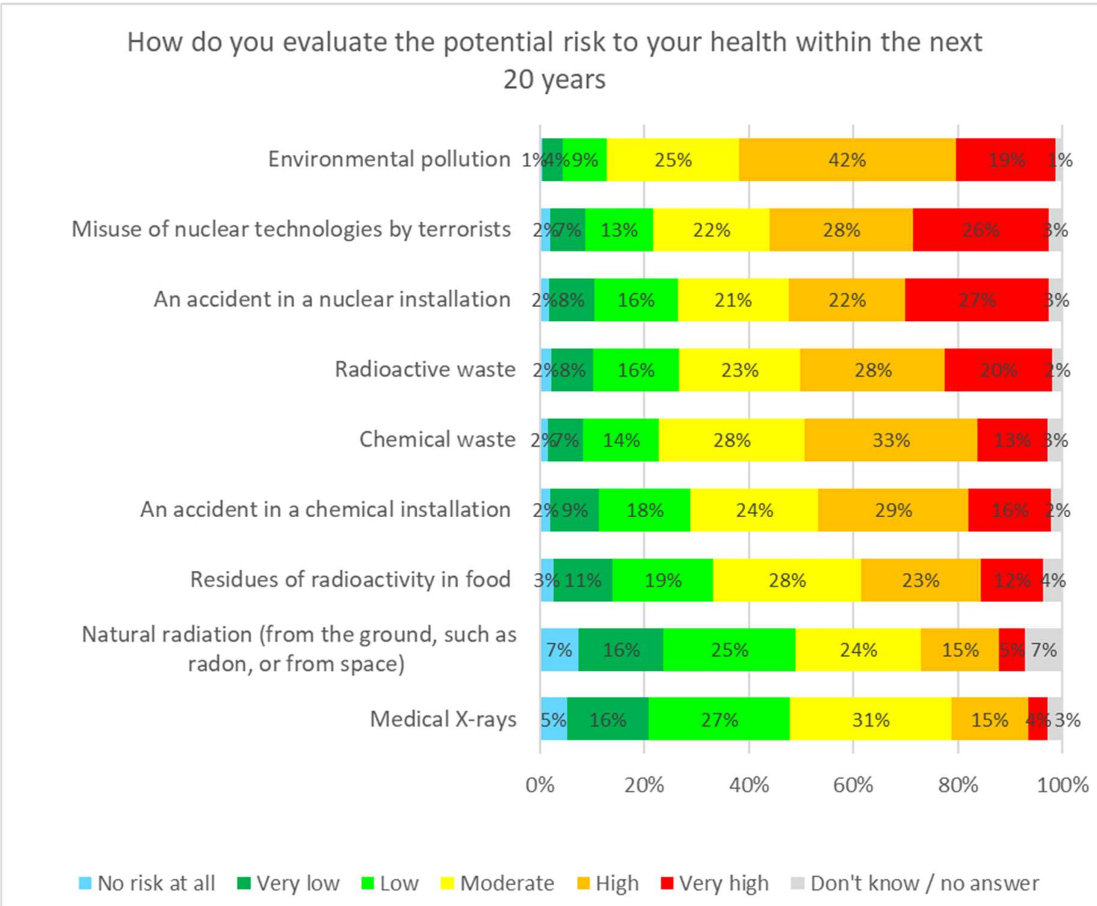

Figure 1 Perception of radiological and chemical risks (N=1083, sample weighed with age, gender, education, province)

By revealing people's concerns and preferences, the study of risk perception can contribute to improving risk policies and designing risk communication strategies (Fischhoff, 1985). Results show that environmental pollution and potential misuse of nuclear technologies are the highest perceived risks among those investigated (with respect to percentages of respondents who perceive these risks as high or very high). One in two respondents also considered personal risks from an accident in a nuclear installation or from radioactive waste as high or very high.

IV.2 Confidence in authorities as regards protective actions taken to mitigate radiological and chemical risks

Using the same items as for risk perception, a next question investigated respondents' confidence in authorities concerning the actions they take to mitigate the respective risks.

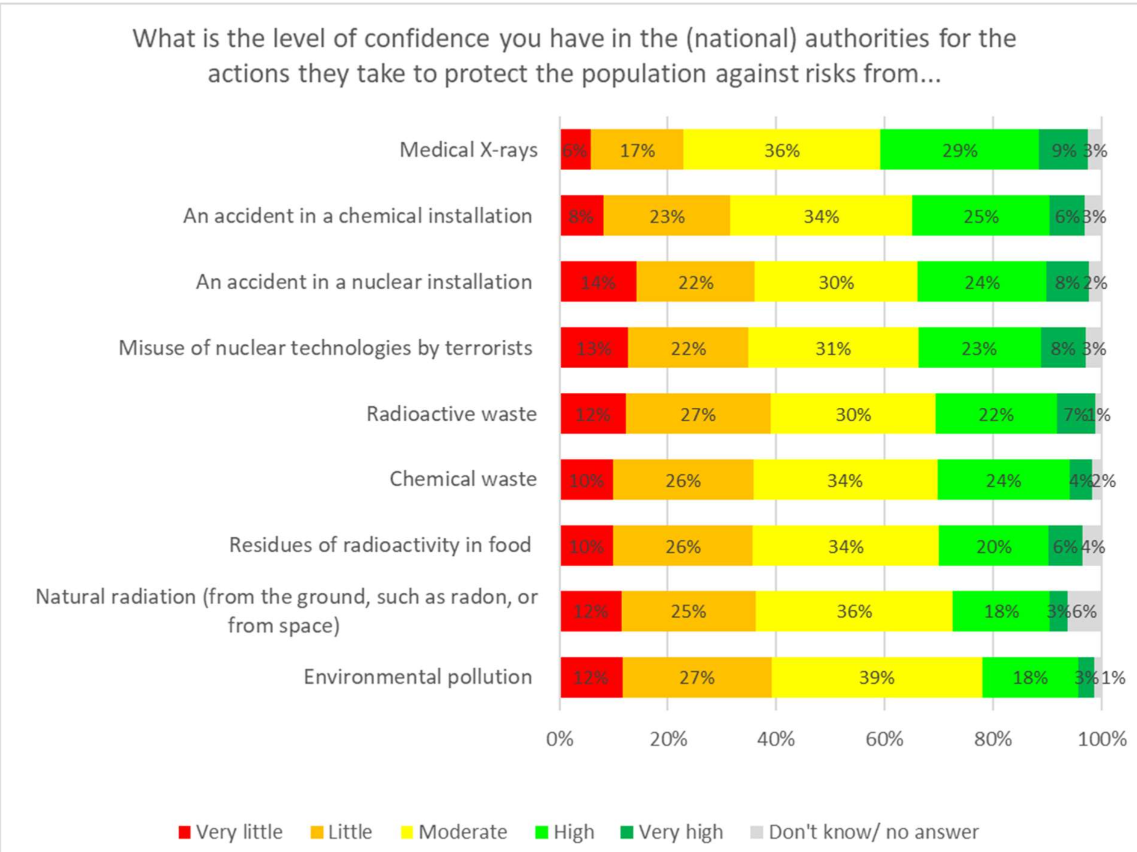

Figure 2 Confidence in authorities as regards protective actions taken against radiological and chemical risks (N=1083, sample weighed with age, gender, education, province)

While an accident in a nuclear installation scores high in terms of risk perception, confidence in authorities is also among the highest, with one in three citizens (32%) having a high or very high level of confidence in authorities. However, opinions are divided and an almost equal with percentage of respondents (36%) having very low or low confidence in authorities for the actions taken to protect against accidents in nuclear installations.

IV.3 Trust in the safe management of nuclear installations

A number of questions probed the respondents' confidence in the safe management of nuclear installations.

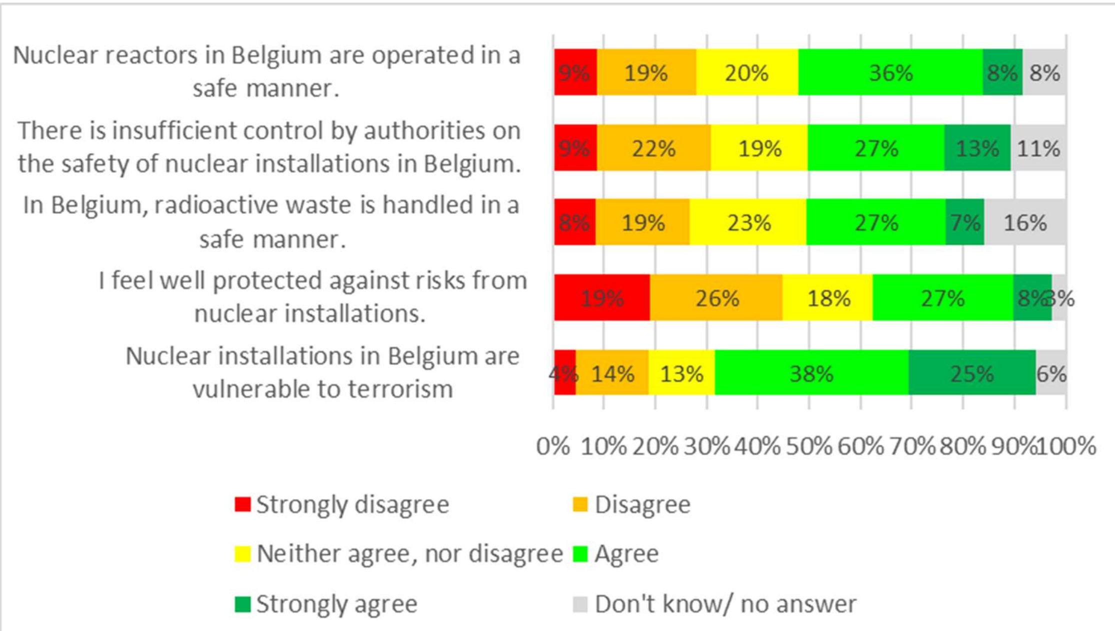

Figure 3 Trust in the management of nuclear installations (N=1083, sample weighed with age, gender, education, province)

Opinions concerning the safe management of nuclear installations are divergent. For instance, 31% disagree that there is insufficient control on nuclear installations, while 40% agree with this statement. At the same time, 35% feel well protected against risks from nuclear installations, while 43% disagree. This result is important since previous research (Turcanu et al, 2016) shows that satisfaction with information about ionizing radiation provided by nuclear safety authorities is influenced by confidence in authorities for the actions taken to protect the population against ionizing radiation risks, perceived trustworthiness and perceived technical competence of the actor as regards risks and benefits of nuclear technologies.

A majority of the respondents expresses concern regarding the vulnerability of nuclear installations to terrorism, confirming the high risk perception observed for this particular risk.

IV.4 Perceived trustworthiness and technical competence of various actors

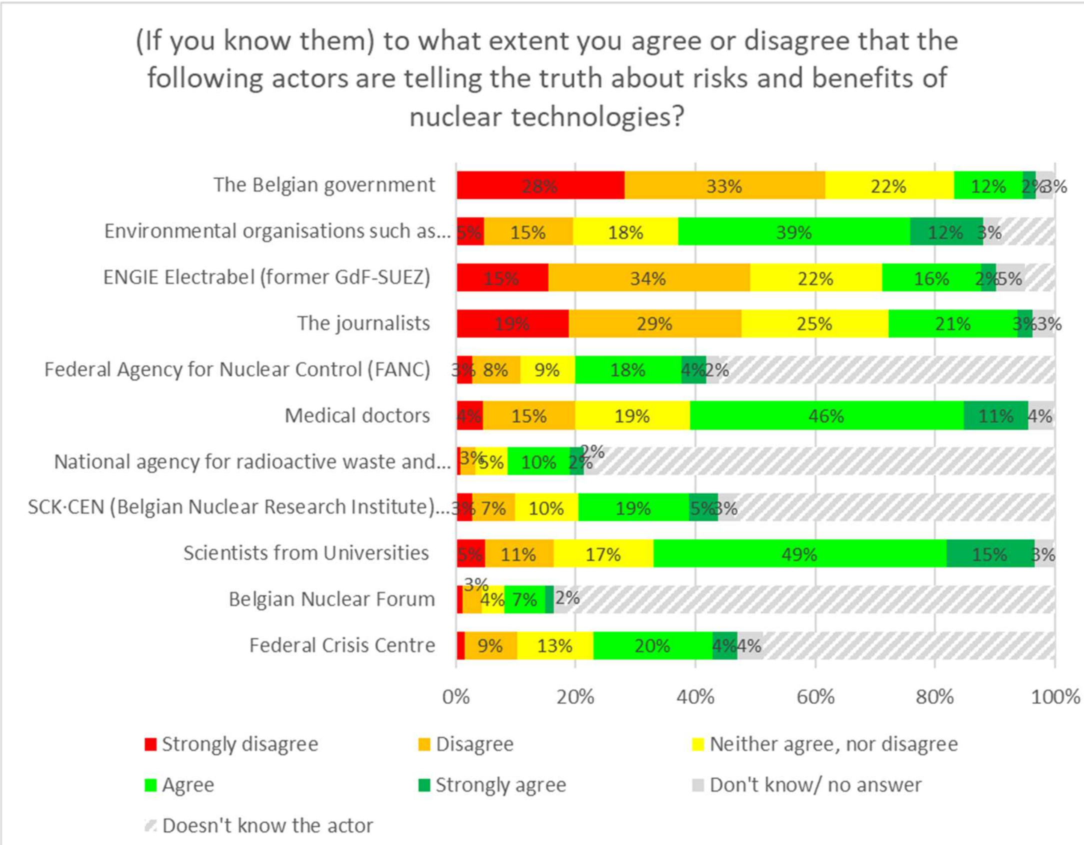

Figure 4 Perceived trustworthiness of various actors as regards risks and benefits of nuclear technologies (N=1083, sample weighed with age, gender, education, province; values lower than 2% not labelled)

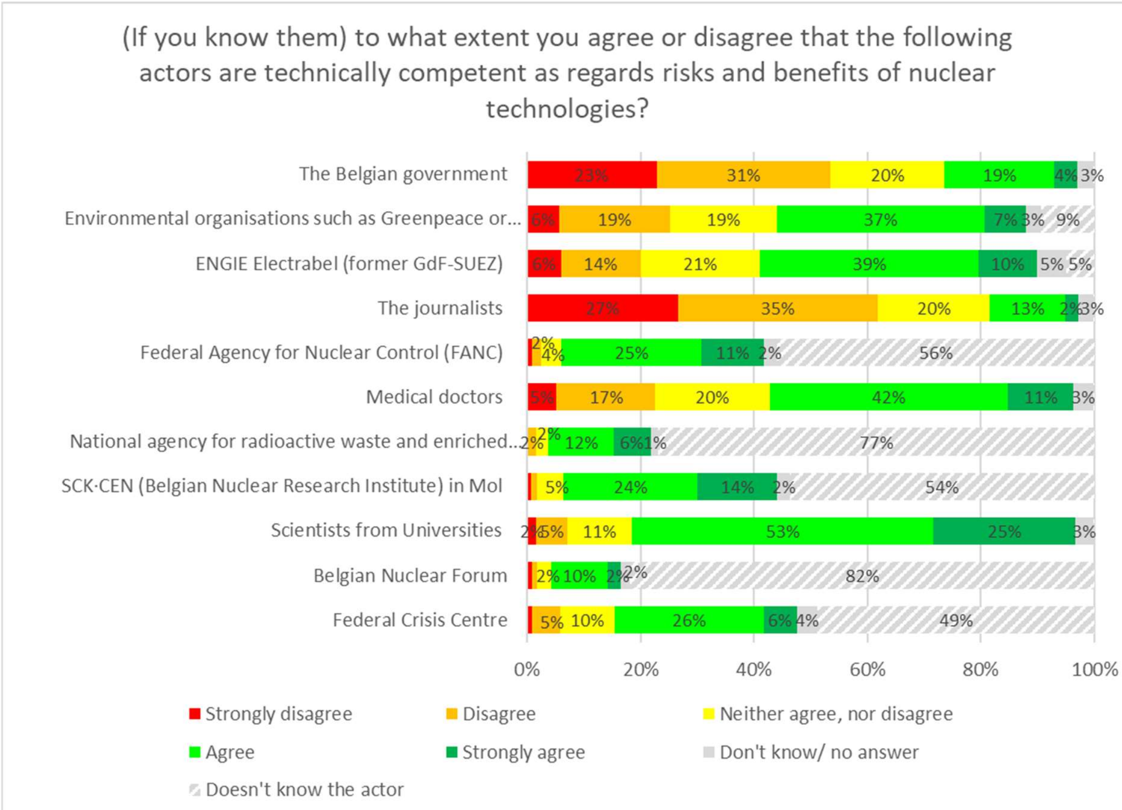

Figure 5 Perceived technical competence of various actors as regards risks and benefits of nuclear technologies (N=1083, sample weighed with age, gender, education, province; values lower than 2% not labelled)

Results suggest that most trusted communicators are scientists from universities, medical doctors and environmental organisations. In terms of technical competence, scientists from universities and medical doctors enjoy the trust from highest numbers of respondents. Nuclear safety authorities and research centres are also highly trusted by the respondents who know these actors, but they are less known to the general public. Most distrusted are politicians and journalists.

IV.5 Perceived distance from a nuclear installation

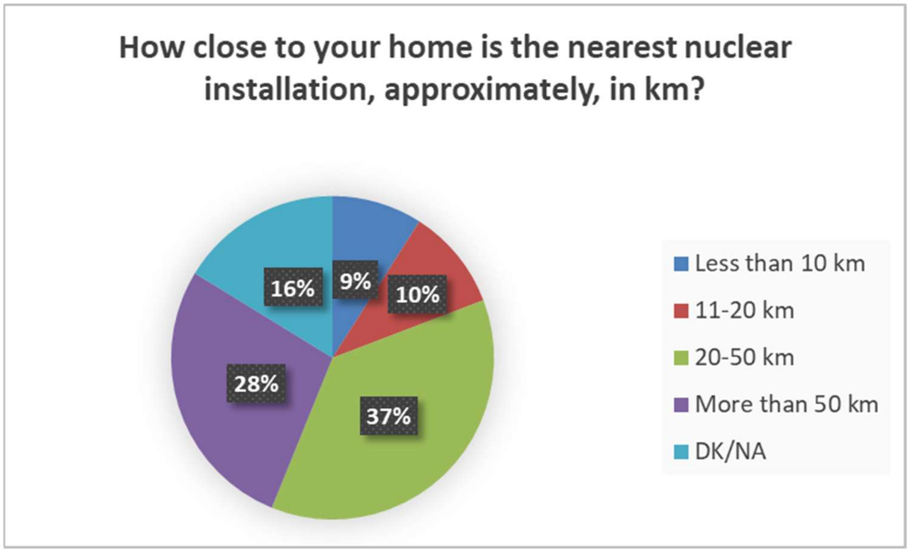

Figure 6 Perceived distance from a nuclear installation (N=1083, sample not weighed)

IV.6 Satisfaction with information concerning protective actions in case of a nuclear accident

A series of questions investigated respondents' self-efficacy as regards information they have or they can easily find in the event of a nuclear accident.

Results show that relatively few respondents (21%) feel well informed about what to do in case of a nuclear accident and a majority (75%) say they do not know enough to judge the efficiency of protective actions (such as for instance sheltering or intake of iodine tablets). A large majority (87%) are of the opinion that the authorities should do more to inform the population in advance about protective actions that can be taken in the event of a nuclear accident. These results reflect the situation in Belgium before the last nuclear emergency information campaign, which took place in weeks following the survey data collection.

One in three respondents says they know where to find relevant information about protective actions, while almost 60% disagree with this statement.

However, 45% say they are confident that in case of an accident they will find the information needed to protect themselves, while 35% disagree with this statement.

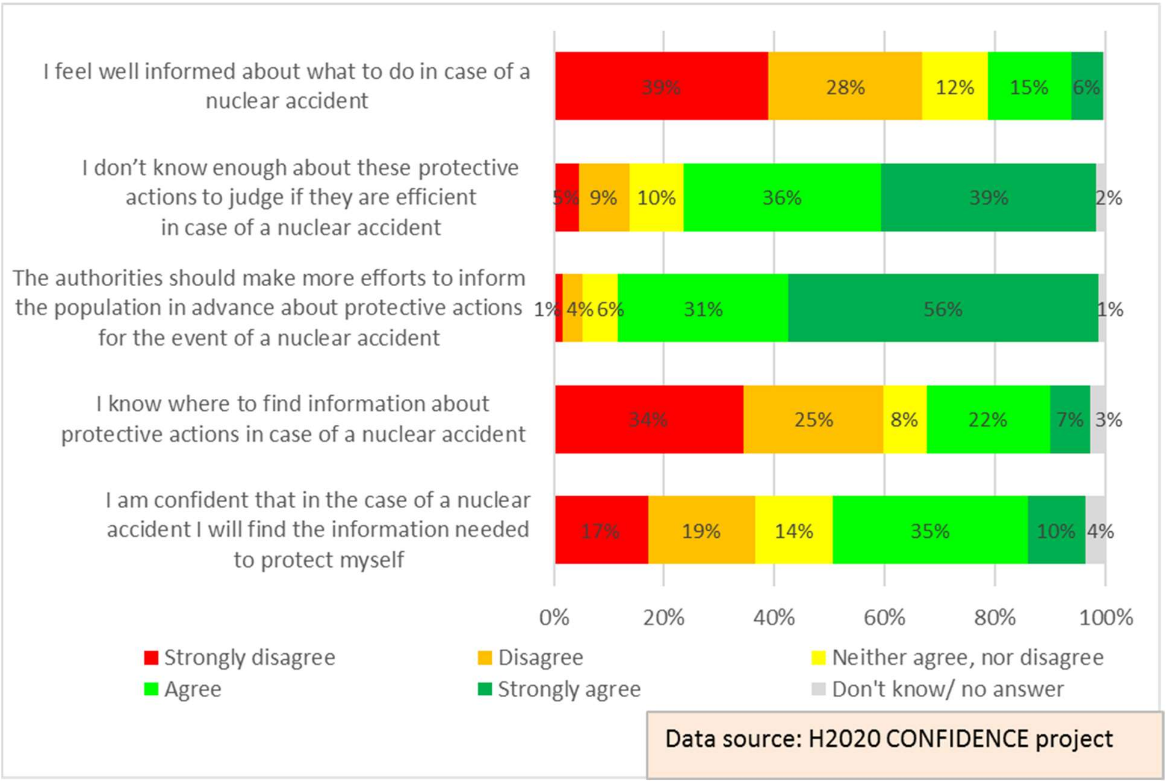

Figure 7 Satisfaction with information concerning protective actions in case of a nuclear accident (N=1083, sample weighed with age, gender, education, province)

IV.7 Trust in information sources in case of an accident

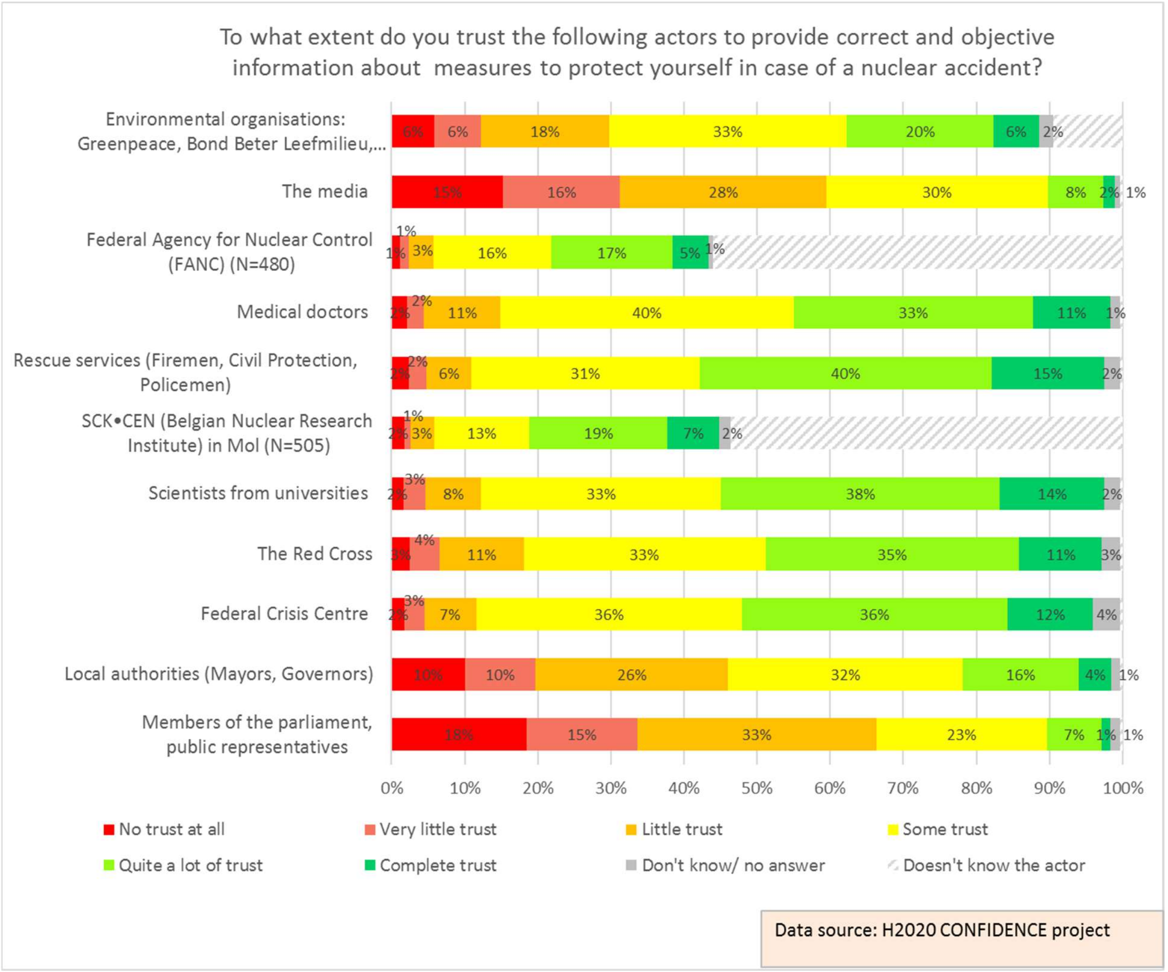

Figure 8 Trust in information sources concerning protective actions in case of a nuclear accident (N=1083, sample weighed with age, gender, education, province)

Results show that rescue services and scientists from universities enjoy high trust from more than half of the population; a high number of respondents also express their trust in the Federal Crisis Centre, the Red Cross and medical doctors. The media and the politicians are distrusted by more than half of the population, while local authorities enjoy a high level of trust from 20% of the population.

As for the nuclear safety authorities and the nuclear research institute, there are more respondents who trust than distrust them, but these actors are unknown to more than half of the respondents, showing that safety authorities and research institutions should take a more active communication role in the preparedness phase.

IV.8 Awareness of the purpose of iodine tablets in case of a nuclear accident

At the time of the survey, 56% of the Belgian citizens were aware of the previous iodine distribution campaign, while 43% said they were not, and 1% did not know. The 208 respondents who said they lived closer than 20 km from a nuclear installation were also asked if they had the iodine tablets at home: 52 said they had these tablets, while 154 said they did not and two respondents did not know.

When asked if they would like to have the tablets even if they live outside of the preventive distribution zone, 65% of the N=1083 respondents answered they did, while 31% said they did not want to have the tablets at home if they live outside of the distribution area[1].

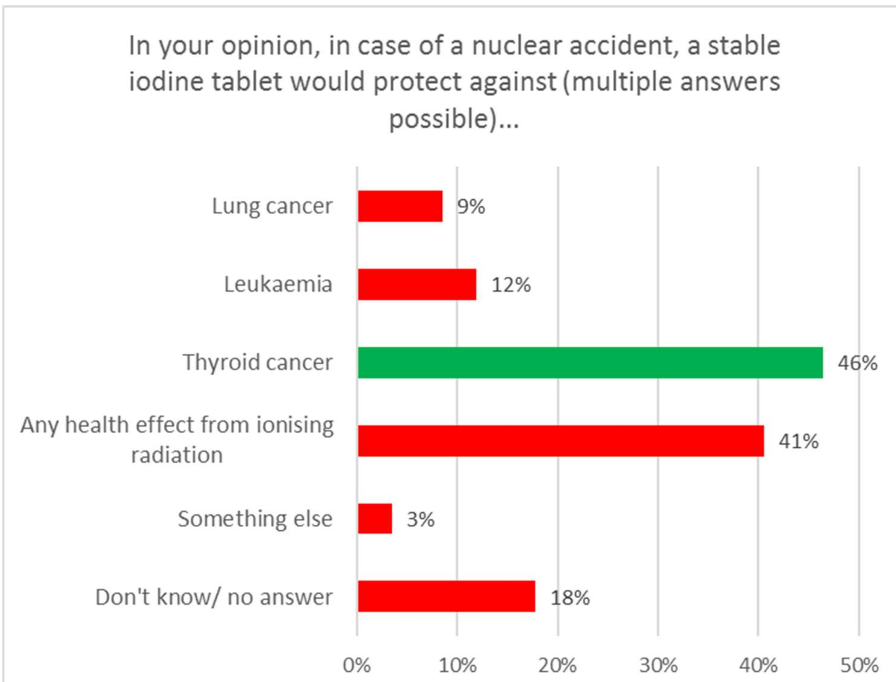

Figure 9 Perceived protective function of stable iodine tablets (N=1083, sample weighed with age, gender, education, province)

When asked what would an iodine tablet protect against, 46% indicated thyroid cancer, while 41% said they believed that the tablets protect against any health effect due to ionizing radiation. The purpose of the iodine tablets has thus to be an attention point in both the preparedness and the crisis communication.

[1] The latest stable iodine preventive distribution campaign was launched by the Belgian authorities very soon after the data collection for this survey, the distribution radius being increased from 20 km to 100 km around nuclear installations in Doel and Tihange.

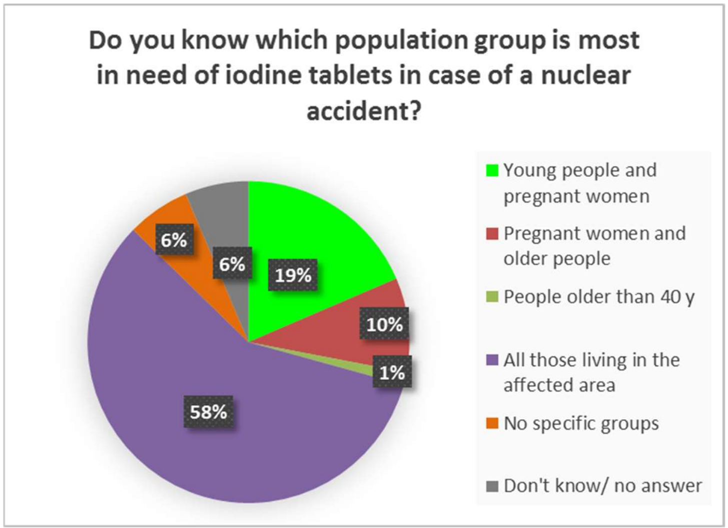

Figure 10 Perceived vulnerable population groups most in need of iodine tablets (N=1083, sample weighed with age, gender, education, province)

Furthermore, while 19% know that young people and pregnant women are most in need of iodine tablets, more than half of the respondents estimate that all those living in the affected area are most in need of iodine tablets.

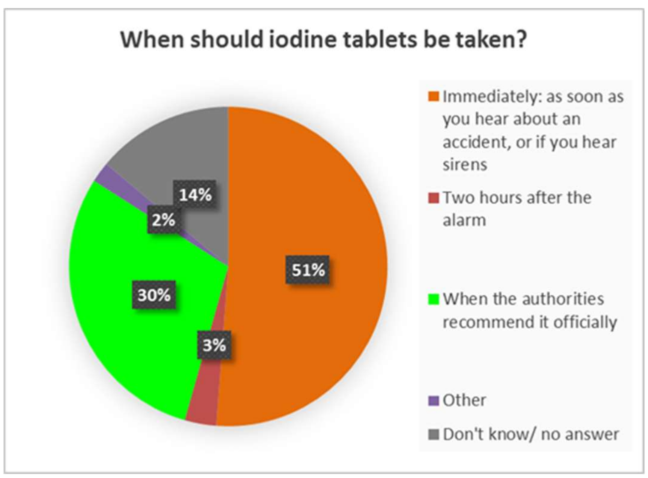

Figure 11 Awareness of the proper time to take iodine tablets (N=1083, sample weighed with age, gender, education, province)

In general, there is low awareness of the right time when iodine tablets should be taken, with half of the respondents believing that iodine tablets should be taken immediately after a nuclear alert. This indicates a high probability of improper use of iodine tablets and the need to communicate clearly about the issue in the preparedness phase and to regularly evaluate the efficiency of this communication.

IV.9 Preferred communication channels in case of an accident

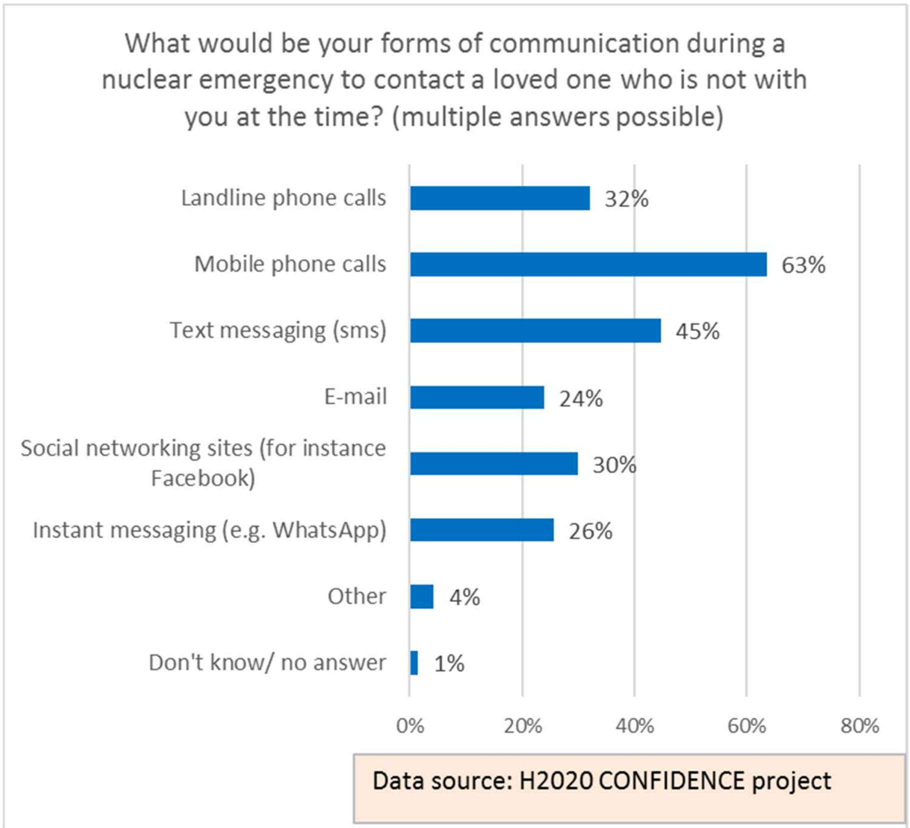

Figure 12 Communication channels that would be used to communicate with relatives and friends (N=1083, sample weighed with age, gender, education, province)

In case of an emergency, people would use different communication means to connect to their close contacts, particularly mobile phones calls or text messaging, and the preferred means of communication for one in two Belgians is mobile phone calls. This poses questions on the reliability of these information channels in case of an emergency. One in four Belgians would also use social media, e-mail or instant messaging.

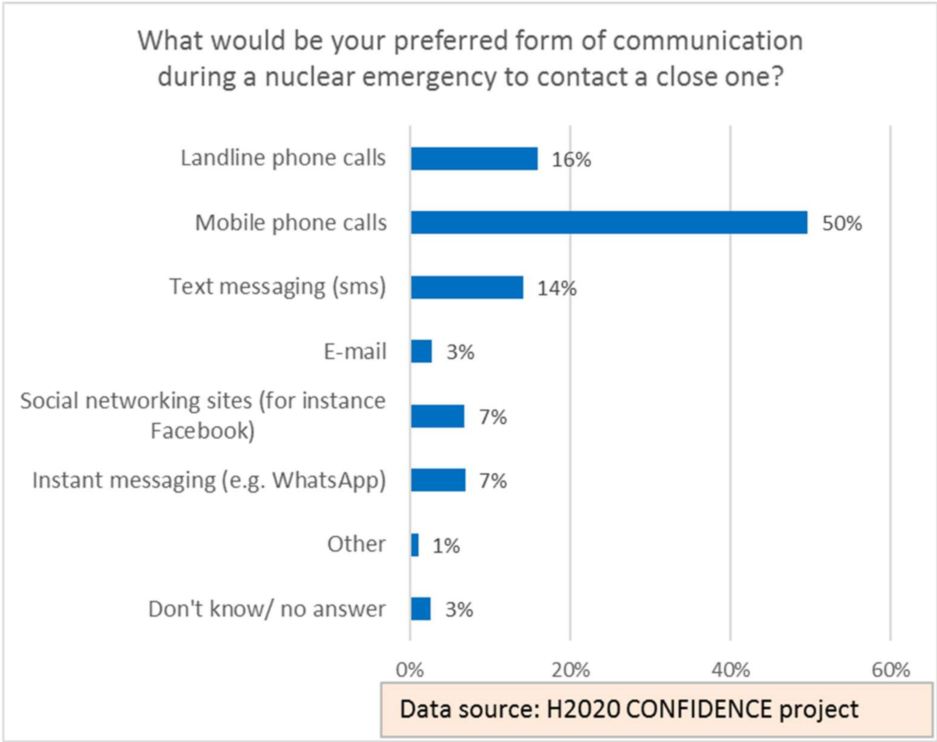

Figure 13 Preferred communication channel to be used to communicate with relatives and friends (N=1083, sample weighed with age, gender, education, province)

Among the different news sources, the general public in Belgium would rely mostly on traditional media (77% TV, 55% radio) but the use of internet sources plays also an important role. Almost half of the respondents said they would use internet sources to inform themselves in case of an accident in a Belgian installation.

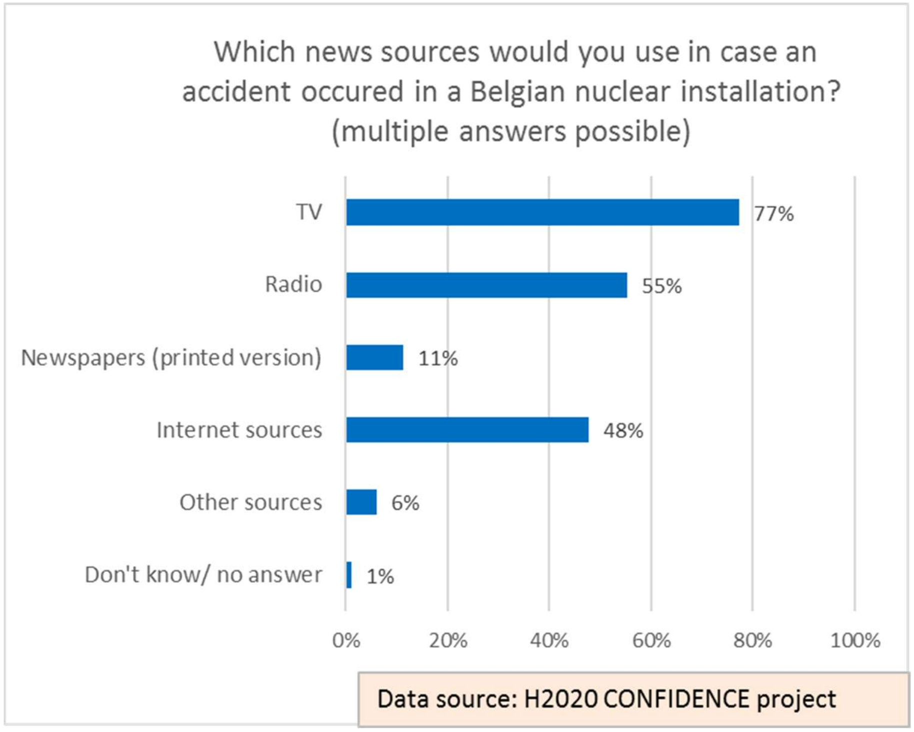

Figure 14 Preferred information channel in case of a nuclear accident (N=1083, sample weighed with age, gender, education, province)

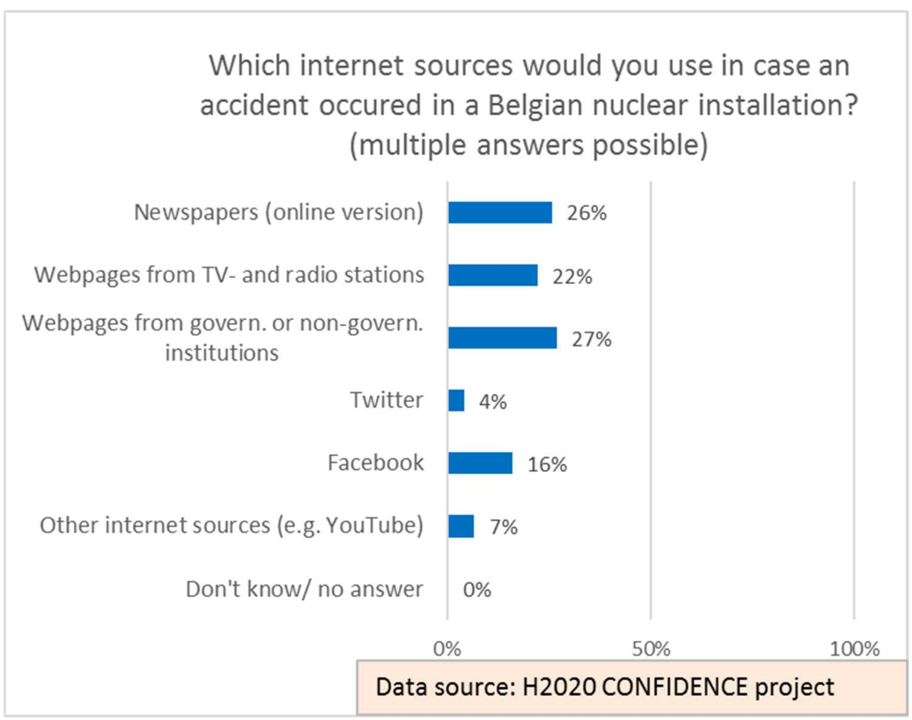

Figure 15 Preferred internet information source in case of a nuclear accident (N=516 who would use Internet sources, sample weighed with age, gender, education, province)

Among the internet sources that would be consulted to acquire information in case of a nuclear accident in Belgium, internet broadcasting of traditional media as well as webpages of governmental and non-governmental institutions. This proves the importance of the latter communication tool and the need to identify the information needs and prepare the relevant communication content already in the preparedness phase, such that it can be immediately available in case of an emergency.

IV.10 Knowledge about ionising radiation

A number of questions probed respondents' knowledge about basic facts related to ionising radiation. The results show that awareness is still rather low, and more than one in four respondents is not aware about the natural radioactivity in human body, the radioactive decay or the difference between irradiation and contamination.

Table 52 Knowledge of ionising radiation

Item	Correct answers (from N=1083, weighed sample)	Incorrect answers (from N=1083, weighed sample)
Does exposure to radiation always lead to radioactive contamination?	36% (no)	54% (yes)
Is radioactive waste produced only by nuclear power plants?	73% (no)	18% (yes)
In your opinion, how is radioactive waste managed?	77% (separately from other waste)	13% (together with other waste)
The human body is naturally radioactive.	41% (agree)	35% (disagree)
With time, every radioactive substance becomes more and more radioactive.	49% (disagree)	27% (agree)
Food sterilisation by irradiation makes food radioactive	28% (disagree)	40% (agree)

Two more items measured perception of radiation risks as a latent variable.

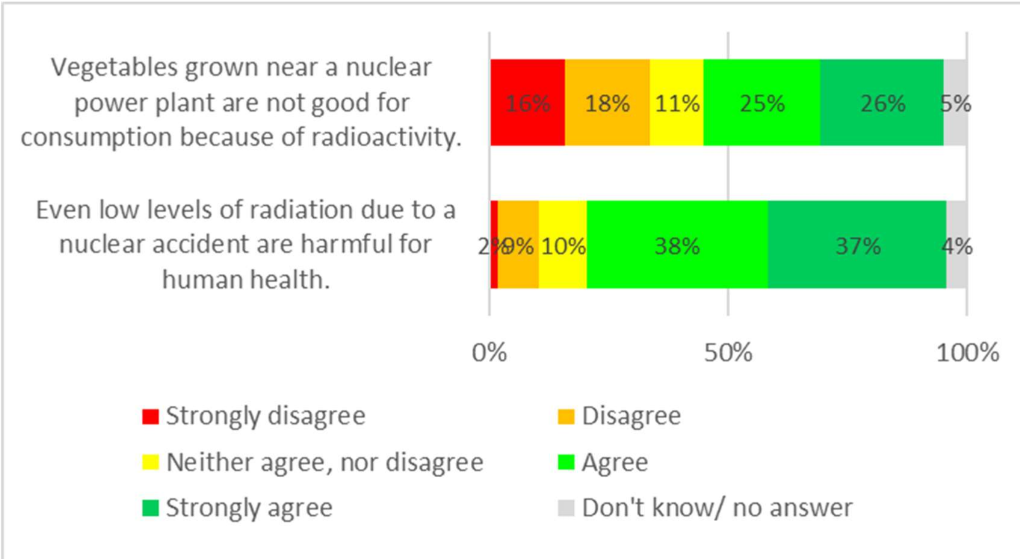

Figure 16 Perception of radiation risk measured as latent variable (N=1083, sample weighed with age, gender, education, province)

The results show that even in the absence of accidental releases, the general public has a high risk perception of radioactivity in the environment.

IV.11 Experience with nuclear

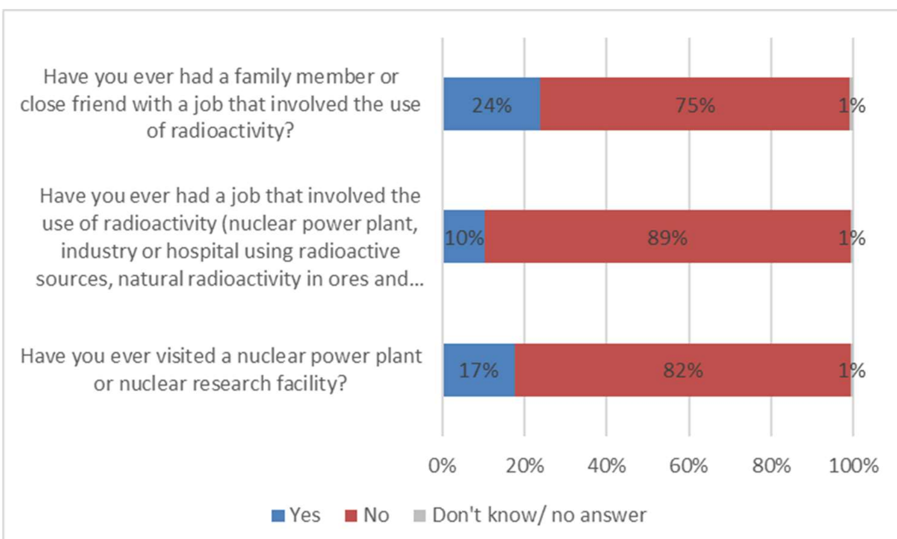

Figure 17 Experience with the nuclear field (N=1083, sample weighed with age, gender, education, province)

This shows that the general public has very little experience with ionising radiation. Therefore, more interaction should be encouraged with the society, for instance by organising open door days, but also supporting citizen science in the preparedness phase.

V. Conclusions and suggestions for good practice

Environmental pollution and potential misuse of nuclear technologies are the highest ("very high" or "high") perceived risks among the risks investigated (radiological and chemical risks). A majority of the respondents expresses concern regarding the vulnerability of nuclear installations to terrorism. Public information should therefore include information on safety and security issues related to nuclear technologies, for instance related to safeguards programmes.

One in two respondents also considered personal risks from an accident in a nuclear installation as high or very high. However, the confidence in authorities as regards protective actions taken against radiological risks is also among the highest, with one in three citizens (32%) having a high or very high level of confidence in authorities. This suggests that authorities can build high trust from the citizens, by communicating proactively and responding to people's concerns, for instance by regular public information campaigns related to nuclear emergencies as carried out in Belgium.

Opinions concerning the safe management of nuclear installations are divergent. For instance, 31% disagree that there is insufficient control on nuclear installations, while 40% agree with the statement that there is sufficient control. In Belgium the survey followed a series of incidents at nuclear installations, for instance micro-cracks in some installations and sabotage in one unit. This result accentuates the need for transparent communication about the management of nuclear installations, including the related challenges.

The most trusted communicators about risks and benefits of nuclear technologies are scientists from universities, medical doctors and environmental organisations. In terms of technical competence, scientists from universities and medical doctors enjoy the trust from highest numbers of respondents. A good practice in nuclear emergency communication for nuclear safety authorities is thus to engage with actors already in the preparedness phase.

70% of people in Belgium acknowledge that they live closer than 50 km to the nearest nuclear installation. This implies that they would feel affected in case of an accident and constitute a target for communication about emergency preparedness. Relatively few respondents (21%) feel well informed about what to do in case of a nuclear accident and a majority (75%) say they do not know enough to judge the efficiency of protective actions (such as for instance sheltering or intake of iodine tablets). A large majority (87%) are of the opinion that the authorities should do more to inform the population in advance about protective actions that can be taken in the event of a nuclear accident. A good practice is thus to carry out regularly surveys assessing the needs for and satisfaction with information about emergency preparedness, to carry out regular information campaigns addressing the needs of specific groups, to assess the impact of information campaigns, and to make available on a permanent basis (e.g. website) information about protective actions.

Rescue services and scientists from universities enjoy high trust related to information concerning protective actions in case of a nuclear accident from more than half of the population; a high number of respondents also express their trust in the Federal Crisis Centre, the Red Cross and medical doctors. A good practice is to integrate first respondents and humanitarian organisations in the nuclear emergency communication chain, including exercises and emergency plans. Media and politicians are distrusted by more than half of the Belgian population, while local authorities enjoy a rather high level of trust from 20% of the population. Safety authorities are trusted but not very well known; therefore, a good practice is to communicate on a continuous basis who they are and what they do.

In general, there is low awareness related to the intake of iodine tablets - specifically the right time when iodine tablets should be taken, with half of the respondents believing that iodine tablets should be taken immediately after a nuclear alert. A good practice is thus to address in communication campaigns the use and purpose of these tablets and the needs of specific population groups.

The preferred communication channel for personal communication between family members and friends during a nuclear emergency would be the mobile phone, although the use of mobile phones is discouraged by authorities in case of an emergency. This shows that several information tools or channels have to be used, including prior information concerning family reunions.

In addition, knowledge about ionizing radiation is rather low: e.g. every second person in Belgium thinks that exposure to radiation always lead to radioactive contamination and one in four does not know about the natural radioactivity in the human body. Such aspects should receive more attention in education curricula in schools and included in the public information campaigns.

VI. References

Fischhoff, B. (1985). Managing risk perceptions. Issues in Science and Technology, 2 (1): 83–96

Turcanu, C. O., M. H. El Jammal, T. Perko, G. Baumont, E. Latré, and I. Choffel de Witte (2016). Satisfaction with information about ionising radiation: a comparative study in Belgium and France. Journal of Radiological Protection 36(2): S122.

Annex: Survey items of interest to the project

S 1	Language of the interview Taal van het interview Langue de l'interview	**[PROG: SINGLE ANSWER]** 1. Dutch/ Nederlands /Néerlandais 2. French/ Frans/ Français
S 3	Place of residence (ZIP CODE) Woonplaats van de respondent *(INT: NOTEER POSTCODE)* Lieu de résidence de la personne interrogée *(INT: NOTEZ CODE POSTAL)*	**[PROG: MINIMUM VALUE = 1000, MAXIMUM VALUE = 9992** **PROG: CHECK IF POSTAL CODE EXISTS, IF POSTAL CODE DOES NOT EXIST, ASK S3 AGAIN AND DISPLAY ERROR MESSAGE]** **[PROG: IF SAMPLE_1=2 CHECK POSTAL CODES FROM BOOST]** I_I_I_I [PROG: ERROR MESSAGE DUTCH: "De ingegeven postcode [INSERT S3] kan niet gevonden worden in de lijst van correcte postcodes. Kunt u opnieuw uw postcode ingeven?"] [PROG: ERROR MESSAGE FRENCH: "Le code postal introduit [INSERT S3] ne se trouve pas dans la liste des codes postaux corrects. Pouvez-vous répéter votre code postal ?"]
S 4	Year of birth Geboortejaar *(INT: NOTEER GEBOORTEJAAR)* Année de naissance *(INT: NOTEZ L'ANNÉE DE NAISSANCE)*	**[PROG: MINIMUM VALUE = 1900, MAXIMUM VALUE = 2017** **IF HIGHER THAN 1999, TERMINATE]** I_I_I_I
S 5	What is the highest diploma you have obtained? Wat is uw hoogst behaalde diploma? *(INT: TOON KAART – 1 ANTWOORD)* Quel est le plus haut diplôme obtenu	**[PROG: SINGLE ANSWER]** 1. Primary school or no education 2. Lower secondary-general 3. Higher secondary – general 4. Lower secondary – technical or arts

	? *(INT: MONTREZ CARTE – 1 RÉPONSE)*	5. Higher secondary –technical or arts 6. Lower secondary- vocational 7. Higher secondary – vocational 8. Higher non-university 9. University (including PhD degree) 1. Lager onderwijs of geen scholing 2. Secundair - algemeen (ASO) lager 3. Secundair - algemeen (ASO) hoger 4. Secundair - technisch of artistiek (TSO of KSO) lager 5. Secundair - technisch of artistiek (TSO of KSO) hoger 6. Secundair - beroeps (BSO) lager 7. Secundair - beroeps (BSO) hoger 8. Hoger - niet universitair 9. Hoger – universitair (inclusief PhD) 1. Primaire ou sans éducation 2. Secondaire inférieur - général 3. Secondaire supérieur - général 4. Secondaire inférieur - technique ou artistique 5. Secondaire supérieur - technique ou artistique 6. Secondaire inférieur - professionnel 7. Secondaire supérieur - professionnel 8. Supérieur - non universitaire 9. Supérieur – universitaire (PhD inclus)
S 6	What is your current occupation? Wat is uw huidig beroep? *(INT: TOON KAART - 1 ANTWOORD)* Quelle est votre profession actuelle ? *(INT: MONTREZ CARTE - 1 RÉPONSE)*	**[PROG: SINGLE ANSWER]** 1. Self-employed 2. Employee 3. Worker 4. Housewife 5. Retired 6. Unemployed 7.Student (including PhD student) 8. Other, non-active

		9. No response 1. Zelfstandige 2. Bediende 3. Arbeider 4. Huisvrouw/man 5. Gepensioneerd 6. Werkloos / werkzoekend 7. Student 8. Andere, niet actief 9. Geen antwoord 1. Indépendant 2. Employé 3. Travailleur 4. Femme/homme au foyer 5. Retraité 6. Chômeur 7. Etudiant 8. Autre, non actif 9. Pas de réponse
S 7	How many family members are presently living in your household (including yourself)? Children living in lodgings who come home during the weekend also count as a household member. Met hoeveel van uw gezinsleden woont u momenteel samen (inclusief uzelf)? Kinderen op 'kot' die in het weekend naar huis komen tellen ook mee als gezinslid. Combien de membres compte votre ménage, y compris vous-même ? Les enfants en kot qui reviennent le week-end à la maison comptent également comme membres du ménage.	**[PROG: NUMERIC, MINIMUM VALUE = 1, MAXIMUM VALUE = 20]** I_I_I
S 8	And how many of those are children	**[PROG: ASK IF S7 >1, MINIMUM VALUE**

	of 16 years old or younger? Hoeveel daarvan zijn kinderen jonger dan 16 jaar? Combien d'enfants de 16 ans ou moins compte votre ménage ?	**= 0 MAXIMUM VALUE = 20]** **[PROG: ANSWER S8 MUST BE SMALLLER THAN S7, IF NOT SHOW ERROR MESSAGE]** I_I_I [PROG: ERROR MESSAGE DUTCH: "Dit aantal is groter dan het totaal aantal gezinsleden, gelieve dit te controleren."] [PROG : ERROR MESSAGE FRENCH: "Le nombre est supérieur au total des membres du ménage, veuillez vérifier."]

Q2.1. I will now read out a list of domains, among which some may pose higher health risks than others. How do you perceive the potential risk <u>to your health within the next 20 years</u> from each of the following sources?

Ik zal u nu een lijst voorlezen met domeinen, waarvan het ene een groter gezondheidsrisico kan vormen dan het andere. Kunt u hieronder aangeven hoe u het potentiële risico voor **uw eigen gezondheid** in de komende 20 jaar inschat met betrekking tot de volgende domeinen?

INT: TOON KAART

Je vais vous lire une série d'éléments dont certains peuvent présenter plus de risques pour la santé que d'autres. Dans quelle mesure chacun des éléments, selon vous, comporte un risque pour **votre propre santé** dans les vingt prochaines années ?

INT: MONTREZ CARTE

<table>
<tr><td>RPP 1</td><td>Environmental pollution
Milieuvervuiling
La pollution environnementale</td><td rowspan="9">[PROG: SCALE FOR EACH ITEM - SINGLE ANSWER PER ITEM]
1. No risk at all
2. Very low
3. Low
4. Moderate
5. High
6. Very high
9. Don't know / no answer

1. Geen enkel risico
2. Zeer laag
3. Laag
4. Gemiddeld
5. Hoog
6. Zeer hoog
9. Weet niet/geen antwoord

1. Aucun risque
2. Très faible
3. Faible
4. Moyen
5. Elevé
6. Très élevé
9. Ne sais pas, pas de réponse</td></tr>
<tr><td>RPP 2</td><td>Radioactive waste
Radioactief afval
Les déchets radioactifs</td></tr>
<tr><td>RPP 3</td><td>Chemical waste
Scheikundig afval
Les déchets chimiques</td></tr>
<tr><td>RPP 4</td><td>An accident in a chemical installation
Een ongeval in een scheikundige installatie
Un accident dans une installation chimique</td></tr>
<tr><td>RPP 5</td><td>An accident in a nuclear installation
Een ongeval in een nucleaire installatie
Un accident dans une installation nucléaire</td></tr>
<tr><td>RPP 7</td><td>Natural radiation (from the ground, such as. radon, or from space)
Natuurlijke straling (straling uit de grond, bv. radon, of uit de ruimte)
Les rayonnements naturels (rayonnement provenant du sol, par example radon, ou rayonnement cosmique)</td></tr>
<tr><td>RPP 8</td><td>Medical X-rays
Röntgenfoto's in de geneeskunde
Les radiographies médicales</td></tr>
<tr><td>RPP 10</td><td>Residues of radioactivity in food
Restanten van radioactiviteit in de voeding
Les résidus de radioactivité dans l'alimentation</td></tr>
<tr><td>RPP 11</td><td>Misuse of nuclear technologies by terrorists</td></tr>
</table>

	Het misbruik van nucleaire technologieën door terroristen L'abus des technologies nucléaires par des terroristes.	

Q 2.2. How much confidence do you have in the (national) authorities for the actions they undertake to protect the population against risks from each of the following sources?
Hoe groot is uw vertrouwen in de autoriteiten voor de maatregelen die ze neemt om de bevolking te beschermen tegen risico's in elk van de volgende domeinen?
INT: TOON KAART
Quel niveau de confiance accordez-vous aux mesures que les autorités prennent pour protéger la population contre les risques liés aux éléments suivants ?
INT: MONTREZ CARTE

RC 1	Environmental pollution Milieuvervuiling La pollution environnementale	**[PROG: SCALE FOR EACH ITEM - SINGLE ANSWER PER ITEM]** 1. Very little 2. Little 3. Moderate 4. High 5. Very high 9. Don't know / no answer 1. Zeer laag 2. Laag 3. Gemiddeld 4. Hoog 5. Zeer hoog 9. Weet niet/geen antwoord 1. Très faible 2. Faible 3. Moyen 4. Elevé 5. Très élevé 9. Ne sais pas/ pas de réponse
RC 2	Radioactive waste Radioactief afval Les déchets radioactifs	
RC 3	Chemical waste Scheikundig afval Les déchets chimiques	
RC 4	An accident in a chemical installation Een ongeval in een scheikundige installatie Un accident dans une installation chimique	
RC 5	An accident in a nuclear installation Een ongeval in een nucleaire installatie Un accident dans une installation nucléaire	
RC 7	Natural radiation (radiation from the ground, such as radon, or from space) Natuurlijke straling (uit de grond, bv. Radon, of straling uit de ruimte) Les rayonnements naturels (provenant du sol, par example radon, ou rayonnement cosmique)	
RC 8	Medical X-rays Röntgenfoto's in de geneeskunde Les radiographies médicales	
RC 10	Residues of radioactivity in food Restanten van radioactiviteit in de voeding Les résidus de radioactivité dans l'alimentation	

RC 11	Misuse of nuclear technologies by terrorists Het misbruik van nucleaire technologieën door terroristen L'abus des technologies nucléaires par des terroristes.	

Now we will discuss the management of nuclear technologies. To what extent do you agree or disagree with the following statements?
Laten we het nu hebben over het beheer van nucleaire technologieën. In welke mate gaat u akkoord of niet akkoord met de volgende uitspraken?
INT: TOON KAART
Abordons maintenant le sujet de la gestion des technologies nucléaires. Dans quelle mesure êtes-vous d'accord ou pas d'accord avec les affirmations suivantes ?]
INT : MONTREZ CARTE

[PROG : QUESTION TEXT B :
To what extent do you agree or disagree with the following statements?
In welke mate gaat u akkoord of niet akkoord met de volgende uitspraken?
INT: TOON KAART
Dans quelle mesure êtes-vous d'accord ou pas d'accord avec les affirmations suivantes ?]
INT : MONTREZ CARTE

[PROG: INSERT FOLLOWING ITEMS (1 PER SCREEN AND KEEP QUESTION PER SCREEN) - RANDOMIZE ITEMS]

MN 1	Nuclear reactors in Belgium are operated in a safe manner. Kernreactoren in België worden op een veilige manier uitgebaat. Les réacteurs nucléaires en Belgique sont exploités de manière sûre.	**[PROG: SCALE FOR EACH ITEM - SINGLE ANSWER PER ITEM]** 1. Strongly Disagree 2. Disagree 3. Neither agree, nor disagree 4. Agree 5. Strongly Agree 9. Don't know / no answer 1. Helemaal niet akkoord 2. Eerder niet akkoord 3. Noch akkoord, noch niet akkoord 4. Eerder akkoord 5. Helemaal akkoord 9. Weet niet / geen antwoord
MN 2	There is insufficient control by authorities on the safety of nuclear installations in Belgium. Er is onvoldoende overheidscontrole op de veiligheid van nucleaire installaties in België. Il n'y a pas suffisamment de contrôles de sûreté effectués par les autorités dans les installations nucléaires en Belgique.	
MN 3	In Belgium, radioactive waste is handled in a safe manner. Het radioactief afval in België wordt op een veilige manier beheerd. En Belgique, les déchets radioactifs sont gérés de façon sûre.	

MN 6	I feel well protected against risks from nuclear installations. Ik voel me goed beschermd tegen de risico's van nucleaire installaties. Je me sens bien protégé(e) contre les risques générés par les installations nucléaires.	1. Pas du tout d'accord 2. Plutôt pas d'accord 3. Ni d'accord, ni pas d'accord 4. Plutôt d'accord 5. Tout à fait d'accord 9. Ne sais pas / pas de réponse
MN 7	Nuclear installations in Belgium are vulnerable to terrorism Nucleaire installaties in België zijn kwetsbaar voor terrorisme. Les installations nucléaires en Belgique sont vulnérables au terrorisme.	

[PROG : ASK PART 6 ONLY TO MAIN SAMPLE (NOT BOOST)]
[PROG: SHOW INTRO_PART 6 ON A SEPARATE SCREEN]

INTRO_PART 6:

If you know the following actors can you tell us if you think they are:

- telling the <u>truth</u> about risks and benefits of nuclear technologies and
- <u>technically competent</u> to point out the risks and benefits of nuclear technologies

Wanneer we kijken naar het domein van kernenergie en andere nucleaire activiteiten, kunt u mij zeggen:

a) of u de volgende actoren kent?
b) en indien u ze kent:
   - kunt u ons vertellen of u denkt dat zij de waarheid vertellen over de risico's en voordelen van nucleaire technologieën?
   - of u hen als technisch bekwaam beschouwt om de risico's en voordelen van nucleaire technologieën te duiden?

Si nous considérons maintenant le secteur de l'énergie nucléaire et ses activités, pouvez-vous nous dire :

a) si vous connaissez les acteurs suivants ?
b) si oui :
- Dans quelle mesure êtes-vous d'accord ou non que chacun des acteurs suivants dit la vérité à propos des risques et des bénéfices des technologies nucléaires ?
- Et dans quelle mesure êtes-vous d'accord ou non que chacun des acteurs suivants est techniquement compétent en ce qui concerne les risques et bénéfices des technologies nucléaires ?

Q6.1.

Do you know….?

Wanneer we kijken naar het domein van kernenergie en andere nucleaire activiteiten, kunt u mij zeggen of u de volgende actoren kent.
Kent u…?
Si nous considérons maintenant le secteur de l'énergie nucléaire et ses activités, pouvez-vous nous dire si vous connaissez les acteurs suivants ?
Connaissez-vous …?

[PROG: INSERT FOLLOWING ITEMS (1 PER SCREEN AND KEEP QUESTION PER SCREEN) - RANDOMIZE ITEMS]

1. **[PROG: DO NOT SHOW, AUTOPUNCH CODE 1 YES]** The Belgian government	**[PROG: SCALE FOR EACH ITEM - SINGLE ANSWER PER ITEM]** 1. Yes 2. No
2. Environmental organisations such as Greenpeace or Bond Beter Leefmilieu (NL) / Inter- Environnement Wallonie (FR)	
3. ENGIE Electrabel (former GdF-SUEZ)	
4. **[PROG: DO NOT SHOW, AUTOPUNCH CODE 1 YES]** The journalists	
5. The Federal Agency for Nuclear Control (FANC)	
6. **[PROG: DO NOT SHOW, AUTOPUNCH CODE 1 YES]** Medical doctors	
7. The national agency for radioactive waste and enriched fissile materials (ONDRAF/NIRAS)	
8. SCK·CEN (the Belgian Nuclear Research Institute) in Mol	
9. **[PROG: DO NOT SHOW, AUTOPUNCH CODE 1 YES]** Scientists from Universities	
10. The Belgian nuclear forum	
11. The Federal Crisis Centre	

1. **[PROG: DO NOT SHOW, AUTOPUNCH CODE 1 JA]** De regering	**[PROG: SCALE FOR EACH ITEM - SINGLE ANSWER PER ITEM]** 1. Ja 2. Nee
2. Milieubewegingen, zoals Greenpeace of Bond Beter Leefmilieu	
3. ENGIE Electrabel (vroeger GDF Suez)	
4. **[PROG: DO NOT SHOW, AUTOPUNCH CODE 1 JA]** Journalisten	
5. Het Federaal Agentschap voor Nucleaire Controle (FANC)	
6. **[PROG: DO NOT SHOW, AUTOPUNCH CODE 1 JA]** Geneesheren	
7. De Nationale Instelling voor Radioactief Afval en verrijkte Splijtstoffen (NIRAS)	
8. Het Studiecentrum voor Kernenergie (SCK•CEN) in Mol	

9. **[PROG: DO NOT SHOW, AUTOPUNCH CODE 1 JA]** Wetenschappers uit universiteiten	
10. Het Belgisch nucleair forum	
11. Het federaal Crisiscentrum	

1. **[PROG: DO NOT SHOW, AUTOPUNCH CODE 1 OUI]** Le gouvernement	**[PROG: SCALE FOR EACH ITEM - SINGLE ANSWER PER ITEM]** 1. Oui 2. Non
2. Les associations écologistes, par exemple Greenpeace ou Inter- Environnement Wallonie	
3. ENGIE Electrabel (ancien GDF-Suez)	
4. **[PROG: DO NOT SHOW, AUTOPUNCH CODE 1 OUI]** Les journalistes	
5. L'agence fédérale de contrôle nucléaire (AFCN)	
6. **[PROG: DO NOT SHOW, AUTOPUNCH CODE 1 OUI]** Les médecins	
7. L'organisme national des déchets radioactifs et des matières fissiles enrichies (ONDRAF)	
8. Le Centre d'étude de l'énergie nucléaire (SCK-CEN) à Mol	
9. **[PROG: DO NOT SHOW, AUTOPUNCH CODE 1 OUI]** Les scientifiques des universités	
10. Le Forum nucléaire belge	
11. Le Centre fédéral de Crise	

Q6.2.

If you know the following actors can you tell us if you think they are:

- telling the **truth** about risks and benefits of nuclear technologies and
- **technically competent** to point out the risks and benefits of nuclear technologies

In welke mate gaat u akkoord of niet akkoord met de volgende stelling?

[PROG: INSERT ITEM OF Q6.1 WITH CODE1 IN ITALIC AND BOLD] *vertelt/vertellen de waarheid over de risico's en voordelen van nucleaire technologieën?*

INT: TOON KAART

Dans quelle mesure êtes-vous d'accord ou pas d'accord avec l'affirmation suivante ?

[PROG: INSERT ITEM OF Q6.1 WITH CODE1 IN ITALIC AND BOLD] *dit/disent la vérité à propos des risques et des bénéfices des technologies nucléaires ?*

INT: MONTREZ CARTE

[PROG: SCALE FOR EACH ITEM - SINGLE ANSWER PER ITEM]

1. Helemaal niet akkoord
2. Eerder niet akkoord
3. Noch akkoord, noch niet akkoord
4. Eerder akkoord
5. Helemaal akkoord
9. Weet niet / geen antwoord

1. Pas du tout d'accord
2. Plutôt pas d'accord
3. Ni d'accord, ni pas d'accord
4. Plutôt d'accord
5. Tout à fait d'accord
9. Ne sais pas / pas de réponse

Q6.3.

If you know the following actors can you tell us if you think they are:

- telling the **truth** about risks and benefits of nuclear technologies and
- **technically competent** to point out the risks and benefits of nuclear technologies

In welke mate gaat u akkoord of niet akkoord met de volgende stelling?

[PROG: INSERT ITEM OF Q6.1 WITH CODE1 IN ITALIC AND BOLD] *is/zijn technisch bekwaam om de risico's en voordelen van nucleaire technologieën te duiden?*

INT: TOON KAART

Dans quelle mesure êtes-vous d'accord ou pas d'accord avec l'affirmation suivante ?

[PROG: INSERT ITEM OF Q6.1 WITH CODE1 IN ITALIC AND BOLD] *est/sont techniquement compétent en ce qui concerne les risques et bénéfices des technologies nucléaires ?*

INT: MONTREZ CARTE

[PROG: SCALE FOR EACH ITEM - SINGLE ANSWER PER ITEM]

1. Helemaal niet akkoord
2. Eerder niet akkoord
3. Noch akkoord, noch niet akkoord
4. Eerder akkoord
5. Helemaal akkoord
9. Weet niet / geen antwoord

1. Pas du tout d'accord
2. Plutôt pas d'accord
3. Ni d'accord, ni pas d'accord

4. Plutôt d'accord
5. Tout à fait d'accord
9. Ne sais pas / pas de réponse

AW 25	How close to your home is the nearest nuclear installation, approximately, in km? Hoe dicht bij uw huis staat de dichtstbijzijnde nucleaire installatie, bij benadering, in km? *INT : INDIEN MINDER DAN 1 KILOMETER, GEEF DAN NUL IN* *DRING GOED AAN, EEN BENADERING IS OK.* Où se situe l'installation nucléaire la plus proche de votre domicile, approximativement, en km ? INT : Si moins d'1 kilomètre, indiquez alors zéro Creusez, une estimation est ok **[PROG: IF SAMPLE 2=CODE 1 (DOEL) ASK]** How close to your home is the nuclear installation of Doel, approximately, in km? Hoe dicht bij uw huis staat de nucleaire installatie van Doel, bij benadering, in km? *INT : INDIEN MINDER DAN 1 KILOMETER, GEEF DAN NUL IN* *DRING GOED AAN, EEN BENADERING IS OK.* Où se situe l'installation nucléaire de Doel de votre domicile, approximativement, en km ? INT : Si moins d'1 kilomètre, indiquez alors zéro Creusez, une estimation est ok **[PROG: IF SAMPLE 2 = CODE 2 (TIHANGE) ASK]**	**[PROG: MINIMUM VALUE = 0, MAXIMUM VALUE = 999]** **[PROG: ALLOW DON'T KNOW BUTTON]** I_I_I km

	How close to your home is the nuclear installation of Tihange, approximately, in km? Hoe dicht bij uw huis staat de nucleaire installatie van Tihange, bij benadering, in km? *INT : INDIEN MINDER DAN 1 KILOMETER, GEEF DAN NUL IN* *DRING GOED AAN, EEN BENADERING IS OK.* Où se situe l'installation nucléaire de Tihange de votre domicile, approximativement, en km ? INT : Si moins d'1 kilomètre, indiquez alors zéro Creusez, une estimation est ok	

Q. 7.6. To what extent do you agree or disagree with the following statements concerning protective actions in case of a nuclear accident?
In welke mate gaat u akkoord of niet akkoord met de volgende uitspraken over de beschermingsmaatregelen in het geval van een nucleair ongeval?
INT: TOON KAART
Dans quelle mesure êtes-vous d'accord ou non avec les affirmations suivantes concernant des mesures de protection à mettre en place en cas d'accident nucléaire ?
INT: MONTREZ CARTE

[PROG: INSERT FOLLOWING ITEMS (1 PER SCREEN AND KEEP QUESTION PER SCREEN)]

EI1.	I feel well informed about what to do in case of a nuclear accident Ik voel mij goed geïnformeerd over wat ik moet doen indien een nucleair ongeval zich voordoet Je me sens bien informé sur les actions à entreprendre en cas d'accident nucléaire	**[PROG: SCALE FOR EACH ITEM – SINGLE ANSWER]** 1. Strongly Disagree 2. Disagree 3. Neither agree, nor disagree 4. Agree 5. Strongly Agree 9. Don't know / no answer 1. Helemaal niet akkoord
EI2.	I don't know enough about these protective actions to judge if they are efficient in case of a nuclear accident Ik weet niet voldoende over deze beschermingsmaatregelen om te kunnen oordelen of ze efficiënt zijn in het geval van een nucleair ongeval	

	Je ne connais pas assez ces mesures de protection pour juger de leur efficacité en cas d'accident nucléaire	2. Eerder niet akkoord 3. Noch akkoord, noch niet akkoord 4. Eerder akkoord 5. Helemaal akkoord 9. Weet niet / Geen antwoord
EI3.	The authorities should make more efforts to inform the population in advance about protective actions for the event of a nuclear accident De autoriteiten moeten meer inspanningen doen om de bevolking op voorhand te informeren over beschermingstegenmaatregelen in geval van een nucleair ongeval Les autorités devraient fournir plus d'efforts au préalable pour informer la population des mesures de protection en cas d'accident nucléaire	1. Pas du tout d'accord 2. Plutôt pas d'accord 3. Ni d'accord, ni pas d'accord 4. Plutôt d'accord 5. Tout à fait d'accord 9. Ne sais pas / pas de réponse
EI4.	I know where to find information about protective actions in case of a nuclear accident Ik weet waar ik informatie over de beschermingsmaatregelen kan vinden Je sais où m'informer sur les mesures de protection à prendre en cas d'accident nucléaire	
EI5.	I am confident that in the case of a nuclear accident I will find the information needed to protect myself Ik ben er van overtuigd dat in het geval van een nucleair ongeval ik de nodige informatie zal vinden om mezelf te beschermen. Je suis certain qu'en cas d'accident nucléaire, je pourrais trouver les informations nécessaires pour me protéger.	

Q. 7.7. And to what extent do you trust the following actors to provide correct and objective information about the measures to protect yourself in case of a nuclear accident
In welke mate hebt u vertrouwen in elk van de volgende actoren om u correcte en objectieve informatie te bezorgen over maatregelen om zich te beschermen in het geval van een nucleair ongeval?
INT: TOON KAART
Dans quelle mesure faites-vous confiance à chacun de ces acteurs pour vous fournir des informations correctes et objectives sur les mesures à prendre pour se protéger en cas d'accident nucléaire ?
INT: MONTREZ CARTE

EMA1. **[PROG : DO NOT SHOW IF MAIN SAMPLE AND Q6.1_item 2 IS CODE 2]** Environmental organisations such as Greenpeace or Bond Beter Leefmilieu (NL) / Inter- Environnement Wallonie (FR) / Milieubewegingen, zoals Greenpeace of Bond Beter	**[PROG: SCALE FOR EACH ITEM – SINGLE ANSWER]** 1. No trust at all 2. Very little trust

Leefmilieu/ Les associations écologistes, par exemple Greenpeace ou Inter- Environnement Wallonie	3. Little trust 4. Some trust 5. Quite a lot of trust 6. Complete trust
EMA2. The media / De massamedia/ Les médias de masse	9. Don't know / no answer
EMA3. **[PROG : DO NOT SHOW IF MAIN SAMPLE AND Q6.1_item 5 IS CODE 2]** The Federal Agency for Nuclear Control (FANC) / Het Federaal Agentschap voor Nucleaire Controle (FANC)/ L'agence fédérale de contrôle nucléaire (AFCN)	10. **[PROG: ONLY FOR BOOST]** I don't know this actor 1. Geen vertrouwen 2. Heel weinig vertrouwen 3. Weinig vertrouwen
EMA4. Medical doctors / Geneesheren / Les médecins	4. Redelijk vertrouwen
EMA5. Rescue services (Firemen, Civil Protection, Policemen) / Hulpdiensten (Brandweer, Civiele bescherming, Politie) / Services de sauvetage (Pompiers, Protection civile, Police)	5. Veel vertrouwen 6. Volledig vertrouwen 9. Weet niet / geen antwoord 10. **[PROG: ONLY FOR BOOST]** Ik ken deze actor niet
EMA6. **[PROG : DO NOT SHOW IF MAIN SAMPLE AND Q6.1_item 8 IS CODE 2]** SCK•CEN (the Belgian Nuclear Research Institute) in Mol/ Het Studiecentrum voor Kernenergie (SCK•CEN) in Mol/ Le Centre d'étude de l'énergie nucléaire (SCK•CEN), à Mol	1. Pas du tout 2. Très Peu 3. Peu 4. Plutôt 5. Beaucoup
EMA7. Scientists from Universities / Wetenschappers uit universiteiten/ Les scientifiques des universités	6. Complètement 9. Ne sais pas / pas de réponse
EMA8. The Red Cross/ Het Rode Kruis/ La Croix rouge	10. **[PROG: ONLY FOR BOOST]** Je ne connais pas cet acteur
EMA9. The Federal Crisis Centre/ Het Crisiscentrum/ Le Centre de crise	
EMA10. Local authorities (Mayors, Governors) / Lokale overheid (Burgemeesters, schepenen) / Autorités locales (bourgmestres, échevins)	
EMA11. Members of the parliament, public representatives / Parlementsleden, volksvertegenwoordigers / Parlementaires, représentants	

[PROG: INTRODUCTION INTRO_KI1 ON SEPERATE SCREEEN]

INTRO_KI1.
What follows is a list of questions concerning iodine tablets. On the initiative of the government, in 2011 there was a campaign for the distribution of iodine tablets to people living near a nuclear installation (within 20km).
Nu volgen een aantal vragen over jodiumtabletten. Op initiatief van de overheid heeft er in

2011 een distributie van jodiumtabletten plaats gevonden bij de mensen die in een straal van 20 km rond een nucleaire installatie wonen.
La liste ci-dessous contient des questions sur les comprimés d'iode. En 2011, sur initiative du gouvernement, une campagne de distribution de comprimés d'iode aux personnes vivant dans un rayon de 20 km d'une installation nucléaire a été organisée.

KI1.	Do you know about this distribution? Bent u op de hoogte van deze verdeling? Etes -vous au courant de la distribution des comprimés d'iode ? **[PROG: SINGLE ANSWER]** 1. Yes 2. No 9. DN/NA 1. Ja 2. Nee 9. Weet niet/ geen antwoord 1. Oui 2. Non 9. Ne sais pas / pas réponse
KI2.	**[PROG: FOR MAIN: ASK IF AW25 <=20 KM]** Do you have these iodine tablets at home? Heeft u dergelijke jodiumtabletten bij u thuis? Avez-vous ces tablettes de comprimés d'iode à votre domicile ? **[PROG: SINGLE ANSWER]** 1. Yes 2. No 9. DN/NA 1. Ja 2. Nee 9. Weet niet / geen antwoord 1. Oui 2. Non 9. Ne sais pas / pas réponse
KI3.	**[PROG : ASK ONLY TO MAIN SAMPLE (NOT BOOST)]** Would you like to have these iodine tablets at your place even if you don't live in the area of distribution? Zou u jodiumtabletten bij u thuis willen hebben, zelfs als u niet in de distributie zone

	woont? Aimeriez-vous disposer de comprimés d'iode à votre domicile même si vous ne vivez pas à l'intérieur du périmètre de distribution ? **[PROG: SINGLE ANSWER]** 1. Yes 2. No 9. DN/NA 1. Ja 2. Nee 9. Weet niet / geen antwoord 1. Oui 2. Non 9. Ne sais pas / pas réponse	
KI6	In your opinion, in case of a nuclear accident, a stable iodine tablet would protect against: Waartegen beschermt volgens u een jodiumtablet bij een nucleair ongeval: *INT: TOON KAART* Selon vous, en cas d'accident nucléaire, un comprimé d'iode protège contre: *INT : MONTREZ CARTE*	**[PROG: MULTIPLE RESPONSE]** 1. Lung cancer 2. Leukaemia 3. Thyroid cancer 4. Any health effect from ionising radiation 5. Something else 9. Don't know / no answer **[PROG: EXCLUSIVE]** 1. Longkanker 2. Leukemie 3. Schildklierkanker 4. Alle gezondheidsrisico's van ioniserende straling 5. Andere 9. Weet niet/ geen antwoord **[PROG: EXCLUSIVE]** 1. Le cancer du poumon 2. Leucémie 3. Le cancer de la thyroïde 4. Tous les risques pour la santé liés aux rayonnements ionisants 5. Autre 9. Ne sais pas / pas de réponse **[PROG: EXCLUSIVE]**

EC3	What would be your forms of communication during a nuclear emergency to contact a loved one who is not with you at the time? Welke vormen van communicatie zou u gebruiken tijdens een nucleaire noodsituatie om een dierbare te bereiken die niet bij u is op dat moment? *INT: TOON KAART – MEERDERE ANTWOORDEN MOGELIJK* Quelles formes de communication choisiriez-vous lors d'une urgence nucléaire afin de prendre contact avec un proche qui n'est pas présent dans cette situation ? *INT : MONTREZ CARTE – PLUSIEURS RÉPONSES POSSIBLE* **[PROG: MULTIPLE]** 1. Landline phone calls 2. Mobile phone calls 3. Text messaging (sms) 4. E-mail 5. Social networking sites (for instance Facebook) 6. Instant messaging (eg WhatsApp, etc) 7. Other 9. DN/NA **[PROG: EXCLUSIVE]** 1. Vaste telefoonlijn 2. Mobiele telefoon 3. SMS-bericht 4. E-mail 5. Sociale netwerken (bv. Facebook) 6. Instant bericht (instant messaging) (bv. WhatsApp) 7. Andere 9. Weet niet / geen antwoord **[PROG: EXCLUSIVE]** 1. Téléphone fixe 2. Téléphone portable 3. SMS 4. E-mail 5. Réseaux sociaux (ex. Facebook) 6. Messagerie instantanée (ex. Whatsapp) 7. Autre 9. Ne sais pas / pas de réponse **[PROG: EXCLUSIVE]**

EC4	**[PROG: DO NOT ASK IF EC3 = CODE 9]** What would be your preferred form of communication during a nuclear emergency to contact a loved one who is not with you at the time? Wat zou uw geprefereerde vorm van communicatie zijn tijdens een nucleaire noodsituatie om een dierbare te bereiken die niet bij u is op dat moment? *INT: TOON KAART – 1 ANTWOORD* Quelle serait la forme privilégiée de communication que vous choisiriez lors d'une urgence nucléaire afin de prendre contact avec un proche qui n'est pas présent dans cette situation ? *INT: MONTREZ CARTE – 1 RÉPONSE*

[PROG: SINGLE – ONLY SHOW ANSWERS CHECKED IN EC3] 1. Landline phone calls 2. Mobile phone calls 3. Text messaging (sms) 4. E-mail 5 Social networking sites (for instance Facebook) 6. Instant messaging (eg WhatsApp, etc) 7. Other 9. DN/NA 1. Vaste telefoonlijn 2. Mobiele telefoon 3. SMS-bericht 4. E-mail 5. Sociale netwerken (bijvoorbeeld Facebook) 6. Instant bericht (instant messaging) (bijvoorbeeld WhatsApp) 7. Andere 9. Weet niet / geen antwoord 1. Téléphone fixe 2. Téléphone portable 3. SMS 4. E-mail 5. Réseaux sociaux (ex. Facebook) 6. Messagerie instantanée (ex. Whatsapp) 7. Autre 9. Ne sais pas / pas de réponse

IS4	Which news sources would you use in case an accident would occur in Belgian nuclear installation? Welke nieuwsbronnen zou u gebruiken als er een ongeval in een Belgische nucleaire installatie zou gebeuren? *INT: TOON KAART – MEERDERE ANTWOORDEN MOGELIJK* Quelle(s) source(s) d'information utiliseriez-vous dans le cas d'un accident nucléaire en Belgique ? *INT: MONTREZ CARTE – PLUSIEURS RÉPONSES POSSIBLES*	**[PROG : MULTIPLE RESPONSE]** 1. TV 2. Radio 3. Newspapers (printed version) 4. Internet sources 5. Other sources 9. Don't know / no answer **[PROG: EXCLUSIVE]** 1. TV 2. Radio 3. Kranten (gedrukte versie) 4. Internet bronnen 5. Andere bronnen 9. Weet niet / geen antwoord

		[PROG: EXCLUSIVE] 1. TV 2. Radio 3. Journaux (version imprimée) 4. De sources provenant d'internet 5. Autres sources 9. Je ne sais pas / Pas de réponse **[PROG: EXCLUSIVE]**
IS5	**[PROG: ASK IF IS4 = CODE 4]** En welke van de volgende internetbronnen zou u raadplegen? *INT: TOON KAART – MEERDERE ANTWOORDEN MOGELIJK* Et lesquelles des sources internet suivantes consulteriez-vous ? *INT: MONTREZ CARTE – PLUSIEURS RÉPONSES POSSIBLES*	**[PROG : MULTIPLE RESPONSE]** 1. Kranten (online versie) 2. Webpagina's van TV-zenders en radiostations 3. Webpagina's van (overheids- of niet-overheids) instellingen 4. Twitter 5. Facebook 6. Andere informatiebronnen op het internet (bv. YouTube) 9. Weet niet / geen antwoord **[PROG: EXCLUSIVE]** 1. Journaux (version en ligne) 2. Des pages web de télévision ou de radio 3. Pages internet de différentes organisations (gouvernementales ou non-gouvernementales) 4. Twitter 5. Facebook 6. Autres sites internet (par ex. You-tube) 9. Je ne sais pas / Pas de réponse **[PROG: EXCLUSIVE]**

Q 12.1. The following questions concern nuclear technology in general. What do you think about the following issues:
De volgende vragen hebben betrekking op nucleaire technologieën in het algemeen. Wat denkt u van de volgende kwesties:
INT : TOON KAART

Les questions suivantes font référence aux technologies nucléaires en général. Que pensez-vous des questions suivantes :
INT: TOON KAART

[PROG: INSERT FOLLOWING ITEMS (1 PER SCREEN AND KEEP QUESTION PER SCREEN)]

AW1.	Does exposure to radiation always lead to radioactive contamination? Leidt blootstelling aan radioactieve stralen volgens u-altijd tot radioactieve besmetting? A votre avis, une exposition aux radiations entraîne-t-elle toujours une contamination radioactive ?	**[PROG : SINGLE ANSWER]** 1. Yes 2. No 9. Don't know/ no answer 1. Ja 2. Nee 9. Weet niet/geen antwoord 1. oui 2. non 9. Ne sais pas / pas de réponse
AW2.	Is radioactive waste produced only by nuclear power plants? Wordt radioactief afval volgens u enkel geproduceerd door kerncentrales? A votre avis, les déchets radioactifs sont-ils exclusivement produits par les centrales nucléaires ?	

AW3.	How much of the electricity used in Belgium in 2016 *do you believe* was produced in nuclear plants? Hoeveel van de in België geconsumeerde elektriciteit werd *<u>volgens u</u>* in 2016 in kerncentrales geproduceerd? *INT: TOON KAART* *A votre avis*, quelle proportion de l'électricité utilisée en Belgique en 2016 a été produite par les centrales nucléaires ? *INT : MONTREZ CARTE*	**[PROG : SINGLE ANSWER]** 1. Less than 30 % 2. Between 30-45 % 3. Between 45% - 60% 4. More than 60 % 9. Don't know / no answer 1. Minder dan 30 % 2. Tussen 30-45 % 3. Tussen 45%-60% 4. Meer dan 60 % 9. Weet niet/ geen antwoord 1. Moins de 30 % 2. Entre 30 et 45 % 3. Entre 45% et 60% 4. Plus de 60 % 9. Ne sais pas / pas de réponse

AW 12	In your opinion, how is radioactive waste managed?	**[PROG : SINGLE ANSWER]** 1. Separately from other wastes

	Hoe wordt volgens u radioactief afval beheerd? *INT: TOON KAART* A votre avis, comment sont gérés les déchets radioactifs ? *INT : MONTREZ CARTE*	2. Together with chemical waste 9. Don't know/NA 1. Gescheiden van ander afval 2. Samen met scheikundig afval 9. Weet niet/geen antwoord 1. Séparément des autres déchets 2. Avec les déchets chimiques 9. Je ne sais pas/pas de réponse
AW 14	**[PROG: ASK AW 14 ONLY TO BOOST SAMPLE (NOT MAIN)]** What is the measurement unit for radioactivity? Wat is de meeteenheid voor radioactiviteit? *INT: TOON KAART* Quelle est l'unité de mesure de la radioactivité ? *INT : MONTREZ CARTE*	**[PROG : SINGLE ANSWER]** 1. Watt 2. Becquerel 3. Metres/second 9. Don't know/ NA 1. Watt 2. Becquerel 3. Meter/seconde 9. Weet niet/geen antwoord 1. Le Watt 2. Le Becquerel 3. Le Mètre/seconde 9. Je ne sais pas/pas de réponse

Q 12.2. To what extent do you agree or disagree with the following statements?
In welke mate gaat u akkoord of niet akkoord met de volgende uitspraken?
INT: TOON KAART
Dans quelle mesure êtes-vous d'accord ou pas d'accord avec les affirmations suivantes ?
INT : MONTREZ CARTE
[PROG: INSERT FOLLOWING ITEMS (1 PER SCREEN AND KEEP QUESTION PER SCREEN)]

AW 15	Vegetables grown near a nuclear power plant are not good for consumption because of radioactivity. Groenten die geteeld worden in de buurt van een kerncentrale mogen niet geconsumeerd worden omwille van radioactiviteit. Les légumes cultivés aux alentours d'une centrale nucléaire ne sont pas bons pour la consommation à cause de la radioactivité.	**[PROG : SINGLE ANSWER]** 1. Strongly Disagree 2. Disagree 3. Neither agree, nor disagree 4. Agree 5. Strongly Agree
AW 16	Even low levels of radiation due to a nuclear accident	

	are harmful for human health. Zelfs lage dosissen radioactiviteit ten gevolge van een nucleair ongeval zijn gevaarlijk voor de gezondheid van de mens. Même des doses faibles d'irradiation liée à un accident nucléaire sont nocives pour la santé humaine.	9. Don't know / no answer 1. Helemaal niet akkoord 2. Eerder niet akkoord 3. Noch akkoord, noch niet akkoord 4. Eerder akkoord 5. Helemaal akkoord 9. Weet niet / Geen antwoord 1. Pas du tout d'accord 2. Plutôt pas d'accord 3. Ni d'accord, ni pas d'accord 4. Plutôt d'accord 5. Tout à fait d'accord 9. Ne sais pas / pas de réponse

Q 12.3. Do you agree or disagree with the following statements?
Gaat u akkoord of niet akkoord met de volgende uitspraken?
INT: TOON KAART
Etes-vous d'accord ou pas d'accord avec les affirmations suivantes ?
INT : MONTREZ CARTE

[PROG: INSERT FOLLOWING ITEMS (1 PER SCREEN AND KEEP QUESTION PER SCREEN)]
[PROG: ASK AW 17 ONLY TO BOOST SAMPLE (NOT MAIN)]

AW 17	Natural radioactivity is never dangerous. Natuurlijke radioactiviteit is nooit gevaarlijk. La radioactivité naturelle n'est jamais dangereuse.	**[PROG : SINGLE ANSWER]** 1. Agree 2. Disagree 9. Don't know/no answer 1. Akkoord 2. Niet akkoord 9. Weet niet/geen antwoord 1. D'accord 2. Pas d'accord 9. Ne sais pas / pas de réponse
AW 18	The human body is naturally radioactive. Het menselijk lichaam is van nature radioactief. Le corps humain est naturellement radioactif.	
AW 19	With time, every radioactive substance becomes more and more radioactive. Mettertijd wordt elke radioactieve substantie meer en meer radioactief. Avec le temps, toute substance radioactive devient de plus en plus radioactive.	
AW 20	Food sterilisation by irradiation makes food radioactive. Sterilisatie van voedsel door middel van bestraling maakt voedsel radioactief. La stérilisation d'aliments par irradiation les rend radioactifs.	

AW 21	Visited a nuclear power plant or nuclear research facility? Hebt u ooit een kerncentrale of nucleaire onderzoekinstelling bezocht? Avez-vous déjà visité une centrale nucléaire ou un centre de recherche nucléaire?	**[PROG : SINGLE ANSWER]** 1. Yes 2. No 9.Don't know/ no answer 1. Ja 2. Nee 9. Weet niet/geen antwoord 1. oui 2. non 9. Ne sais pas/ pas de réponse
AW 26	Have you ever had a job that involved the use of radioactivity (nuclear power plant, industry or hospital using radioactive sources, natural radioactivity in ores and other materials …) Hebt u ooit een beroep gehad waarbij u werkte met radioactiviteit (kerncentrale, industrie of een ziekenhuis waar radioactieve bronnen gebruikt werden, of natuurlijke radioactiviteit in ertsen en andere materialen…)? Avez-vous eu un emploi pour lequel vous avez été amené à utiliser la radioactivité (centrale nucléaire, industrie ou hôpital utilisant des sources radioactives, radioactivité naturelle dans les minerais ou autres matériaux …)	
AW 27	Have you ever had a family member or close friend with a job that involved the use of radioactivity? Hebt u ooit een familielid of goede vriend gehad die een	

	beroep had waarbij radioactiviteit gebruikt werd? Un membre de votre famille ou un ami proche de vous a-t-il déjà eu un travail impliquant l'utilisation de la radioactivité ?	

Annex D

DG Energy project: "*Study on good practices in implementing the requirements on public information in the event of an emergency, under the Euratom Basic Safety Standards Directive and Nuclear Safety Directive*"

Project Ref. Ares(2016)7037963

Deliverable D2.1:

Lessons learned from recent nuclear and radiological events in Europe and neighbouring countries

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Date: September 2018
D2.1
Work package 2
ENER/2017/NUCL/SI2.756526

Contents

DISCLAMER:

This report has been produced by the consortium SCK·CEN/Merience under a contract funded by the European Commission. The views, conclusions and positions contained therein are those of its authors and do not represent the views or the official position of the European Commission. The European Commission does not guarantee the accuracy of the data included in this report, nor does it accept responsibility for any use made thereof.

1 Context of the project and objectives

The European Union has developed an advanced legally binding and enforceable framework for nuclear energy grounded on the Spent Fuel and Radioactive Waste Directive (Directive 2011/70/Euratom), a revised Safety Standards Directive (Directive 2013/59/Euratom) and the Directive 2009/71/EURATOM as amended by the Nuclear Safety Directive 2014/87/Euratom. The amended Directive 2014/87/EURATOM takes account of a review of the EU framework on nuclear safety in the light of the Fukushima accident in 2011 and the findings of the EU stress tests. This Directive had to be transposed into Member States' legislation by 14 August 2017. The report concerning the implementation of the directive must be presented to the Commission by 22 July 2020 at the latest. Additionally, the new Basic Safety Standards Directive must be transposed into Member States' national legislation and administrative measures by the 6 of February 2018.

The implementation of these two Directives provides opportunities amongst the EU Member States to review existing procedures and improve implementation measures in the area of public information and transparency requirements in the event of an emergency. Furthermore, Council Decision 87/600/Euratom on Community arrangements for the early exchange of information in the event of a radiological emergency stipulates the arrangements that apply regarding the notification and provision of information whenever a Member State decides to take measures of comprehensive nature in order to protect the general public in case of a radiological emergency.

This study assesses the current practices in public information and transparency in 28 EU Member States under the existing legal requirements, and highlights best practices. Furthermore, the study analyses the way and the extent to which the arrangements are implemented at a practical level, taking into account the points of view of various governmental and local authorities, licensees and other stakeholders. In addition, the planned changes and potential improvements for implementation of the recently adopted Directives to be transposed by the Member States in the near future are considered.

This project has the following objectives:

- Analysis of national legislative provisions and review of standards and guidance supporting the implementation of EU legislation in Member States (focus on the legal framework): i) A legal analysis of the provisions in the applicable EU legislation ii) a review of existing and latest draft international and European level standards and guidance that are available to support the implementation of the legal requirements; assessing their scope, detail and level of practicability and describing possible gaps, iii) a comprehensive survey of the existing legal framework for applying the public information requirements in all the EU Member States.
- Comprehensive overview of public information settings in the 28 EU Member States from the perspective of EU legislation, including public awareness of protective measures and public satisfaction with information (focus on the administrative and organizational aspects): Conducting a comprehensive survey of the existing administrative and organisational framework for applying public information requirements in all 28 EU Member States, specifically examining how these systems, procedures and practices have been set up and would work in practice.
- **Lessons learned from nuclear and radiological accidents:** Reviewing experience from nuclear and radiological accidents worldwide, and examining the evolution of the event and the way public information needs were managed, the lessons learnt and their relevance in the EU context.

- **Learning from non-nuclear hazard industries, non-nuclear requirements and practices:** Collecting experiences from requirements and practices in the European non-nuclear hazard industries, particularly chemical incidents and emergencies and natural disasters, for illustrative purposes. Extending the analysis to comparative requirements and practices in all hazards emergency communication (including industrial – chemical, nuclear, radiological- and natural disaster management – earthquakes, volcano eruptions, tsunami, etc) for illustrative purposes.
- **Collection of stakeholders' views, needs and recommendations:** Evaluating the effectiveness of the existing systems, procedures and practices in Member States at national and regional levels, particularly from a civil society perspective, pointing out the strengths and weaknesses of different approaches. SWOT analysis and case studies including cross-border arrangements and practices for implementing the requirements on public information in the event of an emergency.
- **Establishment of the Reference group:** The aim is to establish the Reference group as the consultative body to provide advice and expertise to the consortium. It will provide input, will be consulted on the work performed and will review the recommendations.

The following figure presents the interaction among the project partners, stakeholders being consulted during the project and the Reference Group. Additionally, it shows the main methods used for collecting information from stakeholder groups as well as the main events where interaction is foreseen.

Figure 1. Interaction among project partners in the project

2 Introduction and methods

Analysing nuclear accidents in the past teaches us lessons about the importance of public information (Perko, 2011). The disaster at the Fukushima nuclear power plant has also shown that there are still gaps to be filled in nuclear and radiological preparedness communication (Utz, Schultz, & Glocka, 2013). There have been increased efforts at international level to identify and formulate emergency management protocols for improving communication (e.g.: IAEA, 2012) and also, for instance, towards integrating social media into existing emergency response systems (e.g.:Wendling. Cécile, Radisch. Jack, & Jacobzone. Stephane, 2013) in addition to scientific attempts to understand the effects of emergency social media use (e.g: Bunce, Partridge, & Davis, 2012). Therefore, implementation of communication in emergency management plans requires clear recommendations, practical advice as well as an experienced and dedicated team.

This report reviews experiences from nuclear and radiological events in Europe and neighbouring countries by examining existing documents and scientific literature (*document analysis*). The documents analyzed include newspaper articles, social media posts, scientific articles, conference presentations, proceedings, emergency reports, log-books of emergencies etc. In addition, a number of interviews were carried out in some cases with spokespersons at the time of the emergency which complement the document analysis. The evolution of how communication and public information was managed, how traditional and social media reported the accident and the lessons learned are analysed for the following nuclear/radiological events:

- alarm in Europe because of the unusual event at the NPP Krško, Slovenia, on 4 June 2008;
- 137Cesium event in a laboratory in Finland (2016)
- event in November 2007 in Ascó I NPP (Spain) originated the release of significant amounts of radioactive particles with activated corrosion product isotopes;
- accidental release of radioactive iodine from a facility producing radioisotopes for medical use, located in Fleurus, Belgium in 2008;
- discharge stack and uranium leak in the Socatri plant, ensuring treatments of nuclear effluents coming from the Areva facilities in the Tricastin nuclear site (France), 2008;
- detection of radioactive iodine-131 at trace levels across Europe (2017);
- detection of a radioactive cloud in Europe with level of Ruthenium-106 up to almost 1,000 times the normal amount (2017).

The last two events are jointly considered under the section entitled “non-emergency events”. The cases above were chosen because they represent the most significant radiological and nuclear events (incidents and accidents) which have occurred in Europe in the last ten years. They also represent events where different INES rating were used to communicate the safety significance of the nuclear or radiological event to the public. The events clearly reveal challenges regarding radiological emergency communication in the new media landscape including broad use of social media by directly or indirectly affected population. Lessons from these cases can be learned in order to strengthen the response of responsible organisations facing the requirements to provide the public with timely, transparent and clear information in any nuclear or radiological event including events that are of public interest but they don’t present any radiological or health related risks. Apart from summarizing the main lessons learned, the good practices and in some cases, recommendations, are also identified and highlighted.

The level of detail provided for each of the events is not the same. In some cases, a full detailed analysis was possible due to previous collection of information (e.g. media articles, interviews, documents, etc) by the first author of this report (e.g. the case of Krsko, Slovenia and Fleurus, Belgium), whilst in other cases the analysis was based on a specific interview and the review of social media posts (e.g. Finland). Furthermore, the event in the Slovenian Krsko nuclear power plant attracted particular attention all over Europe due to the activation of the ECURIE system for the first time since it had been established. This also justifies the special attention given to this incident, which led to numerous enquiries by European media.

When first-hand information was available, this allowed a more thorough analysis compared to other cases where information was only available through secondary sources or through interviews to key actors during the communication of the emergency. For each of the cases analysed, the methods used are described at the beginning of the chapter. The purpose of this report though is not to compare the different cases. Instead, the analysis of the cases is used for illustrative purposes to extract lessons learned with regards to revealing good practices in information provisions during an emergency.

The report also provides an overview of the knowledge collected in different FP7 and H2020 projects related to nuclear emergencies, radiological disaster management (recent security calls) and radiation protection projects (CONCERT calls). The final remarks highlight the main lessons learned regarding communication and transparency which can be extracted from the radiological events occurred in Europe and neighbouring countries over the last ten years. Finally, the conclusions chapter presents a short analysis that extracts the main lessons learned in relation with the effectiveness of the implementation of public information provisions, highlighting the good practices identified.

3 Unusual Event at the NPP Krško, Slovenia, on 4th of June 2008 (INES 0)

This chapter mainly summarizes the research based on the paper “Media Reporting of Nuclear Emergencies: The Effects of Transparent Communication in a Minor Nuclear Event” (Perko, Turcanu, & Carlé, 2012). The analysis in this chapter is based on a comprehensive content analysis of media articles related to this event. Other documents and newspaper articles, apart from the ones used in the above cited paper, are also included in order to draw lessons learned regarding public information and transparency in the case of a nuclear incident.

3.1 Description of the emergency event

On June 4, 2008, a minor nuclear event occurred at the NPP Krško in Slovenia. The event (a water leak from the primary system) was classified as “unusual” but did not require any protective measures outside the plant. There were no releases of radioactivity to the environment (European Commission, 2008). However, as the full circumstances of the event were not known at the outset of the event, the Slovenian Nuclear Safety Authority (SNSA) decided to partially activate its emergency organization and to initiate international communications by informing the European Commission, the International Atomic Energy Agency (IAEA) and the neighbouring countries. Activation of National Nuclear Emergency Response Plan in Slovenia is not necessary for an event of such minor level, but the SNSA decided to partially activate the emergency response organization. The head of the latter argued that "Leakage from the primary system was relatively small and stable, but at that moment the reason for leakage was not known and possible increase of leakage could lead to a more serious event of the loss of primary coolant" (Stritar, 2009).
The European Community Urgent Radiological Information Exchange (ECURIE) system was used for the first time outside the exercise framework, and therefore gave rise to unprecedented media and political attention throughout Europe. Aside from the previously mentioned points, communication mistakes were made. When SNSA reported the event to the neighbouring states and IAEA, they forgot to cross out the word “exercise” on the form. The mistake was corrected by telephone in a couple of minutes. When the SNSA reported the event to ECURIE they inappropriately used the word LOCA (loss of coolant accident) which is a much worse accident than leakage from the primary circuit. This mistake was also corrected by telephone in 17 minutes. The event was later classified as level zero on the INES scale.

3.2 Public information and information to the international community

SNSA informed the public in Slovenia and abroad in the first hour. Slovenia is a signatory of the Convention on Early Notification of a Nuclear Accident and also of bilateral agreements with neighbouring countries, which refer to the early notification in case of a radiological emergency. As an EU Member State, Slovenia is as well liable to report to the European Commission and through this to all member states in the EU in the framework of ECURIE system. All these agreements prescribe an early notification when it comes to a situation when the state should take measures for the protection of its citizens.
The timeline of the event in the table below shows the sequence of public information and measures taken during an emergency management process.

Table LIII: Timeline of the nuclear emergency event in Slovenia, 2008

4. 6. 2008:
15.07 Operators observed leakage in the reactor building (~3 m3/h) 15.56 “Unusual event” declared - Level 0 emergency Controlled shutdown initiated - 5 MW/min 16:09 Slovenian Nuclear Safety Agency was informed by NPP Krško 16:27 Emergency response team was activated 17:38 Alert message was sent to ECURIE, indicating that the leak is inside containment 18:17 First message for domestic media was distributed 18:35 to 19:00 EMERCON messages to IAEA, Austria, Hungary, Croatia and Italy (Word EXCERCISE from the template was not deleted – IAEA called immediately and corrected) 18:39 ECURIE system distributed message to other countries 19:00 EC issued media statement about the event in Slovenia 19:50 Reactor shut down, cool down and depressurization continued 21:20 SNSA notified ECURIE: reactor is shut down 21:20 ECURIE second media update – "End of event" 21.36 European Commission issued media statement about "End of event".
5.6.2008
Morning: According to director of SNSA approx. 50 media vans in front of the NPP 10: 00 Report of Slovenian Minister for environment and spatial planning at EU Meeting of (environment) ministers in Luxemburg, 11:00 SNSA, press conference 12:00 NPP, press conference Afternoon: Greenpeace at SNSA
9.6.2008
Slovenia reported at OECD/NEA CNRA, Oslo, 9. 6. 2008 about the event 15.30 NPP Krško back in full operation and back in electricity supplying system

3.3 Media response

Despite the low level of emergency significance (level zero on the INES scale) and the transparent communication policy of the Slovenian nuclear safety authorities, this event triggered a high intensity of media coverage. This was the first time that the European ECURIE notification system was used outside the exercise framework. Consequently, this event was considered newsworthy and thus reported in the media all around Europe (informative and daily press). The content of the news varied from country to country.

3.4 Transparency questioned

The question of transparency was largely present in the media coverage of the NPP Krško breakdown since some mistakes were made on the level of communication. Despite open and timely communication by the nuclear safety authority, the transparency of radiological measurements was questioned, mainly due to a temporary communication mistake. SNSA corrected its communication mistake in 17 minutes, but it was already too late. The media reported that Slovenia and Croatia had not properly informed even their own citizens about the events in Krško. A real impetus for the topic of hiding of an accident occurred when German environmentalists found out that on the pages of SNSA, the radiation peaks appeared a day before the reported breakdown. Even though the increased radioactivity was caused by a storm, which makes the radioactive particles from the higher layers of atmosphere wash away towards the ground, the story about Slovenians hiding the radioactive release was in accordance with the memory of the Chernobyl accident. The table below presents selected extracts from media articles with exact wording, as published in newspapers after the event. The wordings published in different newspaper articles show: i.) doubts in transparency, ii.) improper public information, or iii.) hiding of an increased level of radioactivity.

Table II. Selected media extracts questioning transparency and information

Doubts in Slovenian transparency on reporting the true nature of the event in Krško	Improper informing of the inhabitants in Slovenia and Croatia	Hiding of an increased level of radioactivity
"Perhaps there wasn't only a breakdown, but also a huge secret going on" (Bauer, 2008). "Europe is on their feet due to the wrong information, perhaps even hiding of the accident" (Jankovič, 2008). The mistake in the information "threw a bad light on the credibility of Slovenia, which is not very appreciated by its neighbors, especially the Northern ones, anyway" (Pucelj, 2008). "What is "really" going on in the nuclear power plant? What are the Slovenes hiding" (Pucelj, 2008)? " … we are well aware that only time will show what really happened and what consequences could the breakdown have to our health and environment" (Il Piccolo, 2008f). " … the exact causes that determined the incident have to be explained" (Il Piccolo, 2008e). "Even though the mistake was discovered and repaired in a couple of minutes, this was enough for some to raise	In Slovenia "a part of inhabitants got informed about the breakdown only yesterday from the international reporters, which appeared in the vicinity …" (Il Piccolo, 2008h). " … media is already for the second day looking for a guilty one among the responsible Croatian services, which until Wednesday late in the evening haven't been informing the domestic public, which was therefore mainly dependent on the information from foreign media" (Kajzer, 2008). "The Croatians were angrier on their own authorities than on the Slovene ones, since their own authorities published an official notification about the event in NPP Krško only after 10pm" (Nedelo, 2008b).	" … there were peaks on the radiation monitors around the NPP Krško already a day before the event" (Zore in Švagelj, 2008). The measuring device at Skopice "has detected an increased level of radioactivity …. already 20 hours before the breakdown of NPP Krško on Wednesday" (Zore in Švagelj, 2008). "… the increased radioactivity the day before was caused by a storm" (Zore in Švagelj, 2008). "The radioactivity increased because of the storm … " (Zore in Švagelj, 2008). "It is a common phenomenon which is not caused by releases from NPP Krško …" (Zore in Švagelj, 2008) "The measurements were conducted a day before … and now they are alluding that we were hiding the results for the whole day" (Zore in Švagelj, 2008). Director of NPP Krško stated that "he doesn't know about the increased level of

doubt about what is really going on" (Bukša, 2008). "Nevertheless they said it themselves that such routine repairs were performed a couple of times in this year. If they haven't been reporting about them until now, why have they done it now" (Dežulović, 2008)? "… concealing of the information about the Krško all this time" (Tence, 2008). "… the hiding of the information" (Mašanović, 2008). A demand that Slovene authority "clarifies the matter without delay" (Mašanović, 2008). The event was marked as a "true Slovene filthiness" (Delo, 2008b).		radioactivity in the vicinity of the plant and that he guarantees that no radiation release has taken place" (Zagorac in Ćurić, 2008).

Media also expressed doubts regarding transparency of information related to radiological effects (Table III). This was present in two forms: firstly, as mistrust in the Slovenian measurements and secondly, in the negation of a radiation release from the NPP Krško based on the radiation measurements by a neighbouring country. Even though there were no indications of any radioactive release in the environment, the strong memory of how the radiation from the Chernobyl was first reported by Sweden led journalists to think that perhaps Italy might be the first one to detect a radioactive release from the NPP Krško.

Table III: Selected media extracts indicating mistrust and negation of a radiation release

Doubts in the Slovenian measurements	Negation of a radiation release in the environment based on additional measurements by a neighbouring state
"There are exceptional controls performed with equipment to monitor the radioactivity in the environment" by Italian authorities at the border with Slovenia (Il Piccolo, 2008i). "The Government will shortly be sending to Trieste a special high-tech device to measure the potential presence of radioactivity" (Garofalo, 2008). In Trieste (Italy) "status is checked every 30 minutes and we are in contact with the Ministry of Interior Affairs…" (Preda, 2008).	"… in Trieste they had apparently activated the whole special monitoring equipment, which did not detect radioactive emissions" (Nedelo, 2008b). "In the municipalities of Trieste and Muggia, which are closest to the border with Slovenia, there were no traces of radioactivity measured ..." (Preda, 2008). "Devices have detected the same level of radioactivity as in the previous days and months" (Barella & Fain, 2008). "… the condition was measured by

	instruments, which gave a negative result …"(Barella & Fain, 2008). "… did not show any radiation …" (Il Piccolo, 2008c).

3.5 Which countries reported about the nuclear event?

Even though the nuclear emergency event at Krško NPP was classified as level zero on the INES scale (i.e. no safety significance), the media response was enormous. The news frequency varied from country to country. The average frequency of published news in media for each state (Fig. 2) allowed to identify the countries with high attentiveness to this nuclear event.

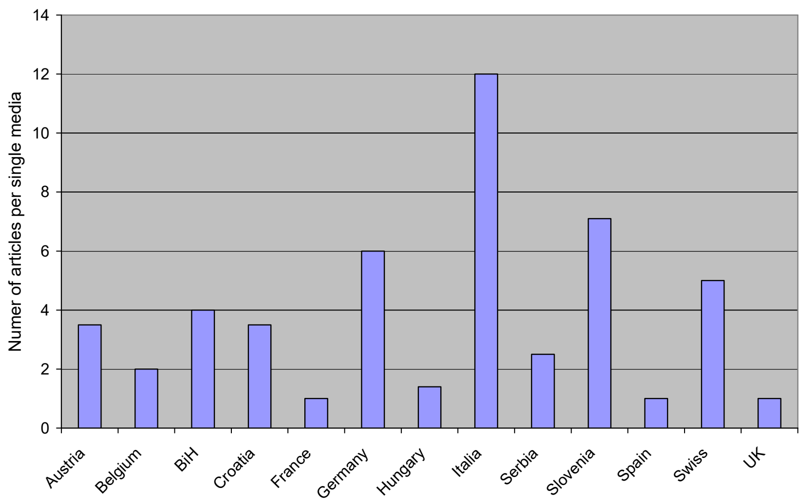

Figure 2: Average frequency of media news in single media per country

The event was most frequently reported in Italian newspapers (12 newspaper articles) followed by Slovenia (7 articles in mass media), Germany (6 newspaper articles) and Switzerland (5 newspaper articles). The states with the lowest frequency of the published articles related to event in Krško (one per newspaper) were France, United Kingdom and Spain. Italy, Slovenia and Germany had different nuclear status, as the public debate related to nuclear program is also quite specific.

The media coverage of the NPP Krško breakdown actually reproduced the debate regarding nuclear power held in each country and had in this way supported the status quo and political order of discourse. The discursive practice of news reporting has therefore been strengthening the hegemonic antinuclear orientation in Austria, the split between the energy policy of right and left wingers in Italy and the questioning of future of new nuclear installations in Croatia and Slovenia. Due to the dependency on the electricity produced by the the NPP Krško, Slovenia and Croatia were also questioning the financial impact that several days of disconnection of NPP Krško from the grid will have on their countries.

3.6 Did the public information sources differ among the countries?

As a rule of thumb, especially when reporting on crisis, reporters are expected to use multiple

sources (Kovach & Rosenstiel, 2007; Wilson, 1996). The primary sources of the information related to problems in NPP Krško were three different notification systems used for notifying different groups of countries. The first one was the National response plan used in Slovenia, in the framework of which Slovenian citizens should be informed about radiological or nuclear emergencies. The second system was the bilateral agreement between Slovenia and the neighbouring countries (Italy, Austria, Hungary and Croatia). The third system was the ECURIE, used to inform all European countries and Switzerland and Croatia. In all three notification and information exchange systems the original source of information was the Slovenian Nuclear Safety Administration (SNSA) as the responsible regulatory body. For other ECURIE states than the neighbouring countries, the European Commission distributed the information, therefore acted as the primary source of information (press release).
The code of journalism assumes that a media article must refer to different sources of information, in order to present several views and depict the event taking different aspects into consideration. Perko at all. (2012) analysed the media sources for each of the following groups of countries separately: Slovenia, neighbouring countries and other ECURIE members (distant countries).

In Slovenia the most quoted media source was the Slovenian Nuclear Safety Authority as origin of information according to the national response plan. As expected, more than 40 % of media news in Slovenia referred to SNSA. Second most quoted source was the operator of the NPP at Krško (quoted in 34% of news), followed by unidentified sources of information. Almost 30% of media news distributed information about the nuclear event without referring to any identified source.

Fig. 3 summarises the media sources for the Slovenian media. It would normally be expected that the local government or the local population from the municipality with the Krško NPP will be highly present in the media, since they are likely to be most affected by a radiological release. Surprisingly, this source of journalistic information was quoted in only few articles in Slovenian media (1% of news).

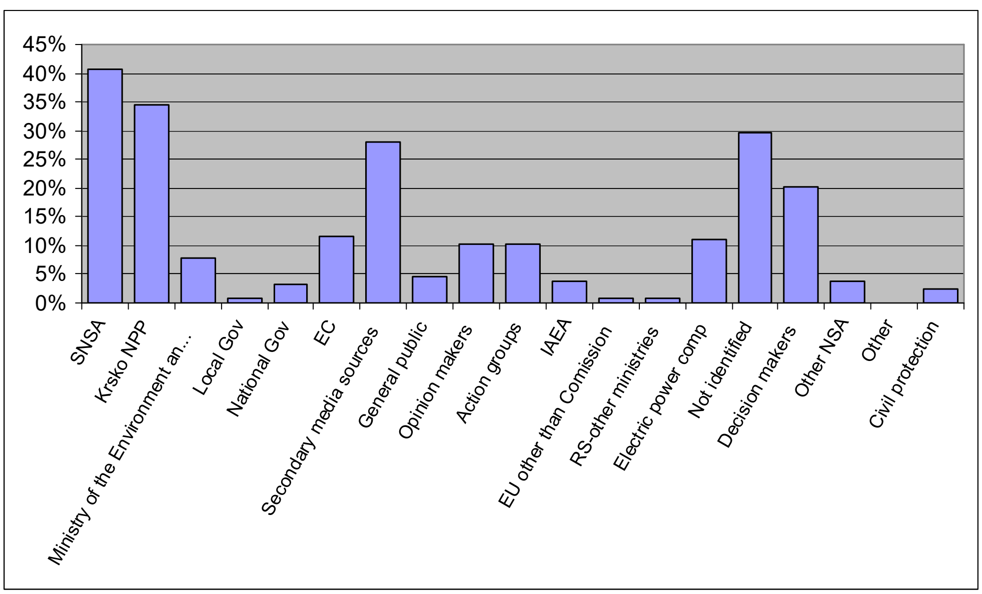

Figure 3: Media sources in Slovenia

In the neighbouring countries - Italy, Austria, Hungary and Croatia- the most quoted source were, by far, the decision makers (see Fig. 3). This category of actors includes politicians and representatives of governments other than Slovenian. 44% of articles published in the neighbouring countries presented the statements of the decision makers. The information or opinion given in the news was usually the opinion of a government or political party, e.g. the E.U. green parliament party. Decision makers were followed by secondary media sources (i.e. reports of other media houses, press agencies or correspondents abroad using "As reported by …").

The original information of SNSA related to the nuclear emergency was presented only in 15% of the articles in these neighbouring states. This is, surprisingly, the same frequency as for the information presented by opinion makers. The category opinion makers include well-known personalities and politicians, scientists whose opinion is considered important enough to be represented separately, either in a full-fledged interview or via quotes. The actors grouped in this category represent themselves rather than an institution or a role attributed to them (the opinion given is that of an individual and not of a group). People from academic institutions also fall into this category when the opinion provided is theirs and not that of the department or division they belong to.

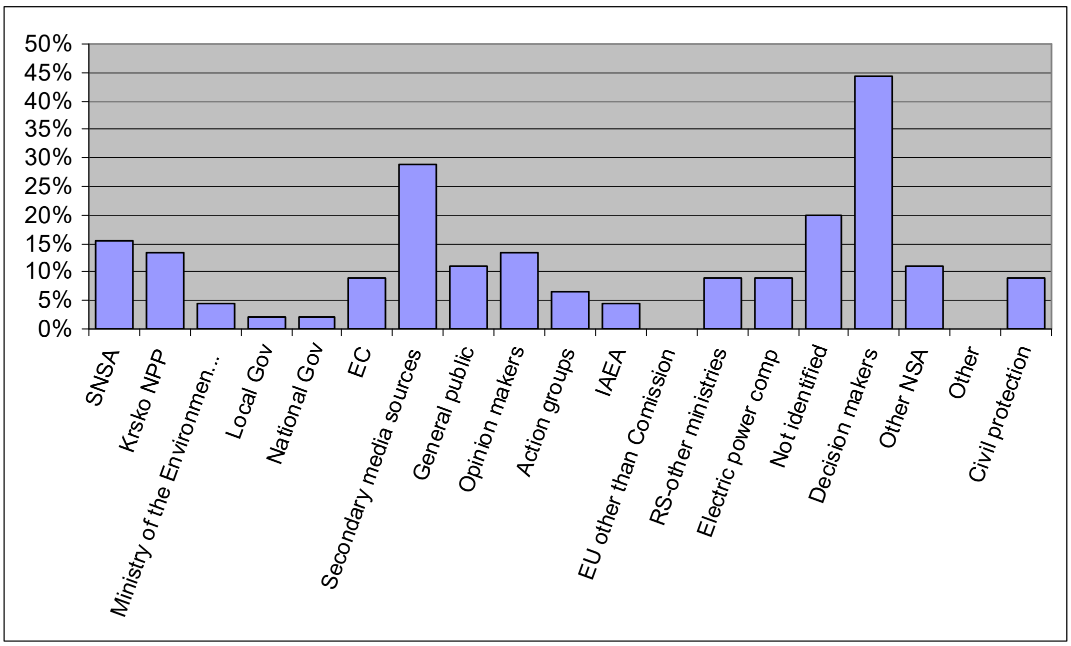

Figure 4: Media sources in neighbouring countries (Italy, Austria, Hungary and Croatia)

In more distant countries the frequency of the most quoted sources was different to those in Slovenia or neighbouring countries. The most quoted sources of information were another media. This source of information is the leading source in almost 60% of the articles related to the nuclear emergency event. In other words, media around Europe reported other media stories related to the nuclear emergency at NPP in Slovenia. This source of information for media in distant countries was followed by the operator of the NPP (39% of articles referred also to the NPP Krško). According to the journalism rule that the journalist has to go to the origin of the information (problem), this frequency of the NPP Krško appearance as source of information was to be expected. This was possible due to the transparent communication policy where also an operator (NPP) was allowed by the authorities to organise a press conference. The European Commission, which distributed the information to ECURIE members and published press release, ended with less than 30% of references on the fourth place of media source frequency. This may be due to poor and technically orientated information in the first press release published by the European Commission (European Commission, 2008) based on the information communicated by the country to the ECURIE system.

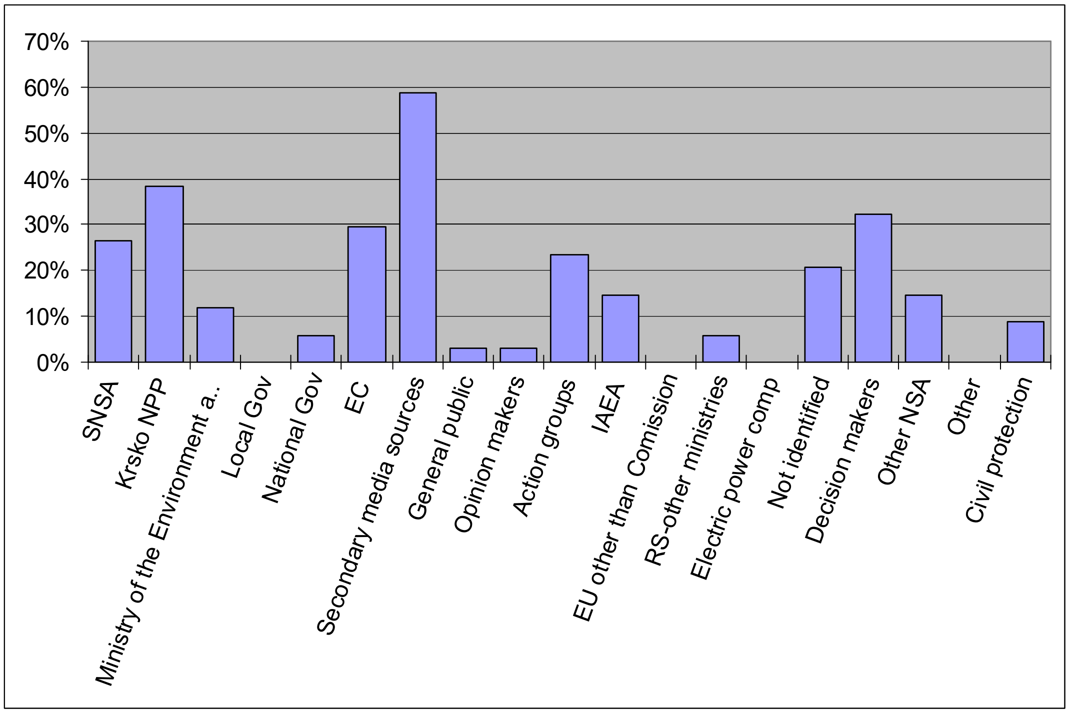

Figure 5: Media sources in other ECURIE countries (distant countries)

The results support the conclusion that, despite the existence of primary sources of information related to the nuclear emergency, the media around Europe preferred to refer to secondary sources of information and sometimes even omitted the primary one (i.e. SNSA or European Commission). While the most quoted source was SNSA as the regulatory body in Slovenia, the most quoted sources of information in the neighbouring states were politicians and representatives of governments. A strong influence of published information in mass media can be recognised by the high frequency of secondary media sources. When the information about the nuclear emergency at the Slovenian NPP was published, mass media in Europe mostly took it over from other media, instead of making their story based on the information from the primary sources. This is in line with previous research showing that media coverage is affected by strong inter-media agenda-setting mechanisms leading to parallel increases and decreases in the attention of various media to the same issue (Vliegenthart and Walgrave, 2008). Media outlets (e.g first pages) generally follow the same track (e.g. presenting an event as a crisis) and let their attention for the issue in a similar manner (Vasterman, 2005; Wolfsfeld and Sheafer, 2006).

3.7 What was the focus of the articles?

The analysis of the main focus of the articles (Perko et. all, 2012) allowed to identify the main challenge and the focal point of the crisis and post crisis communication. The codes used to describe the focus of the articles were: "technical aspect", "inhabitants", "international reaction", "safety/risk aspect", "ECURIE". Figure 6 depicts the percentage of articles (from total articles published in the country or country group) reporting on these focus points. Up to three focus points were allowed for each article.

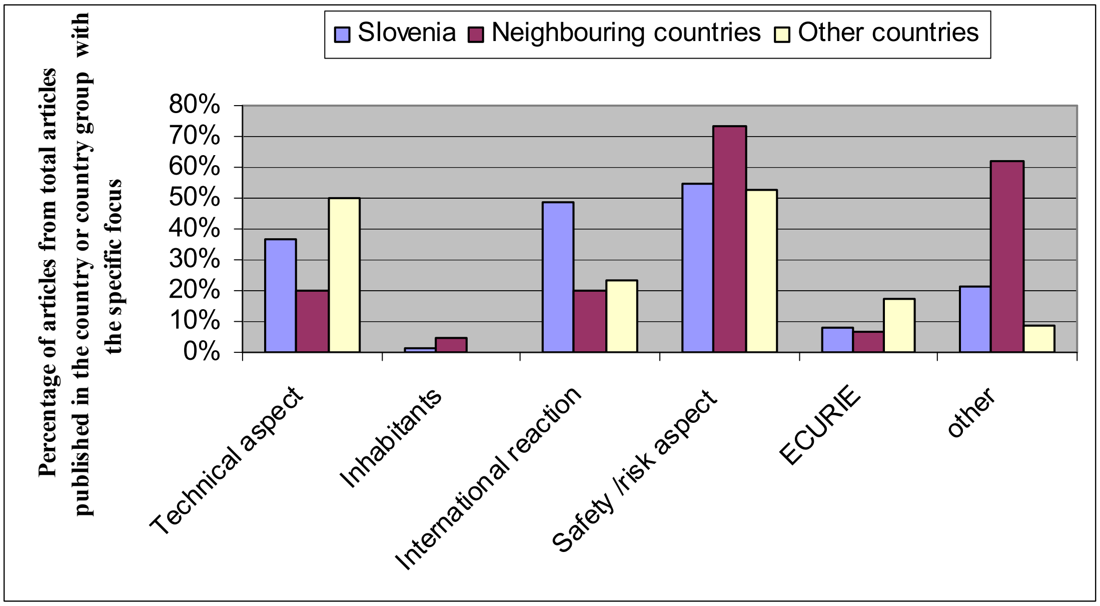

Figure 6: Focus of the articles in Slovenia, neighbouring countries and other ECURIE members

The most important focal point of the published media news in all country groups (see Fig. 5) was the safety/risk aspect. For Slovenia, the second most frequent focal point was the international reaction. For the neighbouring states, the second most discussed focal point was "other", mainly consisting of political problems, ownership issues, ideological discussions etc. For other ECURIE countries the second most discussed focal point was technical aspects.

3.8 Emotions vs. facts in public discourse about the event

To assess whether the event at Krško NPP was reported with a negative connotation that might stimulate public's emotions we analyzed the keywords used in the articles. For this purpose, the frequency of the following keywords was calculated: Chernobyl, panic, alarm nuclear accident, catastrophe, danger, dread, alert (in the sense of warning). Synonyms, antonyms and homonyms were included in accordance to linguistic properties (e.g. "dread" also expressed with the words "fear" and "threat").

The results presented in Fig. 6 show that words with negative connotation were present in the mass media, while they were not present (except for the word 'alert') in communications by the primary information sources.

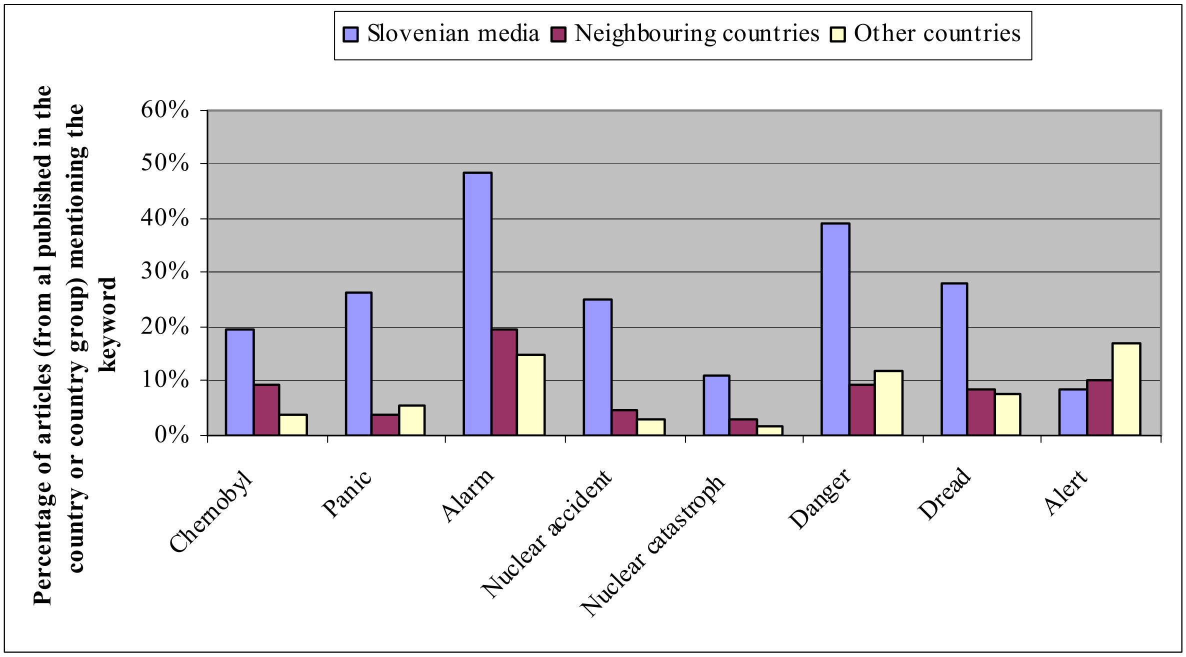

Figure 7: Keywords in articles published in Slovenia, neighbouring countries and other ECURIE members

It is interesting to notice that "alert" was one of the messages delivered in the press release of the European Commission. The analysis revealed however that "alert" was translated to "alarm" (which has a more negative connotation) in almost 50% of Slovenian articles, 20% of articles in neighbouring countries and 15% of article from more distant countries. The connotation of alert and alarm differs quite significantly: while alert refers to a warning, alarm relates to a fear resulting from the awareness of an imminent danger.

The fact that nuclear emergency is linked to a high catastrophic potential is proven by the frequency of the word "Chernobyl". It was used in almost 20% of the Slovenian news and 10% of the articles published in neighbouring countries. If we compare the different groups of countries, we can confirm that with the distance from the affected site, the use of words with negative connotation decreased.

3.9 Lessons learned

1. The analysis revealed that despite a transparent communication policy by the affected country and low level of emergency, this event triggered a high level of media coverage. The results showed that the frequency of the media articles was higher in the countries where nuclear energy was in the public agenda. The states where the future of nuclear energy was under the political discussion (e.g. a planned referendum in Italy and a strong opposition from environmental organisations in Germany) reported even more than Slovenia. Thus, *public and media attention to this nuclear emergency strongly depended on the political discussion about nuclear energy production in the country reporting about the event*.

2. Important differences as regards the information sources were noticed between different country groups. In Slovenia, the most frequently referred source of information was the nuclear safety authority. In the neighbouring countries decision makers (politicians) were the most important information source. In more distant countries media mostly took over other media reports. Overall, *secondary media were an important source of information*.

3. The *safety and the risk aspects were the main focal point in the media reports* for all country groups. In Slovenia however, the international reaction on this event received almost equal attention.
4. The results clearly demonstrated that the *media reports often included messages with negative connotation*. Even if the event had no safety significance, the media linked the event with the nuclear accident at Chernobyl and used emotion triggering words such as panic and danger. Thus, *the use of media reports as secondary resources may multiply the publication of misunderstanding, misinterpretation or specific interests contained in the original source*.
5. The operators and the nuclear safety authorities are obliged by law to be transparent and to openly communicate about nuclear safety issues, regardless of the possibility of (ab)using the emergency for political purposes. *With constant and transparent communication, the communicators can avoid misunderstandings*. However, emotional reactions and heated political discussions may arise when this is not accompanied by an adequate and transparent response in communication by international organisations, because the main media sources in countries with open political questions related to nuclear energy tend to end up being politicians, rather than the resident experts.
6. It is clear that sooner or later in the discussion there will be a high pressure on nuclear emergency authorities to take a side related to nuclear energy. *Any attempt to promote or defend the nuclear programme during an emergency can backfire due to the emotional situation*. A good communicator should stay impartial related to this topic, since the objective of communication by nuclear emergency management should be to warn people, inform about radiation risks, prevent panic and outrage, support the stakeholders to make informed decisions related to radiation risks, and establish two-way communication and joint problem solving.
7. The *nuclear emergency communicators have to be well informed about all major nuclear accidents*, since media memory, as well as collective memory makes links between any nuclear event with major nuclear accidents; Chernobyl or Three Miles Island. Nuclear accidents are intensively re-discussed in the media coverage, especially during the yearly commemoration of such accidents.

Recommendations learned from the Krško emergency event, Slovenia
- Communicating immediately in English allows the nuclear safety authority to reach out to international newswires and correspondents identified at the preparedness stage to ensure that international media use the primary source.
- The public might not agree with the technical definition of "no safety significance event". The public define what is of significance to them. The communication of no safety significant events allows to build institutional trust in public institutions at critical moments.
- Templates need to be used very carefully as they might lead to some negligence. This needs to be addressed in trainings in order to always double check that the template is the right one.
- There is a high media pressure on nuclear emergency authorities to take a side related to nuclear energy production during an emergency. Emergency communication during the acute phase should not be used for political messages.

4 Cs-137 contamination at STUK's premises, Finland on 7th of March 2016 (INES 1)

This chapter mainly summarizes the conversation (interview) with Ms. Kaisa Raitio, Head of Communications of STUK, for the research and analysis of available public information content, mainly from social media.

4.1 Description of the emergency event

On March 7, 2016, abnormally high airborne Cs-137 concentration was detected in laboratory measurements from a filter collected in March 3 –4, 2016 by an air sampler located at the roof of Finnish Radiation and Nuclear Safety Authority (STUK). Concentration was three orders of magnitude higher than the normal range of concentration. No other nuclides were detected. Backtracking showed that air masses had arrived to Helsinki from south-southeast during the collection time of the sample. The filters from all air samplers in Southern Finland were changed and the old ones were sent to be measured. The results of airborne concentration in Helsinki were published on the same day evening (7th of March). Based on analysis of filters from other air samplers, no abnormal amounts of Cs-137 was found. Thus, the experts from STUK concluded that the source of caesium was in Helsinki. Samples from air ventilation system of STUK's premises revealed that caesium was released from the same building where STUK is located.

The source, activity 360 MBq, had been used in a factory in Finland for level gauging and was delivered to POSIVA, the radioactive waste management company, as radioactive waste. When the gauge was received by the company, one member of the staff tried to open the source shield in order to remove the actual caesium source for disposal. He did not have any information or indication that the source might not be intact. During the handling of the source, contamination was released into the room where gauge was handled and also to adjacent rooms and air exhaust ventilation ducts. The detection of caesium occurred four days after the source had been opened due to the time spent in the collection, processing and measurement in the air sampler used in the detection.

Decontamination was conducted in STUK's premises and included the contaminated garage, corridors, rooms, etc. In addition, all persons involved in decontamination or who had been in the garage before contamination was detected, were monitored by whole body counting: 17 from STUK's staff and 13 persons from other employers. Results showed that nobody had been contaminated. The person who opened the caesium source was monitored, too: no abnormal levels of internal caesium were detected. A slight increase of internal caesium was detected in a person who had cleaned the garage before contamination was first detected; the amount of caesium could not be explained by her diet.

4.2 Public information and media reporting

There was a great media interest in Finland and also in Sweden. Media attention started on Monday evening on the 7th of March and media interest disappeared five days later. "We had the whole package of conspiracy theories in social media, reporters waiting in and out, in the lobby, to get new information, dozens of interviews were given out per day", Kaisa Raitio, Head of Communications STUK.
Special attention was given to the international level and public statements and press preleases were published in English as well as in Finnish[1].

[1] Some examples include the following web pages (last accessed 2 March 2018): http://www.stuk.fi/web/en/-/stuk-detected-radin-the-air-in-helsinki-helteringrequired-only-in-case-of-a-million-fold-concentration
http://www.stuk.fi/web/en/-/stuk-no-abnormal-detection-of-cesium-elsewhere-in-finland-theconcentration-in-helsinki-has-normalised

International media reported about the incident extensively. For instance, “Radioactivity in Helsinki unusually high and nobody knows why?” in Belgian newspapers or “Exceptionally 'high amount' of radioactive caesium detected in Helsinki - Finland authorities” in Cyprus. Media abroad often referred to information written in English press releases sent by STUK.

STUK used all mass media channels, including social media (Twitter, Facebook), Phone Calls and E-mails in order to communicate timely about the event. Twitter revealed as a useful communication channel and an important source of information for journalists. See some examples of tweets in the Figure below.

Figure 8. Examples of tweets posted by STUK

Due to a communication twist related to the source of contamination and the open and transparent communication by STUK, the case evolved from high public attention on the event, through making jokes about the authority, to increase public trust in STUK as the nuclear authority. It was clear from the beginning that there was the possibility that the source would be in the same property, and the case could be the “joke of the week”. As a matter of fact, as Ms. Raito claimed, they were. “We did end up in the Saturday’s night comedy panel show with our case, we got memes in twitter and so on. But still, we collected feedback from the press that they appreciated our openness and the constant flow of information that we produced. The editor-in-chief of the biggest newspaper in Finland stated in his editorial that “it´s reassuring to know that we have this kind of measuring network in Finland, so the opportunity to leave even an atom unnoticed is quite small”. The journalists were actually happy about the response that we were providing to them. We got feedback from the public that they appreciate the work that STUK does, and that they are happy that we tell about incidents regardless if it is concerning us or the ones that we supervise.”

4.3 After the crisis: Evaluation of communication and engagement

A questionnaire was conducted among STUK’s employees to get feedback on STUK’s

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http://www.stuk.fi/web/en/-/premises-are-being-reclaimed-and-investigation-continues
http://www.stuk.fi/web/en/-/no-abnormalities-detected-in-the-environment
http://www.stuk.fi/web/en/-/the-damaged-cesium-source-is-now-confined-at-the-storage-ofsuomen-nukliditekniikka

response to the incident as well as on the provision of internal information and instructions. In addition, 10 journalists from different Finnish media were contacted in order to get their feedback on information provision during the incident. Communication about self- assessment of regulatory actions before and during the incident were further communicated to the public.

4.4 Lessons learned

The following lessons learned have been identified by Kaisa Raitio, Head of Communications at STUK in an interview conducted by T. Perko.

1. *Social media first*: In Finland, when publishing information about the emergency, the order is: twitter, SMS press release, if necessary and finally the press release which takes longer.
"In this case due to many unfortunate coincidences, we didn't have any kind of action in social media until four hours after the first press release. And I was contacted by the press asking if we were trying to hide something or why we were not communicating in social media and specially twitter."[2]

2. *All public information should be published in English* too: From the first moment, it is important to produce "the core facts" about the incident and the safety significance in English in addition to the main language or languages of your country.
"We were communicating in Finnish, Swedish and English in twitter, just after the first press release. We used google translator and we did make grammatical errors, BUT the negative feedback that we were getting during the first hours stopped right away when we started to just try our best on this. And actually, people came to help us like unplanned crowdsourcing in twitter. For background information, we don´t have any translator working at STUK of course, most of us have good language skills, but it is definitely not the same like being a native English speaker. But it is better to at least try! During the event, we communicated in three languages in twitter and all the press releases had been translated at the latest the following day after they were released."

3. *Use graded approach for labelling the emergency (incident vs. accident) and radiological risk comparisons*
"In the first press release our director pointed out the following:

"The regularly detected cesium 137 usually originates from the fallout of the Chernobyl nuclear power plant accident that occurred in 1986. While the detected radioactivity does not pose a threat, its amount is exceptionally high."

"It was not a good idea to put Chernobyl in the press release, even though the substance relates to Chernobyl but the concentrations were so small that there was no good reason to steer the thoughts to a NPP accident."

4. *Comparison of radiological risks due to emergency event with radiological exposure in daily life.*

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[2] See the interview at: http://www.karjalainen.fi/uutiset/uutis-alueet/kotimaa/item/99656-stuk-helsingincesium-havainnoista-olisi-pitanyt-tiedottaa-monipuolisemmin (in Finnish) (last accessed 1 March 2018).

“We also got a useful comment: using large numbers when communicating (e.g. concentration) just leads to confusion. Before this incident, we had always compared radiological risks to flights. And in this case, we learned that when you are comparing risks, you should just compare the amount of radiation that a regular Finnish person gets per year rather than radiation received from voluntary choices like taking a flight. So, we went from, the quotation from the press release:

“The measuring result, 4,000 microbecquerels per cubic meter of air, is about a thousand-fold compared to normal. In this case, an amount a thousand-fold compared to normal means that the concentration is roughly a millionth of a concentration that would require people to shield themselves from it.”
To this:
“This is yet again an excellent demonstration of the responsive and high-quality radiation control function that we have in place in Finland. The Caesium concentrations measured on the roof, for example, were so low that a person would need to breathe the air for 1600 years continuously before exceeding the regular annual radiation dose of a Finnish person (3,2 mSv)”

5. *Use the public attention from the event to explain what you do and basic radiological concepts.*

“We used this opportunity to tell people about our daily work. We turned the focus from the becquerels and millisieverts to how we take care of the Finnish radiation and nuclear safety. We explained for example the automatic external radiation monitoring network and the radioactivity monitoring of outdoor air. We also explained the work that we carry out in our laboratories. The main point, which was that there were no health effects, went through from the first press release, but then we tried to explain why we are doing “a spring clean” in our contaminated garage, and I think that we were even more successful in this…Now more Finnish people at least know something about the radiation surveillance and measurements that STUK conducts in its laboratories”

6. *Ensure transparency related to radiological measures, and communicate openly also about “non-significant incidents”*

“I think that we should communicate about the non-significant radiological events as well. We should use every opportunity to communicate what we are doing. In Finland, we publish our measurement data from the automatic external radiation monitoring network and the radioactivity monitoring of outdoor air. So even tough, the caesium incident was not significant for a regular Finnish person concerning the health hazard, the communication process was a good way to build institutional trust. The result would be public anyhow and it is just better to publish it yourself than wait for the press to find it out.”

7. *Incompleteness in information provision, mistakes, uncertainties in communication are accepted during an emergency, whereas poor and delayed communication is not.*
“In a crisis situation, trust is vital. And I believe you can´t control trust. It´s like an unfinished building, that you just have to carry on building it daily, through communicating, transparency, willingness to engage in dialogue and learning from your mistakes and sharing them for the general good. You prepare for the crisis by building trust, by communicating actively during the so called peace times. So when there’s such a strong faith in you, you fall from very high if there´s even one doubt that you are not working correctly. And the only way to prevent that

quick plunge is to do your communication with openness and courage. Those, by the way, are two of the four STUK´s values. And in this case my personal opinion is that we were quite open and brave".

Recommendations from the Cs-137 contamination event in Finland
- Evaluate and improve communication after an emergency based on feedback received (e.g. through questionnaires with employees, discussion with journalists, social media analysis, etc)
- Depending on the context, it might be better to communicate first on social media (twitter first) because it is faster before focusing on other types of traditional media (press release) which take longer. This way, rumours of lack of transparency in releasing information may be avoided.
- Issue a concise mass media statement immediately, even if the information is not complete.
- Publish all public information also in English, even if there might be grammar and language mistakes.
- Carefully select keywords used for labelling the emergency: event, incident, accident (use graded approach) and avoid referring to previous radiological and nuclear accidents or incidents.
- Use radiological events as an opportunity to increase public awareness of the nuclear regulatory authority, its tasks as well as ionizing radiation.
- Communicate timely and openly also about non-significant emergency events.
- Do not wait until all information is available before communicating: start early and update often. However, never speculate for the sake of timeliness. Information published needs to be confirmed (e.g. through a process of peer review).

5 Release of radioactive particles at Ascó I Nuclear Power Plant in Spain in November 2007 (INES 2)

This chapter summarizes different documents (e.g. CSN, 2008a and b, IAEA report[3]): conference presentations, newspaper articles and internet pages of governmental and non-governmental organizations.

5.1 Description of the emergency event

On 14 March 2008, radioactive pollution was detected outside the Ascó nuclear power plant in Tarragona (Spain). The release of radioactive particles with activated corrosion product isotopes occurred on 26 November 2007 at the Unit 1 reactor, during routine activation of the ventilation system. The radiological checks carried out on a weekly basis did not detect the leak until four months later, on 14 March 2008. Particles were dispersed and deposited in roofs and neighbouring areas within the nuclear power plant controlled area. According to Barbero et al. (2014), more than 1,300 hot points with radioactive particles were found, 94% located inside the double fenced controlled area and 6% within the exclusion area. The Nuclear Safety Council (CSN initially estimated that the total radioactivity detected was about 235,000 becquerels. The council operating the plant later estimated that a maximum of 84.95 million becquerels of radioactivity were spilled.

[3] https://www.nucnet.org/all-the-news/2008/04/18/clean-up-under-way-at-asco-1-as-iaea-releases-preliminary-report/print (last accessed 1 March 2018).

The management of the plant took 19 days to notify the Nuclear Safety Council (CSN) that radioactive particles had been detected, despite the fact that they are required by law to do so immediately. An investigation was opened, the director of the nuclear power plant was fired and the head of radiological protection replaced. CSN changed the classification of the leak, initially from level 1, and rated the incident at level 2 on the International Nuclear Event Scale (INES) because of the "inadequate control of radioactive material and providing incomplete and deficient information to the controlling body" (CSN, 2008b). The radiological impact was not considered significant and the doses for workers below the legal limits. The company conducted radiological reviews of all persons exposed from 28 November until April (around 2,700 persons, including workers and visitors) through the whole body radiological counter. No person was found contaminated.
The event was investigated and the conclusion was that the release of hot particles to the atmosphere started on November 29th 2007, when the ventilation system was switched from filtered mode to normal mode. As a consequence, particles were dragged out through the stack and then dispersed via the stack to the roof of Unit I buildings.
The CSN proposed to the Ministry of Industry, Tourism and Trade that sanctions proceedings be initiated with respect to six infringements and approved the design of a plan to avoid the repetition of the event and correct the deficiencies identified in the organisation and operation of the licensee (CSN, 2008a).

5.2 Public information and transparency

The CSN Council report to the Parliament of 2008 states that the "Ascó event was undoubtedly one of the most outstanding points of attention during the year, both for the CSN itself and as a result of its impact in the media" (CSN, 2008a). The event had a negative effect in terms of transparency and social trust towards the nuclear industry. According to a press release from the CSN (2008b):
"based on the chronology of the facts, it can be deducted that on 9 April the operator knew that the information on the total spill was not correct but did not communicate it to the CSN, despite having been asked reiteratively and in writing. The operator did not inform either the extraordinary Local Information Committee held that afternoon in Ascó" (our translation from Spanish).

The IAEA report of the incident stated that:
"Preliminary information was not even distributed within the licensee to the operation staff"[4].

Greenpeace reported the leak before CSN on 5 April 2008[5]. According to Greenpeace, the municipalities in the area were informed of the accident through the media. Greenpeace protested about the delay in detecting contamination from the leak as well as the delay in making the information public[6]. The environmental groups, Greenpeace and Ecologistas en Acción, asked the European Commission to clarify whether the legislation had been correctly applied by the regulatory authority, following the articles 35, 36 and 37 of the Euratom Treaty on Health protection[7]. They also highlighted the lack of rigorous information provided by

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[4] https://www.nucnet.org/all-the-news/2008/04/18/clean-up-under-way-at-asco-1-as-iaea-releases-preliminary-report/print (last accessed 1 March 2018).
[5] https://greenpeaceblong.wordpress.com/2008/04/14/la-fuga-radiactiva-de-asco/ (last accessed 1 March 2018).
[6] https://www.reuters.com/article/us-spain-nuclear-asco/spain-nuclear-plant-leak-below-legal-limit-watchdog-idUSL0848095620080408 (last accessed 1 March 2018).
[7] http://archivo-es.greenpeace.org/espana/es/news/2010/November/greenpeace-y-ecologistas-en-ac-2/ (last accessed 1 March 2018).

Civil Protection and requested public information on the measurements of the Radiological Alert Network.

The incident appeared clearly in the national media with headlines like "The radioactive spill in Ascó was 100 times bigger than declared. The Safety Council accuses the operator to hide information and will take disciplinary action against the plant" (El País, 15 April 2008). More than a year later, the national media focused on the fines to the nuclear power plant management "Fine to the Ascó nuclear power plant of 14.4 million euros for the particles spill" (El Mundo, 12 May 2009), the highest fine of the nuclear industry in Spain.

5.3 Lessons learned

1. The need to communicate any incidents, even if they are considered irrelevant, very quickly;
2. Provision of transparent information to the regulatory authorities, the media as well as the citizens living nearby;
3. Hiding information is an effective way towards losing public trust. Honesty and transparency should be the first rule of communication instead of silence and suppression;
4. Communication and mutual respect between regulatory authorities and other interested parties (e.g. environmental organisations) should be established and maintained.
5. Internal communication and inter-organisation communication should be improved and regularly exercised and tested.

Recommendations from the Ascó I Nuclear Power Plant event in Spain

- Establishing mechanisms for engaging in dialogue around risk communication, such as focus groups or advisory boards, can be effective in increasing trust between the nuclear power plant and stakeholders.
- Honest, timely and consistent information can be provided and regularly updated by trusted sources.
- Regular training in crisis communication is essential for helping communicators avoid mistakes that could be detrimental when responding to a crisis.

6 Release of ^{131}I from a facility producing radioisotopes for medical use in August 22nd 2008, Fleurus, Belgium (INES 3)

Main sources of information for this chapter are the following documents from (Carlé, Perko, Turcanu, & Schröder, 2010; De Svaef, 2016; DeBeule, 2009; FANC, 2008a, 2008b, 2008c; Perko, Thijssen, C., & Van Gorp, 2014; Perko, Turcanu, Schröder, & B., 2010; Van der Meer et al., 2010).

6.1 Description of the emergency event

In August 22nd 2008, radioactive iodine (131I) was accidentally released from Institut des Radioelements (IRE), a facility producing radioisotopes for medical use, located in Fleurus, Belgium. The release was not noticed until after the weekend, and people living in

neighbouring areas were informed no sooner than 6 days after the onset of the incident. It was only then that the Belgian authorities activated a nuclear emergency plan and took protective actions for the population (food chain).
IRE produces isotopes for the medical sector, by extraction of fission products from highly enriched uranium targets irradiated in reactors such as the BR2 in SCK•CEN in Mol, Belgium. The production is a batch process and, after processing, waste liquids are collected in waste tanks. On 22nd of August, Friday, contents of smaller waste tanks were transferred to a larger tank, starting a chemical reaction and leading to the release of 131-I to the stack, through filter batteries. The bulk of the release took place over the weekend, after which smaller quantities kept being discharged for several days, amounting to a total of 50 GBq 131I. The release was not noticed till after the weekend, when a safety engineer started his work on Monday morning. The problem was first examined in cooperation with the technical support organisation, BEL-V, and the Belgian agency for nuclear control (AFCN-FANC) was not notified about the release until 5:15 p.m. on Monday evening.
On Tuesday, August 26th, the agency made its first mention of the event on its website, announcing that inspectors were being sent to the installation to examine the situation. More details were given in a press release the same afternoon that classified the event as a "serious incident" (INES-3) and announced that production in the IRE as well as the neighbouring MDS Nordion facility were temporarily stopped. The statement specified the occurrence of a "very small release" to the environment that neither called for activation of the Belgian nuclear emergency plan nor for measures to protect the environment. The press release announced follow-up measurements by the Belgian automatic radiological measurement network TELERAD.
It may be worth mentioning that, in fact, four additional mobile TELERAD stations were placed on and near the Fleurus site that, due to the characteristics of the release, were not able to register the release. The fact that only pure 131Iodine was discharged at a low concentration during a relatively long period, made it impossible for the TELERAD network to capture dose rates increases.
On Wednesday August 27, AFCN-FANC (the Belgian nuclear safety agency) informed IAEA about the incident, stating "*The waste division of the IRE has performed a transfer of liquid radioactive waste from one tank to another one. Immediately afterwards – for reasons still unknown – radioactivity was released through the stack. The quantity of radioactivity released into the environment is estimated at 45 GBq I-131, which corresponds to a dose of 160 microsievert for a hypothetical person remaining permanently at the site's enclosure. This incident did not cause a contamination of the personnel, and their dose limits were neither exceeded.*" (BVS, 2008, p. 21).
On Thursday August 28, the first results for three environmental samples became available. These samples, taken by the agency in the close vicinity of the IRE, and analyzed in the lab of the scientific institute of Public Health ISP/WIV, shed new light on the situation. Radioactivity was established at up to 5000 Bq/kg for one grass sample, suggesting that the intervention limits for the food production might have been exceeded and, therefore, activation of the Belgian emergency plan was needed. On Thursday evening, governmental web sites issued the first recommendations to the population: People living in a zone of 5 km north east of the IRE were neither to eat fruits and vegetables from their own gardens, nor to use rain water. The press publicized these recommendations. Moreover, local and provincial emergency managers received a FAQ list specifically compiled for the occasion [Crisiscenter 2008]. The local police and the city of Fleurus communicated directly with the concerned population on Friday August 29th and an information phone line was opened. Further characterisation of potential water, air, grass, vegetables and milk contaminations was carried out.
On Saturday August 30th, new measurements somewhat alleviated the concerns. These

allowed a reduction of the area for which protective measures were recommended to 3 km-area north east of the IRE. In addition, they confirmed that no significant contamination of milk had occurred. (Maximum measurement was 17 Bq/liter where the intervention level is 500 Bq/liter). Nevertheless, a large-scale campaign to do thyroid measurements was announced to start on Monday, September 1st. These measurements assess a potentially enhanced risk for thyroid cancers and are especially important for children (Public Health 2008).

The next week, the crisis management team focused on complete certainty that the release had stopped. It requested that the IRE installed extra filters between the waste tank and the stack, and it further monitored the situation by environmental sampling, and active charcoal air sampling. By Saturday September 6th, there were no more uncertainties: No measurements of over 100 samples of vegetables and fruits had been near the intervention levels (FAVV, 2008), the maximum was 86 Bq/kg, while the intervention level is 2000 Bq/kg, however the WHO has a recommendation to take action when baby food exceeds 100 Bq/kg, and at no time there had been a need to trigger direct protective action for the population (sheltering, evacuation or intake of iodine tablets). Therefore, recommendations to avoid eating fruits and vegetables from the gardens were lifted, and the emergency plan scaled down to a U1 level. Nevertheless, thyroid testing for possible contamination continued to be offered to the local population, with the idea that this could be re-assuring. The medical examinations, performed on Monday September 1st and Tuesday September 2nd, prioritized the most sensitive persons, children and pregnant women. A total of 1320 persons were examined, and no signs of contamination found.

The following protective actions were applied:

- Activation of the Belgian emergency plan.
- Restrictions on the use of local farming produce within 5 km of the release point for a period of two weeks.
- 1320 people were tested for possible contamination in thyroid.

6.2 Public information and mass media

The national nuclear and radiological emergency plan was declared in the evening of 28/8/2008. The European Commission sent out a warning using the ECURIE-alert system on the 29th of August and the event received a level 3 on the INES scale.

The event was covered by all Belgian mass media and it remained a daily news item for several weeks. The news items were mostly informative, based on the information provided by the Crisis Centre or interviews with important actors: crisis managers, experts, managers from the installation and local and national politicians (Carlé at. al, 2010). The national media focused their attention on the accident and then placed it within the context of lack of radioisotopes for medical use, which were produced in a facility and used for healing cancer. This framing did not appear in the local media, however. The incident was not sensationalised in the national mass media; there was neither amplification of negative messages nor stigmatisation of the technology. Discussions addressed the responsibility for the incident, with a focus on the unacceptable late response of the authorities and the lack of information to the population in the first days. Another issue of discussion was the failure of the automatic measuring network TELERAD to register the release; this failure was interpreted as another instance of poor performance of this network that had received some negative press before. Blame of the IRE management for their lack of communication was another theme, framed as an illustration of the existing problematic relation between IRE, the local authorities and the local population (Fleurus, 2008). Part of the news framing was also on the expected shortage of medical isotopes, a consequence of the incident.

Public meetings with the local community were organized in a sports centre, and the accident was discussed with all stakeholders involved.
The table below summarizes the main messages communicated by the authorities during the event (Table IV).

Table IV: The messages of risk communication, aim and tools

Communicated message*	Basic information	Message about a protective action	Reassuring message	Main communication tool*
In the region of Fleurus there has been an accidental radiation release	✓			Local, national media
Release occurred in a facility producing isotopes for medical use	✓			National media
The influence of the radioactive release is only local.	✓		✓	Public meeting
The pollutant was radio-iodine	✓			Local media
Authorities advise not to consume vegetables from gardens for a period of 2 weeks		✓		Leaflets, public meeting
Radio-iodine can increase the risk of getting thyroid cancer	✓			Public meeting
The Belgian public health authorities organize a thyroid measurement campaign for the local population		✓		National media, leaflet
Evacuation of people is not needed			✓	Public meeting
Due to the accident, there is a lack of isotopes for curing cancer patients in the hospitals	✓			National media

* Published media news and public communication was collected by authorities, and the most relevant ones were selected.

6.3 Interaction with the affected public

(Source: Based on the interview with the measurement team)
Most members of the public did not ask for information. However, when an initiative was taken to provide them with information, the majority reacted positively and asked for more information. A considerable minority considered the campaign as a cover-up of the authorities, but nevertheless accepted measurements.

The minority who asked for more information on its own initiative was first of all concerned whether the measurements themselves could harm them and wanted to know more about the effect of 131I and how harmful it was. Secondly, the questions related to how the measurements were performed and how reliable the measurements were.

Performing measurements on small children is an art in itself. The size of the Ge detectors was rather impressive for the youngest (0-5 years) and required adaptations like laboratory gloves blown as balloons. For that group, the NaI detector of the University of Liège was less frightening since its size was much smaller, but it was also less efficient.

An additional disadvantage was that September 1st is the first school day, so the teachers were not yet acquainted with the children and had not yet established a bond of trust.

The vast majority considered SCK•CEN and the University of Liège as impartial and therefore trusted the quality and outcome of the measurements. This would not have been the case if IRE, that caused the release, would have carried out the measurements.

The vast majority of the team on the first day consisted of native Dutch-speaking people, with one exception. Although many of them spoke reasonably well French, communication with the French-speaking population led sometimes to misunderstandings, certainly when it concerned children. It was decided for the second day to compose teams with a stronger French-speaking component.
Waiting room reveled to be a bottle neck of the emergency, since there were only few germanium detectors available (and calibrated) and each measurement took at least 2 minutes. There have been more than 1300 people queuing in front of the building, terribly seeking for more information about the emergency, protective actions, experts and on-going activities.

6.4 Communication by a thyroid measurement team

There was a clear need to inform the general public. However, the public is, in general, reluctant to ask experts but is eager to listen and learn when something is explained. Therefore, communication to the public should be part of the overall strategy, consisting first of all of the harmful effects of radiation and secondly of the principles of the measurement method. Communication should be prepared in advance and should be part of the overall measurement strategy. Therefore, the measurement team should actively provide information about health effects of radiation and radiation measurement principles, focusing on various target audiences: children, pregnant women, teachers and the general public (Van der Meer et al., 2010)

6.5 Level of agreement with communicated messages

Public understanding of nuclear risk-related information is hindered by the complexity of the risk concept. This concept includes not only the probability and consequences of a nuclear event, but also the specific risk characteristics. For nuclear hazards such characteristics are, among others, the strong link to a high catastrophic potential, the fear and the unfamiliarity.
The most important lesson from the case study brings into attention the importance of prior (or specific) knowledge: the communicated message (e.g. that radioactive iodine may cause a thyroid cancer and not lung cancer) may not be received, if the audience has insufficient knowledge. If people do not possess a certain level of prior knowledge (e.g. what is difference between contamination and irradiation), the communicated messages will not trigger enough attention to be heard or recalled. In other words, hazards and risks have to be communicated openly long before a crisis, in in the context of preparedness for nuclear emergencies (Perko T. et al, 2014). For instance, in the case of Fleurus people who were more knowledgeable about nuclear issues in general were more likely to know when and where did the accident happen and what kind of protective actions were taken by the authorities; however, they didn't necessarily agree with these actions.
For the agreement (level of acceptance) of protective actions communicated to the broader public (e.g. vegetable from gardens can be safely consumed after 14 days) Perko et all. (2014) demonstrated that the perceived disaster potential of a nuclear accident was the most influential predictor. The higher people perceived a risk from the accident, the less they agreed with the communicated messages. Specific knowledge could not influence the acceptance of this messages. In addition, it has been investigated if and how did the predictors and the strength of these predictors vary among two population groups: the population that has been directly affected by a radiological accident, respectively the population that had neither been exposed to protective actions, nor has it been target population for risk communication. Several differences were identified between the general population and the affected population. As opposed to the general population, in the affected population, socio-

demographic variables such as gender or education were revealed as not important for information processing (attending to information, understanding it, storing the information in a long-term memory, recalling it back and agreeing with it). This could be due to the higher intensity of the communication campaign in the affected population and a higher saliency of the issue. Based on the findings, we can conclude that the more affected one is by an emergency, the less important socio-demographic characteristics are for the information processing. In addition, specific knowledge was revealed as more influential for the reception of information in the affected population than in the general population. At the same time, risk perception was revealed as the most significant predictor for information reception in the group of the general population that remembered the accident: respondents with higher risk perception were more likely to remember more details about the accident. Risk perception was however not significant for information reception in the affected population (Perko T. et al, 2014).

6.6 Use of communication channels

Public opinion survey conducted 11 months after the accident showed that 15% of the general population and 91% of the affected population remembered the accident. Among these, over 80% of the respondents in Fleurus watched TV daily in order to get information, while nearly 70% of the population in the rest of the country indicated they followed the Fleurus incident daily on TV. Radio was the second most important information channel, around 50% both in the local population and in the rest of the country followed the news about the accident daily on the radio, and another 20 % did so several times a week. Newspapers were the third mass communication channel, consulted daily or several times a week by 55% of the general population (or at least by the part of the general population who remembered the incident). For the local population, newspapers were less important, 50 % of the Fleurus population stated that they read the newspaper never or less than once a week during the incident. Three types of internet use could be differentiated: internet online journals, replays of TV news on internet and replay of radio news on internet. In general, internet was during the Fleurus accident used less than the other media; over 60% of the respondents indicated they never used internet in any of the three ways specified. About 25% of the Fleurus respondents said they used internet journals daily or at least several times a week, and 22% used the replays of TV and radio news as often. The responses for the general population indicated a marginally lower use of the internet sources (Perko T. et al, 2014).

6.7 Perception of the radiological emergency

As part of the research undertaken in the context of the Fleurus case, it is interesting to identify how a radiological accident is perceived in the Belgium population and in particular, if there are differences in perception of an accident between the general population in Belgium (N=1035) and the population that was exposed to a radiological accident (INES=3) in 2008 in Fleurus, Belgium (N= 104) (Perko, 2015). Figure 9 shows that a nuclear accident is perceived as strongly feared event with fatal consequences, has delayed effects, is a result of a human tampering with nature and is perceived as rather unknown to science and unknown to exposed people. Interestingly, there are not strong significant differences in risk perception of an accident between the general population and the affected population, except for the catastrophic potential factor, where the affected population perceived a nuclear accident as less catastrophic than the general population and for unknown to science factor, where affected population perceived a nuclear accident as more unknown than general population.

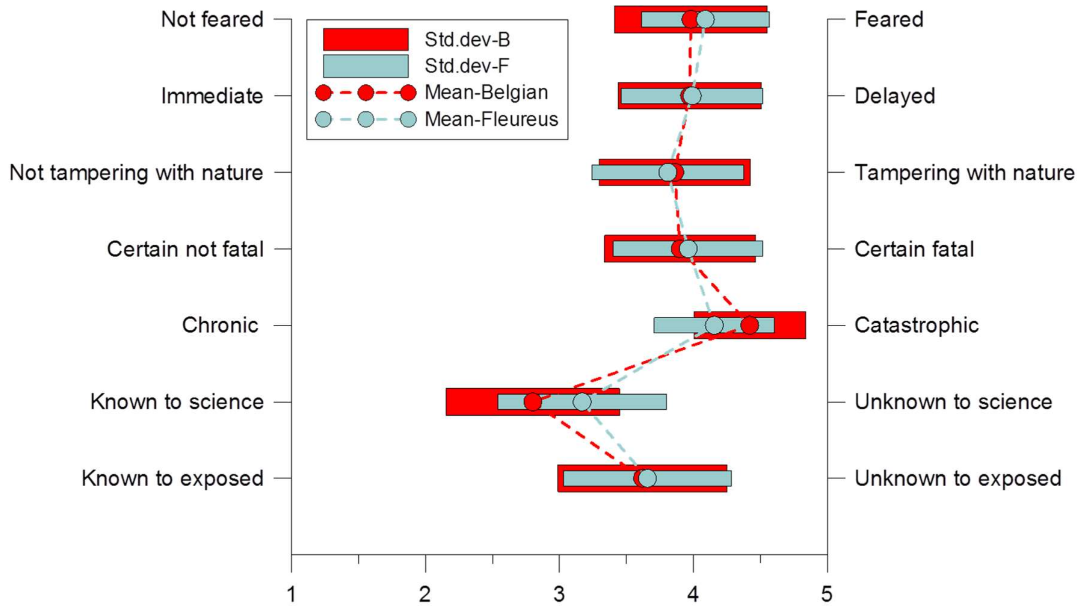

Figure 9: Risk perception of an accident at a radiological installation in Belgium; Differences between the general population (N=1035) and the affected population (N=104) (Perko, 2015)

6.8 Lessons learned

1. The *emergency communication* to the affected population should consist first of all of the *harmful effects of radiation* and secondly of the *principles of the measurement method*. Communication should be prepared in advance and should be part of overall measurement strategy. Therefore, the measurement team should actively provide information about the health effects of radiation and radiation measurement principles, focusing on various target audiences: children, pregnant women, teachers and general public.
2. *Communication messages should be designed to at least two groups of people (directly affected population and general population)*: several differences were identified among information processing in the general population and the affected population. The more one is affected by the risk, the less important factors such as gender, age or education will be for information processing.
3. Specific knowledge (indicator of systematic information processing of the communicated messages) was revealed as more influential for the reception of information in the affected population than in the general population. In other words, communication will get affected people faster although they don't have higher knowledge gained during preparedness communication or education. At the same time, risk perception (indicator of heuristic information processing) was revealed as the most significant predictor for information reception in the group of the general population that remembered the accident: *respondents with higher risk perception were more open to information communicated during an emergency ant they likely to remember more details about the accident*. These people are also target (general) population for emergency communication and the communication should address risk perception first.
4. Since the accident took place in 2008, social media did not play a big role in this event. "The use of traditional media prevailed" (Turcanu & Perko, 2014, p. 50). Another *important information source was personal communication* (40% for the affected area, 20% in the

Belgian population) (Turcanu & Perko, 2014). To try to find out to what degree social media was used and in what way this could be used nowadays, specifically regarding the type of messages used in their emergency communication, other methods would need to be applied.
5. Before the Fleurus emergency, communication aspects were not often included in exercises in Belgium. After Fleurus, *communication aspects are included in exercises on a regular basis* (De Svaef, 2016) as they provide valuable opportunities to identify and overcome communication challenges during nuclear or radiological emergencies.

Good practices from the Fleurus emergency in Belgium
- Training media and public speaking courses designed for first responders prior to nuclear emergencies;
- Communication with the affected population during contamination measurements or/and decontamination should be done by native speakers.
- Collect Frequently Asked Questions on a regular basis and distribute answers to all organisations and actors involved in emergency management.
- Communication of measurement team should focus on various target audiences: children, pregnant women, teachers and general public.
- Communication should be part of the overall measurement strategy. Communicate not only on radiological measurement results but also measurement process and principles.
- Traditional communication channels, such as TV, journals and radio should be used in combination with social media.
- Communication aspects might be included in nuclear emergency exercises on a regular basis.
- Keeping first responders and especially measurement teams informed about the overall key messages and the communication strategy followed by the public communication team is of outmost importance in order to get clear instructions on how and what to communicate.

7 Successive emergency events at the Tricastin nuclear site, July-September 2008, France (INES 1)

This chapter is based mainly on mass media reports and lessons learned are taken from the presentation “Managing a crisis: Learning the lessons”, given by Christophe Hervé, director of communications, generation department, EDF at PIME 2009, Conference in Edinburgh (Feb. 17th, 2009) and personal discussion with T. Perko.

7.1 Description of the emergency case(s)

The night of the 7th July/8th July 2008, employees of Tricastin, the Socatri (Areva subsidiary) operated waste treatment and uranium recovery facility, noticed overflowing of a storage tank containing uranium effluents. Around 30 m^3 of radioactive liquid had been spread to the ground as well as to the waste water collection system, provoking discharges in the surrounding rivers. The authorities issued a ban on fishing and water sports in two local rivers. The incident was classified as level 1 on the INES scale.

Emergency management was activated with member of Areva (industry), experts from the French Institute of Radiation Protection & Nuclear Safety (IRSN) and local decision-makers (prefects of Drome and Vaucluse administrative departments). They chose to impose restriction actions on water use and consumption as precautionary measures before getting the results from measurements. French Ecology Minister Jean-Louis Borloo said that there was "no imminent danger" to the local population. Also, the Socatri plant informed that tests of the groundwater, local wells and rivers showed they were not contaminated. Later on, Socatri decided to request additional measurements, based on the World Health Organisation (WHO) guidelines. Based on measurements by IRSN on rivers, groundwater, bathing water (lake), sediments, fish and aquatic plants, local authorities prohibited the consumption of drinking water, bathing, fishing and also agricultural irrigation. The protective measurements were lifted after 15 days. The lifting of restriction actions was done by the Prefects (local authorities) on 22nd July 2008. However, the environmental surveillance implemented since the Socatri incident, was adapted by IRSN in agreement with local authorities to establish a broader monitoring plan, more appropriate to the Tricastin situation and allowing quick reactions in case of new exceeding WHO guideline values.

Public understanding of the emergency became difficult and complex since there was an additional emergency on the same day, 7th of July, 2008, in another nuclear installation in France. 15 EDF workers were exposed to what the company called "non-harmful" traces of radioactive elements at the Saint-Alban plant in the Alpine Isere region.

In September 2008, the measurement results identified the presence of a former uranium contamination within Tricastin groundwater not directly linked with the Socatri incident. Before the Socatri incident, AREVA and IRSN were already working on uranium contamination in Tricastin groundwater. The results of this former study were presented to the local information commission (CLIGEET) on July 4, 2008, just before the Socatri incident. The fears, concerns and interrogations from local populations and local decision-makers pushed AREVA and IRSN to continue the research on this uranium contamination. Taking into account the sensitive context associated with the leakage of uranium, IRSN and AREVA decided to implement their own research taking an innovative approach and involving local stakeholders.

Although different stakeholders were involved in decision-making, the local populations became more skeptical about official information related to the Tricastin situation and lost confidence on experts and decision-makers. Other emergency events in two months contributed to a decrease of public trust and an increase of public concerns.

A week after the uranium spill at the beginning of July, on 18th July, there was another incident at a fuel fabrication plant of Areva in Roman-sur-Isère, where liquid containing slightly enriched uranium leaked from an underground pipe. This may have happened already for several years, according to the operator FBFC (Franco-Belge de Fabrication du Combustible).[8]

On 23rd of July, a hundred people had to be evacuated from the Tricastin power plant nr. 4 reactor building and sent for anthropogammametric measurements, after a contamination of the air in the reactor building was detected. Some staff members at Tricastin were "*slightly contaminated*" by radioactive particles that escaped from a pipe in the reactor building, an EDF spokeswoman said. "*Seventy of them show low traces of radioelements, below one 40th of the authorised limit*," EDF said, adding that the incident would not affect people's health or the environment.[9] The company argued that sensors detected a rise in the radiation level while

[8] https://www.asn.fr/Controler/Actualites-du-controle/Avis-d-incident-des-installations-nucleaires/Rupture-of-an-underground-pipe-of-uranium-liquid-discharges-at-the-FBFC-plant (last accessed on 27 November 2018).
[9] http://news.bbc.co.uk/2/hi/europe/7522712.stm, https://www.asn.fr/Controler/Actualites-du-controle/Avis-d-

maintenance work was being carried out at a reactor that had been shut since 12 July. A level 0 INES was declared by ASN, the nuclear regulatory authority.

A few days later, on July 29th, 2008, more than 120 workers were evacuated a nuclear power plant in southern France after an alarm was set off. EDF said the alarm was triggered accidentally.[10]

All these events prompted calls by environmental groups for a national debate on the safety measures in nuclear power plants in France.

7.2 Public information, mass media and conflicting information

The leak happened late on 7th July Monday night, but people in the affected areas were not informed until Tuesday at 10.00. Days later, mass media reported that the French Nuclear Safety Authority (ASN) inspected the Tricastin plant and found that existing prevention measures were deficient and that its operator, Societe Auxiliaire de Tricastin (Socatri), had been too slow to inform authorities about the leak[11]. The ASN submitted a report to the state prosecutor for possible legal action against Socatri. They reported that the safety inspection found that "security steps aimed at preventing any further pollution were not completely satisfactory". The inspectors also found "irregularities" at the site's operations at the time of the leak. Socatri had been ordered to implement "a reinforced surveillance plan, including analysis of the surrounding rivers and ground water"(BBC). Later, on 24th of July media reported that a French nuclear monitoring body expressed concern at the number of leaks from French nuclear power stations in recent weeks. The director of Criirad, an independent body for research and information on radiation, said the organisation was worried by the numbers of people contaminated by four separate incidents. "In the most recent leaks, about 100 staff at Tricastin, in southern France, were exposed to low doses of radiation." (Criirad). It came two weeks after a leak forced the temporary closure of a reactor. There has also been a 10-fold increase in the number of incidents reported by people working in the French nuclear power industry, Criirad director Corinne Castanier said. "This type of contamination is a recurring problem. But that many people in such a short period of time, this worries us," she said[12]. Although the incident was rated as INES 0, NGOs linked the high number of incidents to an increased pressure to deliver energy quickly and suggested that working conditions were getting worse at power facilities. Media reported, that the environment minister has since ordered tests of all France's nuclear power plants to ensure such leaks have not gone undetected elsewhere.
Media attention was equally high for INES 1 or INES 0 event. For instance, for the event related to evacuation of the reactor building at 10 h 45 on July 29th the communication department, EDF received between 12 h and 19 h, 23 enquiries by national and local media (C. Herme, 2009).

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incident-des-installations-nucleaires/Contamination-of-a-hundred-workers-at-Tricastin-nuclear-power-plant-Drome (last accessed on 27 November 2018).

[10] https://www.reuters.com/article/france-nuclear-alarm/workers-evacuated-at-troubled-french-nuclear-site-idUSL933527320080729 (last accessed on 27 November 2018).

[11] For instance, BBC 11.7.20108: http://news.bbc.co.uk/2/hi/europe/7502208.stm (last accessed on 1 March 2018).

[12] http://news.bbc.co.uk/2/hi/europe/7522712.stm (last accessed 1 March 2018).

7.3 Public engagement in nuclear emergency management

A Pluralistic committee was established at Tricastin in order to engage different stakeholders in the emergency issue. Emergency and post-emergency management were discussed within a committee gathering experts form AREVA and IRSN as well as institutional representatives, various local decision-makers and local stakeholders as such as: representatives of Drome and Vaucluse departments, representative of the regional health agency, members of the Local Information Commission (with representatives of the local authority, trade unions and environmental NGOs) and a representative of an environmental NGO, i.e.: the Commission for Independent Research and Information about RADiation (CRIIRAD). From February 2009 to September 2010, this pluralistic committee met 8 times at the occasion of plenary working meetings and twice at the occasion of thematic working meetings dedicated to the understanding of the potential health effects of low doses and the different associated mechanisms. After almost 2 years, the results of the study followed by the pluralistic committee was summarized in a final report and was also presented at a public meeting on September 22, 2010 (*personal communication Mr. Hervé, 2009*).

This public meeting brought together local actors and inhabitants from the Tricastin region. Efforts made by IRSN and AREVA to work with transparency with the pluralistic committee and the adaptation of their research to respond to people's concerns were recognized and highly appreciated. During this public meeting, the different steps of the study, the results obtained and the interpretations made were presented in a pedagogical way by IRSN experts. Then, exchanges with local participants were the occasion for experts to address people's fear and concerns about their local situation. It appears that this transparent process highly contributed to alleviate public concerns.

7.4 Lessons learned from the Tricastin emergency event, France

1. The fact that there is no 100% safety and that a nuclear incident or accident can always happen needs to be admitted in communication.
2. Spokespeople and managers of nuclear installations are an important information source in case of emergency.
3. Journalists report directly from the place of the emergency.
4. Engage the local community in an early stage of emergency.
5. During an emergency, the communication process develops very fast and there is no time for coaching spokespeople or for searching the best way of communicating to the public. This should be trained and exercised before an emergency.
6. Public information cell needs full support of technical expertise as well as other experts e.g. legal aspects during the duration of an emergency. Spokesperson needs to have access to the decision-making body at any time.
7. Delay in communication about significant or insignificant events causes mistrust and loss of recognition of transparent communication.

Good practices from the Tricastin emergency event, France

- Establishment of a pluralistic committee involving the company, the technical support

organization, the local communities, NGOs, institutional representatives, etc to discuss and improve communication in emergency and post-emergency management.
- Involve a wide range of expertise in the public information cell (technical, legal, communication, etc) to enable them to be involved in communication any time.

Recommendations
- Regular training and exercises for spokespeople before an emergency.
- Communicate as soon as possible about significant or insignificant events in order to be recognized as a honest, transparent, trustful and high speed source of information.

8 Non-emergency events: very low concentrations of iodine-131 in air and increased levels of the radioactive isotope Ruthenium 106 detected in Russia and Europe

This chapter focuses on two cases which could be classified as non-emergency events: the very low concentrations of iodine-131 measured by European laboratories network in February 2017 and the high levels of the radioactive isotope ruthenium-106 detected in Russia in September-October 2017, measured above EU countries[13]. Greater attention has been paid in this report to the latter since the information related to public communication of the iodine-131 case was scarcer.

The information for iodine-131 case is mainly based on information on the internet pages of European nuclear safety authorities and IRSN, international organisations (the preparatory commission for the Comprehensive Nuclear-Test-Ban Treaty Organization, CTBTO), on-line media (EURACTIV) and social media (SAFECAST blog, the Independent Barents Observer). Also, the presentation "New Challenges in crisis communication. Results of societal survey in the Czech Republic" made by representatives of Czech authorities (the State Office for Nuclear Safety SÚJB and the National Radiation Protection Institute SÚRO) during the RICOMET 2017[14] has been also used to inform the case.

The ruthenium case information is mainly based on the following information sources: scientific articles (e.g. De Mutter et al., 2018), internet pages of European nuclear safety authorities, scientific communication by experts from different EU institutes (e.g. SCK•CEN and IRSN), social media (e.g. SAFECAST blog, tweets by the Royal Meteorological Institute in Belgium, personal tweets by a celebrity (famous weather forecast person and response of his followers), media articles, official communication by national and international organizations (e.g. IAEA) and personal discussion with public relations officers of EEAE, SNSA, IRSN, SCK-CEN and STUK and experts (IRSN, SCK•CEN) conducted in the context of this project.

8.1 The Iodine 131 case

In January and February 2017, radioactive iodine was detected at trace levels in the air in

[13] http://www.irsn.fr/FR/Actualites_presse/Actualites/Documents/IRSN_Report-on-IRSN-investigations-of-Ru-106-in-Europe-in-october-2017.pdf;
[14] http://ricomet2017.sckcen.be/-/media/Files/Ricomet2017/Day2/3_6_Ricomet_petrova.pdf?la=en&hash=399FF97F21116C404DBCF40FA13EE3F94B7777B4 (last accessed 2 March 2018).

Europe by the technicians of Europe's informal network of radioactivity surveillance experts, the Ring of Five. The Figure below show the locations and dates of atmospheric iodine-131 detections in Europe in early 2017.

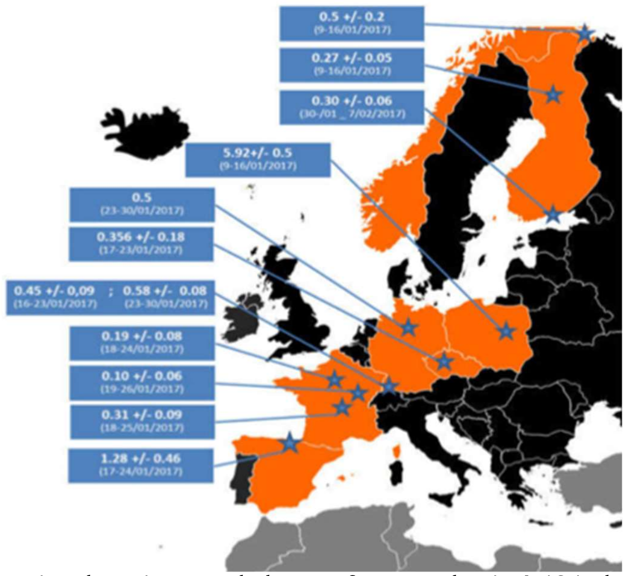

Figure 10: Map showing locations and dates of atmospheric I-131 detections in Europe in early 2017 in μBq/m3 (Source: IRSN).

Authorities in Europe such as IRSN in France tried to trace the origin of the atmospheric dispersion by effectively reversing the trajectory of its detection but acknowledge that this was not easy, particularly in view of the weather conditions experienced at the time of the detection. There were speculations that the I-131 could be produced from an unannounced Russian nuclear weapons test at Novaya Zemlya, the release from a civilian nuclear reactor or an incident during handling operations of damaged test fuel assembly at the HBWR research reactor in Halden, Norway. Pressed to comment on the spike in radiation levels, the European Commission sent the following statement to EURACTIV on 24 February: "we are aware of the reported measurements and will continue to monitor the developments, and liaise with the national authorities as appropriate. We also note that the measured levels pose no potential threat to human health"[15]. On 20th February 2017, CTBTO also published in their website that "if a nuclear test were to take place that releases I-131 it would also be expected to release many other radioactive isotopes"[16]. In April 2017, IRSN stated that "the most likely origin would be an industrial radioactive iodine production facility for medical applications" but "since the levels were very low, the emission source could not be determined with precision, but it is likely situated in Eastern Europe"[17].

In France, IRSN and in Finland, STUK, decided to publish a press release about the increased levels of radioactivity, whilst in Norway, the Head of section for emergency preparedness at the Norwegian Radiation Protection Authority declared that "the levels raise no concern for

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[15] https://www.euractiv.com/section/climate-environment/news/radiation-observatories-detect-iodine-leak-in-europe/ (last accessed on 1 March 2018).
[16] https://newsroom.ctbto.org/2017/02/20/media-advisory/ (last accessed on 1 March 2018).
[17] http://www.irsn.fr/EN/newsroom/News/Pages/20170411_Radioactive-iodine-detected-early-2017-in-Europe-not-related-to-incident-of-October-2016-in-Halden-Norway.aspx (last accessed on 1 March 2018).

humans or the environment. Therefore, we believe this had no news value"[18].

In the case of the Czech Republic and based on the presentation from Ms. Petrová and Ms. Fojtíkova at RICOMET 2017 mentioned above, SUJB received many questions by phone, email, letters, etc, from the public and the media. Despite statements published by SUJB in their official websites, on newspapers and on TV that the level of radioactivity was negligible from the point of view of radiation protection, public concerns increased over time. A number of websites providing incorrect information were identified as one of the main reasons for risk overestimation among the public and the media. AENews was one of the most professional disinformation websites spreading a hoax on the health risk of iodine 131. A statement strongly warning against this hoax was published on SUJB website, the Ministry of Health, Czech Press Office and the Ministry of Interior with the following messages:

- Measured concentrations of activity are not dangerous for human health;
- News spread by AENews (buy iodine tablets and dosimetry devices, etc) are totally absurd and apparently deliberately wants to cause panic in the Czech Republic for some reason;
- The purpose of this action is unknown, but the SUJB is considering to initiate a complaint against the distribution of the e-hoax;
- The SUJB appeals to the common sense of the citizens and the media.

After this statement, approximately in two weeks' time, AENews published other news unrelated to iodine 131.
USJB decided to conduct a sociological survey in March 2017 (3-4 weeks after the disinformation campaign) in co-operation with the Faculty of Social Sciences of the Charles University in Prague with the aim to evaluate the impact of the disinformation on the behavior and the attitudes of the public. 700 people aged between 18 and 65 from the whole country responded to the survey. It was found that those who had first access to information from social networks were more afraid than those who had accessed to information from other means (like television) and they also forwarded this information more than the rest. The case in the Czech Republic showed to the authorities firstly, the need to be prepared for new situations, like how to deal with unofficial sources of information in case of emergency, and secondly, even if the radiological impact is negligible, a proactive approach in the media is reasonable.

8.2 Context of the ruthenium-106 case

In late September and October 2017, Ru-106 was detected throughout the northern hemisphere by national environmental radioactivity monitoring networks in EU countries and by the International Monitoring System that is established to verify compliance with the Comprehensive Nuclear-Test-Ban Treaty. Ru-106 is a radioactive particulate that has no natural sources and therefore, there is no measurable global background of Ru-106. Based on the fact that only Ru-106 (and, in much lower concentrations and at fewer places, Ru-103) and no other fission products (such as iodine and caesium) were measured, a nuclear accident could be excluded.

Nuclear safety authorities in Europe and EU experts agreed that low concentrations of Ru-106 Ru-103 in Europe do not present any health risk to European citizens. However, they

[18] https://thebarentsobserver.com/en/ecology/2017/02/radioactive-iodine-over-europe-first-measured-finnmark (last accessed on 1 March 2018).

expressed concerns for the population living in the vicinity of the release. Concentration in a region of the source may be harmful for human health and would demand protective actions, including ban of food products and diet. The map below presents the release path through Europe (a snapshot on the 3rd of October, 2017) and shows which countries detected increase of Ru-106. The Ru-106 source was reconstructed using detections and non-detections from the International Monitoring System (IMS) that is being setup to verify compliance with the Comprehensive Nuclear-Test-Ban Treaty. The reconstructed source is then used by atmospheric transport modelling to predict the evolution of the plume of Ru-106 with time. The figure below shows the activity concentration per cubic meter from Ru-106 for the northern hemisphere. The location of the IMS stations is also shown. This figure and similar figures became publicly available – public information - and were reported in social media and traditional media.

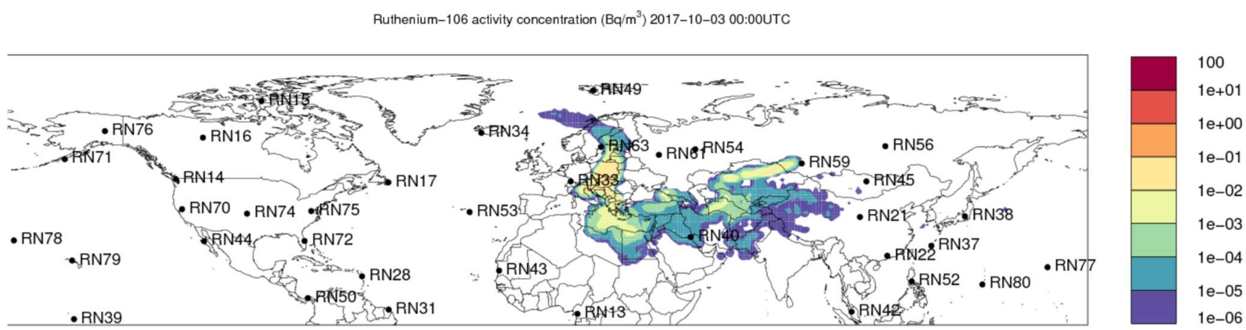

Figure 11. Ruthenium-106 activity concentration (Bq/m^3)

(Source: P De Meutter et al., 2018)

Public information has been conducted by national safety authorities and expert institutes, for instance, by the Institut de Radioprotection et de Sûreté Nucléaire (IRSN) in France. IRSN published a study on the possible source regions based on measurements exchanged via the "Ring of Five" network, an informal network of European experts. They employed forward atmospheric transport modelling over a limited domain to test which single grid box source could best explain the observations. They found that the detected Ru-106 was likely coming from an area between the Volga and the Urals (ISRN, 2017). This scientific result has been broadly reported in mass media and representatives of nuclear safety authorities and experts communicated about it with a broad public: gave public statements, interviews and participated in discussions[19]. The Mayak complex in the southern Urals, run by Rosatom and

[19] Some examples of news in the media include: http://www.dailymail.co.uk/sciencetech/article-5067243/French-institute-suspects-nuclear-accident-Russia-Kazakhstan-Sept.html
https://www.express.co.uk/news/world/882275/russia-nuclear-disaster-radioactive-cloud-europe-ural-mountains-isotope-ruthenium-106
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https://www.focus.de/wissen/natur/atom-radioaktivitaet-gemessen-experten-vermuten-quelle-im-ural_id_7687341.html

which reprocesses nuclear fuel for radioactive material used in research and industry, denied being the source. The IAEA report (2017, p. 4) states that "*Based on the monitoring data and the information provided by Member States to the IAEA, no specific event or location for the dispersal of Ru-106 into the atmosphere have been determined. It is currently not possible for the IAEA to make conclusions towards identifying a location of these release without factual reporting from a State of the origin of the release*".

The Nuclear Safety Institute of the Russian Academy of Sciences (IBRAE RAS) and the Russian National Commission for Protection against Radiation Risks came up with the initiative to set up an independent team of scientists who could establish the origin of the radionuclide.[20] In December 2017 the commission denied that the Mayak production association was the source of radioactive ruthenium 106 detected over Europe in September. IBRAE RAS announced the establishment of an international commission to investigate the incident. The government also announced the establishment of a new interdepartmental group (including different governmental departments in Russia) to study the situation concerning Ru-106.[21]

8.3 Public information regarding the ruthenium-106 event

The timeline of the incident, as described by Azy Brown (Safecast blog, 2017)[22], and considering the information provided by safety authorities and the media, is as follows:

Sept 29, 2017: The radioactive cloud is detected by several radiation monitoring stations in Europe; analysis of the findings takes several days and reports come after that.

Oct 3, 2017: The Austrian Ministry of the Environment and the Norwegian Nuclear Safety Authority report the detection of small quantities of Ru-106 in the atmosphere.

Oct 4, 2017: IRSN issues its first statement, saying it is working to detect the release.

Oct 4, 2017 and updated: Germany's BfS reports the Austrian detections and also reports that a trace monitoring station in Germany recorded low amounts of Ru-106 on October 4, while a National Meteorological Service monitoring station in Saxony detected traces on a sample collected between Sept 25 – Oct 2, 2017.

Oct 4, 2017: French newspaper Le Figaro reports IRSN's findings so far, noting that traces of Ru-106 had been found in Norway, Switzerland and Austria, and that IRSN had not yet detected the plume but was extending the sampling times on its filters in order to have a greater volume of air analyzed to increase the possibility of detection. Le Figaro notes that because of the very low levels detected, IRSN believes there is no danger to human health.

October 5, 2017: Other news sites, such as PhysOrg, note the BfS report, and quote a BfS spokesman as saying that calculations indicate it may have been released in eastern Europe.

(last accessed 1 March 2018)

[20] http://www.rosatom.ru/en/press-centre/news/nuclear-scientists-are-setting-up-a-commission-to-find-out-ruthenium-106-source-of-origin-/ (last accessed 1 March 2018)

[21] http://www.neimagazine.com/news/newsrussian-commission-says-mayak-not-the-source-of-ru-106-6000301

[22] https://blog.safecast.org/2017/11/about-that-radioactive-plume-of-ru-106/ (last accessed 1 March 2018)

Oct 8, 2017: BfS reports that its analysis points to the southern Urals as the likely origin of the release, although other areas south of that are possible. They rule out a nuclear power plant accident. They note that the levels of Ru-106 measured are very low, the highest concentration measured in Görlitz being about 5 Millibecquerels per cubic meter of air. "Assuming constant inhalation of this activity concentration for the period of one week would result in a dose being lower than the dose within one hour due to the natural radiation background. The measurements at the other stations (Arkona/Rügen, Greifswald, Angermünde, Cottbus, and Fürstenzell/Bavaria) are even lower." They go on to state:

"Considering that Russia must be assumed to be the region of origin of radioactive release, the Federal Minister for Environment, Nature Conservation, Building and Nuclear Safety (Bundesumweltministerium, BMUB) expects responsible Russian authorities, and IAEA, to provide robust information as soon as possible in order to help clarify the causes of the increased ruthenium readings."

Oct 8, 2017: Le Figaro publishes another article about the plume. They note the low levels reported by BfS, and add that the levels detected by the IRSN station at Seyne-sur-Mer are more than a thousand times lower than in Germany: 7.7 micro- Bq / m3. They say that IRSN and BfS have determined that the releases originated south of the Urals in Russia, but that Russian authorities have not yet commented on the incident.

Oct 9, 2017: IRSN issues an update saying that the releases appear to have originated in the southern regions of the Urals, and that the quantities detected suggest that the populations near the releases should be protected. They note that they are in close communication with BfS in Germany, which has independently reached similar conclusions. They are unable to confirm that the releases have ended at this point.

Oct 10, 2017: Russian state media outlet RT reports that although BfS analyses point to the southern Urals, Rosatom claims that "the radiation situation around all Russian nuclear facilities is within the norm and corresponds to natural background radiation." Rosatom strongly denies that the incident occurred in Russia. RT adds that Russia's meteorology service Roshydromet detected Ru-106 in St. Petersburg but nowhere else in Russia, and the levels detected were four times lower than allowed and "insignificant."

Oct 11, 2017: RT and RIA Novosti continue to try to discredit the data from IRSN and DfS, reporting that Rosatom called their reports "unfounded" and insisting that "the radiation situation around all the facilities of Russia's atomic industry remains within norms and corresponds to natural radiation level."

Oct 13, 2017: The IAEA issues a two-part report through the USIE portal, not publicly accessible (links to leaked version above). Based on past policy, we can expect these to eventually be published openly after a mandated review period.

Oct 19, 2017: Russian energy industry blog Geoenergetics publishes a lengthy article which attempts to discredit IRSN and BfS, and claims that the IAEA has exonerated Russia.

Oct 22 2017: Le Figaro reports that a month after the first detections of Ru-106 by several Western nuclear security authorities, pointing to Russia as the origin, Moscow continues to try to discredit their reports unconvincingly. Rosatom again insists that "facilities of the nuclear industry in Russia cannot be considered a source of discharges," and that they have seen no evidence of violations anywhere within their jurisdiction.

Nov 9, 2017: IRSN releases its 4-page report on the incident, mentioned above.

Nov 10, 2017: Le Figaro notes the Russian "counterattack" against the conclusions of the other European countries, and points out that the cause remains a mystery. They suggest that likely causes include an accidental degassing of a solution containing ruthenium resulting from the reprocessing of nuclear fuels, or ruthenium radioactive sources (used to irradiate certain tumors) that could have been lost and accidentally burned in an incinerator. They note that Russian authorities prefer the theory of the fall and disintegration into the atmosphere of a satellite with a ruthenium-powered electricity generator, but note that IRSN experts have investigated this possibility and consider it unfounded.

Nov 10, 2017: Other international news media carry the story, as mentioned above.*Nov 10, 2017:* Radio Free Europe reports that representatives of Kazakhstan's Nuclear Physics Institute said there had been no nuclear leaks detected in Kazakhstan in September and October. Officials at the Kazakh Institute of Radiation Security and Ecology in Kurchatov (center of the Soviet-era Semipalatinsk Nuclear Test Polygon) said that Kazakhstan does not have facilities that could accidentally release ruthenium to the atmosphere.

8.4 Role of nuclear safety authorities and research institutes in public information and transparency in the Ru-106 case

Nuclear safety authorities in Europe issued press releases with confirmation of the increased concentration of Ru-106 in the atmosphere based on their national measurements and in collaboration with other EU laboratories. They framed it as "*small quantities*". All authorities, from Greece to Finland and from France to Slovenia, simultaneously stated, that concentration is so low that there is "*no environmental and no health consequences expected*". They stated, that they were following the situation, continued monitoring and collaborated with the IAEA and other European safety authorities. They also reported measurements done by other safety authorities or referred to measurements done in other EU countries. Generally, press releases were issued mainly due to media pressure, with the exception of France. Samples of press releases were published also on the internet pages of the safety authorities -IRSN, France; EEAE, Greece; BfS, Germany; STUK, Finland; NSA, Slovenia - and are shown below. Based on this public information, representatives of authorities and experts were invited to engage in communication and public discourse and they needed to participate at different media outlets e.g. studio guests on the evening news. Public information (i.e. press releases) was not enough and media and the public demanded communication with questions and answers and pressed representatives of authorities and experts to "speculate" about the origin of the source.

Samples of press releases published on internet pages of European nuclear safety authorities and expert institutions are shown below and can be seen as a good public information practice.

IRSN
INSTITUT DE RADIOPROTECTION ET DE SÛRETÉ NUCLÉAIRE

OK | Your region | Your subject of interest | OK | EN FR

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NEWSROOM

- News and press releases
- Newsfeed
- Press contact

Home > Newsroom > News and press releases

Print Send

04/10/2017

Detection of ruthenium 106 in the air in the east and south-east parts of Europe

Ruthenium 106 has been detected by several European networks involved in the monitoring of atmospheric radioactive contamination. Ruthenium 106 is a radionuclide of artificial origin. It is a fission product from the nuclear industry. This radionuclide is also used in the medical field for brachytherapy treatments.

The Austrian Ministry of the Environment published Tuesday October 3rd 2017 a statement indicating that it detected small quantities of ruthenium without consequences for environment and health. The Norwegian Nuclear Safety Authority (NRPA) issued a press release also reporting low levels of ruthenium in the atmosphere.

For its part, the Swiss Federal Office of Public Health (FOPH) gave its first results of measurements indicating *"low levels of radioactivity in the air"*. These measurements *"revealed traces of ruthenium-106, a radioactive element with a half-life of 373.6 days, in aerosols taken from Cadenazzo, Ticino, between 25 September and 2 October 2017. The concentration of ruthenium 106 amounts to about 40 micro-Bq / m3, which is 17 000 times lower than the limit of air emissions set for this radionuclide in the Radiation Protection Ordinance."*

Since October 3, 2017, IRSN has mobilized all its measurement stations for atmospheric monitoring and undertook the analysis of their filter samples [1].

Analysis of the filters at the Orsay (91) and Grenoble (38) stations gives results of less than 50 micro-Bq / m3. It should be noted that the weather conditions of the last 48 hours did not favor the transfer of air masses from Eastern Europe to Western Europe. On the basis of the weather conditions of the last days, retro-trajectory calculations are under way, to try to determine the origin of this air pollution.

The very low levels of atmospheric contamination of ruthenium 106 observed to date by European monitoring networks have no environmental or health consequences. Nevertheless, IRSN maintains a watchful vigilance on this presence of ruthenium in the air.

[1] - In France, IRSN is responsible for monitoring the radioactivity of the atmosphere on a nation-wide scale. Its surveillance network OPERA-Air includes high-volume aerosol samplers (700 to 900 m3 of air per hour) and measurement equipment capable of detecting trace amounts of radioactivity.

< Back to all the news

Home / Uncategorized / Quantities of radioactivity were detected in the atmosphere of Greece and 6 more EU countries

EEAE

QUANTITIES OF RADIOACTIVITY WERE DETECTED IN THE ATMOSPHERE OF GREECE AND 6 MORE EU COUNTRIES

October 10, 2017 · Uncategorized · 6 Comments

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The Greek Atomic Energy Commission (EEAE) announced on Tuesday that in the period September 27 – October 5, 2017, small quantities of radioactivity were detected in the atmosphere at Athens. The isotope detected is ruthenium-106 (**Ru-106**).

According to the measurements performed by EEAE and the network of collaborating laboratories, traces of Ru-106 were detected in the atmosphere at very low concentrations (<5 mBq / m^3).

These concentrations levels do not pose risk to health or the environment, and no protection measures are required.

The data are communicated to the Incident and Emergency Centre of the International Atomic Energy Agency (IAEA). Sample measurements are ongoing and the results will be announced.

Similar findings have been reported by other countries, e.g. **Italy, Switzerland, Germany, Finland, Austria, Slovenia.** The abnormal radioactivity detection, although not of concern from radiation protection point of view, requires further investigation for the identification of the source of origin.

Notes:

1. The radioactivity levels in the air of the country are systematically monitored through

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Bundesamt für Strahlenschutz

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Startseite > Aktuelles > Weitere Meldungen > Geringe Mengen Ruthenium-106 in Europa gemessen

Pressemitteilungen
Weitere Meldungen
Veranstaltungen
Stellenangebote
Ausschreibungen
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Geringe Mengen Ruthenium-106 in Europa gemessen

- An zahlreichen Spurenmessstellen in Europa wurden seit dem 29.09.2017 leicht erhöhte Radioaktivitätswerte in der Luft nachgewiesen.
- Spurenmessstellen des DWD haben mittlerweile an 7 Stationen in Deutschland geringe Mengen von Ruthenium-106 registriert.
- Die Messwerte in Deutschland liegen zwischen wenigen Mikrobecquerel und 5 Millibecquerel pro Kubikmeter Luft.
- Bei dieser geringen Menge an Radioaktivität besteht keine Gesundheitsgefährdung für die Bevölkerung.
- Analysen zur Quelle des radioaktiven Stoffs deuten mit hoher Wahrscheinlichkeit auf eine Freisetzung im südlichen Ural hin, andere Regionen in Südrussland können aber nicht ausgeschlossen werden.

An verschiedenen Spurenmessstellen in Europa sind seit dem 29.09.2017 leicht erhöhte Radioaktivitätswerte in der Luft nachgewiesen worden. An insgesamt 7 Stationen in Deutschland sowie an zahlreichen Stationen in mindestens 13 weiteren europäischen Ländern (unter anderem in Österreich und Italien) wurden geringe Mengen an Ruthenium-106 (Ru-106) gemessen.

Die Messstation Schauinsland des BfS

Die Konzentration des radioaktiven Stoffs liegt in einem sehr niedrigen Bereich zwischen wenigen Mikrobecquerel und wenigen Millibecquerel pro Kubikmeter. Bei dieser geringen Menge an Radioaktivität besteht keinerlei Gesundheitsgefährdung für die Bevölkerung.

Unfall in Kernkraftwerk als Ursache ausgeschlossen

Da ausschließlich Ruthenium-106 nachgewiesen wurde, kann ein Unfall in einem Kernkraftwerk als Ursache ausgeschlossen werden. Ruthenium-106 wird unter anderem als Strahlenquelle für die Krebstherapie zur Behandlung von Tumoren am Auge eingesetzt. Außerdem wird Ruthenium-106 selten in sogenannten "Radioisotope thermoelectric generators" (RTG) verwendet, die der Stromversorgung von Satelliten dienen. Auch bei der Wiederaufarbeitung von nuklearen Brennelementen kann Ruthenium auftreten. Die französische Strahlenschutzbehörde > **IRSN** (Institut de Radioprotection et de Sûreté Nucléaire) zieht nach einem fachlichen Austausch mit dem BfS ähnliche Schlussfolgerungen.

Die Herkunft des gemessenen Rutheniums-106 ist noch unbekannt. Durch Rückrechnungen der Ausbreitung von radioaktiven Stoffen in der Atmosphäre können die Gebiete eingegrenzt werden, in denen die Freisetzung erfolgt sein könnte. Neue Analysen zur Quelle des radioaktiven Stoffes deuten mit hoher Wahrscheinlichkeit auf eine Freisetzung im südlichen Ural hin, andere Regionen in Südrussland können aber weiterhin nicht ausgeschlossen werden. Abschätzungen zufolge ist die Freisetzung des radioaktiven Materials in der letzten Septemberwoche erfolgt.

Das BfS wertet permanent alle verfügbaren Messungen von radioaktiven Stoffen in der Atmosphäre aus, unter

KONTAKT

Bei Fragen kontaktieren Sie bitte unsere Pressestelle

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Helsingissä kerätyssä ilmanäytteessä pieni määrä radioaktiivista ainetta

Helsingissä kerätyssä ilmanäytteessä pieni määrä radioaktiivista ainetta

3.10.2017 klo 15:11 / Verkkouutinen

Säteilyturvakeskuksen (STUK) Helsingin valvonta-asemalta 28.9.–3.10. kerätyssä ilmanäytteessä oli rutenium-alkuaineen radioaktiivista isotooppia (Ru-106). Helsingissä mitattu radioaktiivisen ruteniumin pitoisuus oli 80 mikrobecquerellia kuutiometrissä ilmaa. Määrä on niin pieni, että sillä ei ole merkitystä ympäristön tai ihmisten turvallisuudelle.

Radioaktiivisen ruteniumin alkuperästä ei tällä hetkellä ole tietoa. Se on metallinen aine, jota käytetään esimerkiksi ihosyöpien ja silmän syöpien hoitoon.

Radioaktiivista ruteniumia on syys- ja lokakuun vaihteessa havaittu eri Euroopan maissa kerätyistä ilmanäytteistä. Myös Norjan ja Ruotsin säteilyturvaviranomaiset ovat kertovat, että niiden ilmanäytteissä on mitattu samaa ainetta.

Helsingin lisäksi STUK valvoo ilman radioaktiivisten aineiden pitoisuuksia seitsemällä muulla paikkakunnalla. Muiden valvonta-asemien mittaustulokset valmistuvat myöhemmin. Menetelmällä havaitaan erittäin pienet muutokset säteilytilanteessa.

STUK valvoo ilman radioaktiivisten aineiden pitoisuuksia

STUK valvoo ulkoista säteilyä Suomessa paitsi ilmankerääjien keräämistä näytteistä myös automaattisella säteilyvalvontaverkolla, johon kuuluu 255 mittausasemaa. Mittausasema hälyttää välittömästi, jos säteilytaso kohoaa normaalista taustasäteilystä, joka on 0,05–0,3 mikrosievertiä tunnissa. Ulkoisen säteilyn normaali vaihtelu on suurempaa kuin mitä aiheutuu nyt ilmanäytteestä mitatusta aktiivisuuspitoisuudesta.
Tästä syystä valvontaverkko ei havaitse pitoisuuksia, joita nyt on mitattu ulkoilmasta.

Lisätietoja ulkoilman radioaktiivisten aineiden valvonnasta sekä ulkoilman radioaktiivisten aineiden mittaustulokset löytyvät STUKin internetsivuilta. Ilmassa oleva ruteniumin, Ru-106, paljastaa mittauksissa sen radioaktiivisessa hajoamisessa syntyvä tytämuklidi Rh-106, rodium.

Lisätietoja:

Laboratorionjohtaja Maarit Muikku, puh. (09) 759 88 509

Säteily ympäristössä

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NOVICA

9. 10. 2017

Sledi Rutenija-106 v zraku

V preteklem tednu je Uprava RS za jedrsko varnost, podobno kot sorodni upravni organi v Evropi, v zraku zaznala zelo nizke ravni radioaktivnega izotopa rutenija-106. Takšne nizke ravni so zaznali merilniki radioaktivne kontaminacije zraka v Ljubljani in v okolici Maribora.

Takoj po odkritju je URSJV naročila dodatne meritve z namenom nadaljnjega spremljanja ravni in razširjanja radioaktivnih snovi. Meritve še potekajo, največje vrednosti pa so bile izmerjene 4. 10. 2017, in sicer 37 mBq/m3.

Gre za zelo nizke ravni radioaktivnosti, ki nimajo nobenih okoljskih ali zdravstvenih posledic in so več tisočkrat nižje od predpisanih mejnih vrednosti za prebivalstvo. Za primerjavo, vsak prebivalec Slovenije (ali Evrope) od naravnih virov vsakodnevno prejeme 100 krat večjo količino sevanja.

O rezultatih meritev pri nas je URSJV danes obvestila tudi Mednarodno agencijo za atomsko energijo. URSJV zelo pozorno spremlja tudi rezultate meritev iz drugih evropskih držav in ugotavlja, da so njihovi rezultati primerljivi našim.

Rutenij-106 je radionuklid umetnega izvora, uporablja pa se v medicini za zdravljenje tumorjev na očeh.

V Sloveniji ni bilo dogodka ali aktivnosti, ki bi lahko povzročil izpust rutenija v ozračje, do sedaj pa še ni bilo ugotovljeno, od kje je radioaktivnost dejansko prišla.

URSJV bo še naprej spremljala stanje in obveščala javnost in strokovne institucije o ugotovitvah.

8.5 Mass media and social media response regarding the Ru-106 case

There was great mass media pressure on public relations officers in many EU countries. Vasiliki Tafili, spokesperson at the Greek Atomic Energy Commission (EEAE) summarised her experience regarding the Ru-106 case to the members of this consortium, as follows:

- On October 9, late afternoon EEAE issued an announcement at the website in Greek and English[23]. The announcement was also posted at EEAE social media accounts on the same day (Facebook, twitter).
- The media interest was very intense on the following 3 days (10 - 12 October). More than 30 journalists representing different media contacted EEAE asking for information on the topic. However, the number of the phone calls was much larger, since all these journalists kept calling asking for updates or asking for interviews/statements every day.
- On October 12, EEAE issued a second announcement at the website in Greek and English[24].The announcement was also posted at EEAE social media accounts on the same day (Facebook, twitter).
- EEAE decided from the very beginning of the crisis to keep the media exposure to the minimum level, due to the fact that there was no radiological risk and due to the uncertainty about the origin of the Ru-106. In general, a graded approach in media exposure was followed, based on the risk involved. Therefore, journalists were given all the necessary information by phone or email and EEAE rejected all proposals for TV and radio interviews or statements, explaining that there was no radiological risk that justifies any other information action by EEAE. EEAE avoided any scenario-based discussion regarding the origin of the Ru-106 traces. The Chairman of EEAE made only one statement to a national newspaper in the beginning of the crisis and gave one radio interview some weeks later. During the crisis, only the Head of the International and Public Relations Officer was authorized to speak with journalists. However, due to the absence of the Head of the International and Public Relations Office who was abroad for other professional obligations on October 11 and 12, some of the contacts with journalists were assigned to other EEAE staff.
- A comment on media reaction in Greece: the topic of radioactivity detection in Greece and in Europe appeared in most of the papers on 11 October (not in front covers) and it was among the top topics in all news websites on 10 and 11 October. It was an extraordinary and unusual news story that caused a lot of media attention mainly by TV stations and websites.

The media interest was also enormous in other EU countries. The Nuclear Safety Authority SNSA from Slovenia reported for this project the following:

> Regarding Ru-106 over Europe, we can confirm that the interest in the media and the public in Slovenia was great. We issued a press release[25] on our website on 9 October 2017, after we gathered relevant information from our authorized organizations. Slovenian media informed us that some neighbouring countries (Italy, Austria) published similar news a few days earlier. This confirmed our belief that when

[23] http://eeae.gr/en/news/announcements/5997-detection-of-ruthenium-106-in-the-atmosphere (last accessed on 1 March 2018).

[24] http://news.bbc.co.uk/2/hi/europe/7522712.stm (last accessed on 1 March 2018).

[25] http://www.ursjv.gov.si/si/info/novica/5981/ (last accessed on 1 March 2018)

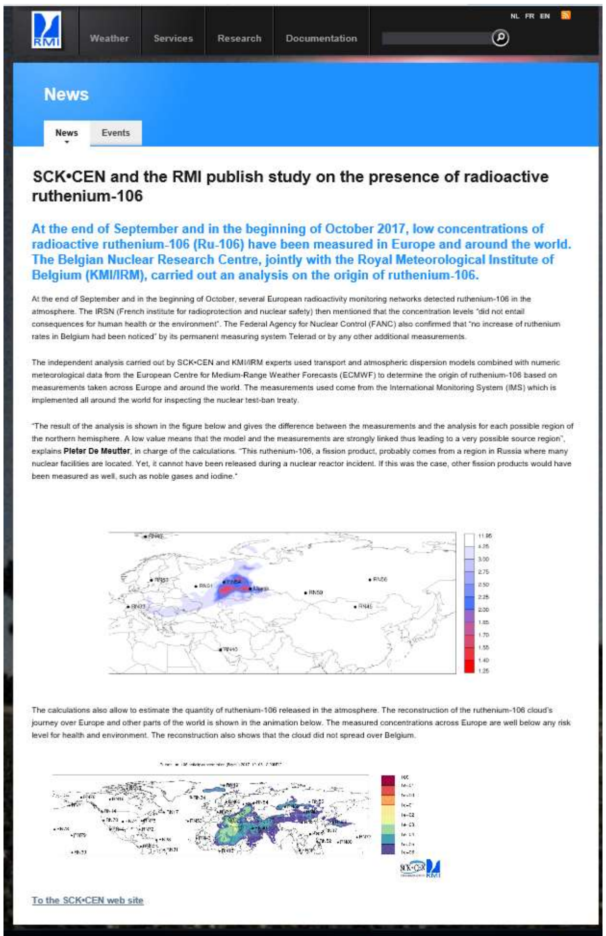
we have the relevant information, and the Ruthenium case was, we need to inform the public about the matter.

Our press release was captured practically by all media in the country on the same day. The next day, the subject was commented by Mr. Michel Cindro, monitoring expert at all major TV stations (RTV Slovenija - Odmevi, POP TV, Kanal A, Planet TV), as well as some other nuclear experts from the Jožef Stefan Institute.

On the topic of Ruthenium, another press release was published on 10 November 2017[26], which was mostly summed up by the media. However, media attention decreased and there were no more requests. In addition, Mr. Cindro was an in-live guest on the Slovenian evening news at 19:00 on RTV Slovenia.
Social media was not specifically monitored, so it is difficult to say anything about some special experiences here, but the fact is that the media were satisfied with our explanations and that some further exaggerated reactions on social networks were not detected.

The topic was newsworthy also for social media in other countries. NGOs and citizen science organisations, for instance Safecast, wrote blogs, expressing lack of transparency especially related to origin of the Ruthenium increase. Some expert organisations were involved in the discussion and tried to clarify (no)risks for health and environment as well to present scientific calculations to broader public. SCK·CEN and the Royal Meteorological Institute from Belgium, for instance, published scientific results on 21st of December 2017. These results were tweeted by Mr. Frank Deboosere, famous weather forecast person from national TV (see below)[27].

[26] http://www.ursjv.gov.si/si/info/novica/5991/ (last accessed on 1 March 2018).
[27] https://twitter.com/frankdeboosere/status/943939773382774785 (last accessed on 1 March 2018)



Weather Services Research Documentation

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News

News Events

SCK•CEN and the RMI publish study on the presence of radioactive ruthenium-106

At the end of September and in the beginning of October 2017, low concentrations of radioactive ruthenium-106 (Ru-106) have been measured in Europe and around the world. The Belgian Nuclear Research Centre, jointly with the Royal Meteorological Institute of Belgium (KMI/IRM), carried out an analysis on the origin of ruthenium-106.

At the end of September and in the beginning of October, several European radioactivity monitoring networks detected ruthenium-106 in the atmosphere. The IRSN (French institute for radioprotection and nuclear safety) then mentioned that the concentration levels "did not entail consequences for human health or the environment". The Federal Agency for Nuclear Control (FANC) also confirmed that "no increase of ruthenium rates in Belgium had been noticed" by its permanent measuring system Telerad or by any other additional measurements.

The independent analysis carried out by SCK•CEN and KMI/IRM experts used transport and atmospheric dispersion models combined with numeric meteorological data from the European Centre for Medium-Range Weather Forecasts (ECMWF) to determine the origin of ruthenium-106 based on measurements taken across Europe and around the world. The measurements used come from the International Monitoring System (IMS) which is implemented all around the world for inspecting the nuclear test-ban treaty.

"The result of the analysis is shown in the figure below and gives the difference between the measurements and the analysis for each possible region of the northern hemisphere. A low value means that the model and the measurements are strongly linked thus leading to a very possible source region", explains **Pieter De Meutter**, in charge of the calculations. "This ruthenium-106, a fission product, probably comes from a region in Russia where many nuclear facilities are located. Yet, it cannot have been released during a nuclear reactor incident. If this was the case, other fission products would have been measured as well, such as noble gases and iodine."

The calculations also allow to estimate the quantity of ruthenium-106 released in the atmosphere. The reconstruction of the ruthenium-106 cloud's journey over Europe and other parts of the world is shown in the animation below. The measured concentrations across Europe are well below any risk level for health and environment. The reconstruction also shows that the cloud did not spread over Belgium.

To the SCK•CEN web site

People started to react on the tweet: some expressed concerns, some expressed scepticism about no health effects, one person even claimed that got bleeding from eyes due to increased Ruthenium. Since some people indicated that this kind of results were too late and expressed dissatisfaction with "slow" reaction of scientists, SCK•CEN decided to involve in the discussion on twitter. SCK·CEN tweeted the following "*SCK • CEN scientists followed this up from the first indication of Ruthenium increase. Based on the measurements, we knew that* *there was no risk to health and the environment in Belgium. Here we show a scientific study that requires more time.*" Tweets following the SCK•CEN response expressed support for valorisation of results, trust in measurements and good reputation of the SCK•CEN researchers. Some tweeters even expressed that they would contact SCK•CEN for more information. SCK•CEN scientists were contacted afterwards by a company collaborating with another company close to the source of Ruthenium. They were concerned about sending their workers to the "potentially dangerous" environment. This company appreciated advice given by SCK•CEN scientists.

In the case of Finland, Mr. Risto Isaksson, Communication Specialist at STUK, reported for this project that the first press release was at 2pm on 3rd of November 2017[28]. The information of the press released focused on the findings in Finland and in other European countries and the fact that there was no risk or harm to the environment or to the people because of ruthenium. The Finnish media started to make news stories on the issue only after that and practically all stories based on the information in the STUK's release. STUK nominated one of their specialists as the main spokesperson on the issue and she gave a few interviews during the afternoon.

The second press release was published on 10th November 2017[29]. This press release and the media interviews were based on the following messages:

- Radioactive ruthenium was detected in Helsinki, Imatra, Ivalo, Kajaani, Kotka, Kuopio, Rovaniemi and Sodankylä between September 28 and October 9 October. After that ruthenium was not detected in Finland;
- STUK continually monitors environmental radioactivity in Finland and ensures that Finnish safety is not jeopardized due to radioactivity. Correspondingly, the authorities in other countries are responsible for radiation control and safety in their own countries. According to international agreements, countries report abnormal events and radioactivity for example to the International Atomic Energy Agency (IAEA), which transmits information to member states.
- Ruthenium concentrations in air samples ranged from 15 to 850 micro becquerel per cubic meter of air. Such quantities are so small that they are not relevant to the safety of the environment or people.
- It is unknown where ruthenium comes from. No state or organisation has reported any damage or accident that could be the source of the ruthenium. Since there are no other radioactive substances in addition to ruthenium, ruthenium is not a nuclear explosive or a nuclear power plant accident. According to calculations based on airflows made by STUK and the Finnish Meteorological Institute, the source of the release could be somewhere south from Ural. The calculations involve a lot of uncertainties, so the location or the size of the initial emission cannot be known.

On 9th November 2017 Reuters had published a piece of news about a "possible nuclear accident in Russia or Kazakhastan" and this piece was also published in the Finnish media.

[28] http://www.stuk.fi/-/helsingissa-keratyssa-ilmanaytteessa-pieni-maara-radioaktiivista-ainetta (last accessed on 1 March 2018).
[29] http://www.stuk.fi/-/suomessa-ei-ruteniumhavaintoja-lokakuun-alun-jalkeen (last accessed on 1 March 2018).

The third press release about ruthenium detections was on 21st November 2017[30]. It was after Rowsgiromet had informed about the detections made in Russia. This was noticed also in Finnish media and the press release was a reaction to the media interest.

The third press release summarised the detections made in Russia and in other European countries and put them on scale (The findings were of the same magnitude everywhere. The concentrations of ruthenium do not harm the environment or people). Some media, like YLE, the Finnish Broadcasting Company, among others, published news about the case just after STUK's press releases[31].

The press releases were also linked to STUK's social media platforms (facebook and twitter). Some STUK's employees also have the routine to publish STUK's updates on their social media accounts (and STUK encourages staff to do so). Although STUK did not want to guess the possible source of the release, Finnish media found the speculations from abroad and published them.

In addition to the press releases, STUK always published the results of outdoor radioactivity measurements when completed, on the webpage[32]. A number of media interviews were given by STUK, probably around five to ten interviews every time they published a press release.

Co-operation with other Nordic and Baltic countries is highlighted by the STUK communication specialist: "*As a standard procedure public communicators at STUK and public communicators at our sibling organizations in Norway, Sweden, Denmark, Estonia and Lithuania shared information with each other even before any public communication activities took place. So we were aware of the coming press releases in neighboring countries and could coordinate our own activities with them*".

8.6 Lessons learned from the I-131 and Ru-136 cases

In the case of I-131 event, as stated above, the main lessons learned are the following: the need to be prepared for new situations, like how to deal with unofficial sources of information in case of emergency, and even if the radiological impact is negligible, a proactive approach in the media is reasonable.

Regarding the Ru-106, different safety authorities in Europe (among others, Austria, Czech Republic, Finland, France, Germany, Greece, Norway, Slovenia and Switzerland) detected increased radioactivity levels of Ru-106 in Europe and reported that these small quantities do not represent a risk to human health or the environment. No public protective actions were reported by the Member States to the IAEA (IAEA, 2017).

This event received extensive media and public attention for around 40 days. Even if there was not an emergency as such in EU, there was a demand for information. This isotope had not been recorded on a continental scale since the Chernobyl disaster.

[30] http://www.stuk.fi/-/ruteniumhavainnot-venajalla-samaa-suuruusluokkaa-kuin-etela-euroopassa (last accessed on 1 March 2018)

[31] News published by YLE can be found: https://yle.fi/uutiset/3-9864427 and https://yle.fi/uutiset/3-9940944 (last accessed on 1 March 2018).

[32] http://www.stuk.fi/web/en/topics/environmental-radiation/radioactivity-in-outdoor-air (last accessed on 1 March 2018).

The fact that Russia denied the information and did not provide any information to the public could give the impression that radiological issues are not fully under control in some countries like Russia or Kazakhstan and may influence negatively the image of nuclear facilities in Europe. The history of hiding information in Russia and particularly during the Mayak accident in 1957 and after Chernobyl, creates a climate of suspicion regarding the level of information that Russian authorities disclose.

The lessons learned in this case are the following:

- any incident related to radiological issues might be used as an opportunity to communicate on radiological emergencies and to raise awareness on ionizing radiation among the general public;
- communicating about incidents related to radiological issues might help to increase recognition and build trust;
- a proactive approach in the media is reasonable even if the radiological impact is negligible;
- nuclear safety authorities should be better prepared to deal with unofficial sources of information in case of emergency;
- the history of secrecy around the nuclear sector in the past is still evident nowadays and points out to the low level of transparency of nuclear activities in post-Soviet states;
- reporting of nuclear incidents at international level as it is undertaken nowadays may risk that no one is held responsible for radiological releases;
- even if a radiological event does not have any health or environmental impact in Europe, European citizens may have concerns and even some may be directly impacted e.g. workers, tourists, etc and may request information.
- providing public information on a radiological event is not enough for media and citizens. Nuclear safety authorities should engage early enough in a two-way communication, rather than only providing one-way information.

Good practices from the I-131 and Ru-106 cases

- To communicate radiological events occurring beyond the national borders, even if they do not involve health or environmental impacts, as it will allow the nuclear safety authority to lead communication in case of future rumours and/or excessive media coverage;
- Use radiological events as an opportunity to raise awareness about the role of the nuclear regulatory authority and ionizing radiation.
- Respond to misinformation by using the communication channel where the misinformation appeared.
- Empower experts to communicate about the issue from their field of expertise.

9 Public information and transparency related to nuclear emergencies collected by FP7 and H2020 projects

The following lessons learned are based on project results from PREPARE, EAGLE, CONCERT, OPERRA, projects reported in the “Science for disaster risk management 2017: Knowing better and losing less”(EC, 2017) and article “Communication with Media in Nuclear or Radiological Emergencies: General and Practical Recommendations for Improvement” (Perko et al., 2016). Good practices extracted from these different projects are shown in italics.

Lessons learned and good practices related to mass media communication

- Mass media communication is a challenge for emergency management since communication has evolved into a multiple-way process where information is disseminated at an, often, uncoordinated incredibly rapid pace, and is able to easily reach all kinds of audiences: affected, indirectly affected and not affected by radiological risks. Social media has provided all users a virtual platform to express themselves and share information. An overload of (mis)information coming from different sources (e.g. government, expert organisations, traditional media, individuals, inhabitants, NGOs etc.) can make it difficult for people to know which information is correct. Moreover, the rise of social media has enabled users to demand more transparent, high-speed communication and accountability from governments, public institutions and emergency managers. It is therefore of importance that nuclear emergency communicators *keep track of all the parties that might be interested in the nuclear emergency and to correct any incorrect information or add information that is incomplete*. Besides their obvious advantages, social media can potentially become a tool for misinformation and manipulation, as well as spread anxiety. These actions may cause high time pressure and an additional personnel burden for emergency management (Perko, Mays, Valuch, & Nagy, 2015) as well as requiring skills, training and resources.
- Mass media communication offers great opportunities for emergency management since it is by definition capable of reaching a large number of people simultaneously (Wimmer & Dominick, 2006). In the early phase of an emergency, mass media can increase awareness and understanding of protective actions and improve the response of affected populations. In the medium and long term, media can facilitate the information and communication regarding the remediation process and the return to normal life. Effective media communication can support implementation of protective measures, reduce public fears and thus minimize the chance of negative psychological effects and help sustain public confidence in the organizations that are responsible for emergency management (Perko, 2012). Moreover, *emerging and evolving communication technologies, such as social media, offer the possibility of improved nuclear emergency communication, as these technologies have the potential for increased information capacity, dependability and interactivity* (Jaeger et al., 2007).

Lessons learned and good practices related to research in nuclear emergency communication

- In the new era of citizen science, *nuclear emergency communicators should*
- *support citizen engagement and create opportunities for people to monitor radioactivity with the help of scientists*. Knowledge-based society requires citizens' involvement in nuclear emergency preparedness, response and recovery at a large scale, including local communities, teachers, students, health professionals, mothers, volunteers, etc.
- *Nuclear emergency management should promote a trans-disciplinary approach in research on public information in nuclear and radiological emergencies*. This refers especially to improvement of collaboration between the technical and natural sciences and social sciences and humanities.
- *Scientists* should be educated about the value of *openly communicating their knowledge, uncertainty and scientific limits to the public* in time of an emergency and before.

- Research on communication in nuclear and radiological emergencies needs to be more action-oriented. Simply generating new knowledge is not enough; this should be complemented by transferring new knowledge into practice. Results of projects need to contribute more to achieving positive changes in real life. In this regard, *governmental stakeholders need to support responsible research related to emergency management, which implies giving due attention to social and ethical issues in the research and practice of communicating about nuclear and radiological emergencies*.
- Assessment of the evacuation cases in time of nuclear and radiological emergencies shows that evacuation creates confusion regardless how it is planned. *Nuclear emergency actors need more research on the evacuation in case of nuclear emergencies and complex exercises, where communication aspects are trained as well* (Malesic, Prezelj, Juvan, Polic, & Uhan, 2015; Perry & Lindell, 2003; Swain & Tait, 2007). Additionally, *practical exercises are required to train people to react properly in case of an emergency*.

Lessons related to the role of journalists on emergency communication

- The interest of journalists in playing an active role in communication planning and preparations before the outbreak of nuclear and radiological emergencies should be encouraged and opportunities created. In this respect, the common ground between journalists and other stakeholders in nuclear emergencies should be improved.
- Involvement of communication aspects in nuclear emergency exercises, for instance students of journalism are highly recommended. Journalists themselves have limitations to participate in such exercises because of their ethical code, while students of journalism can.
- Discussions with journalists on emergency communication resulted in the following recommendations:
  - International communication networks need to be operational.
  - Coordination among supranational authorities to produce reliable data is important.
  - More transparency and honesty from governments would be welcomed.
  - Journalists need to be helped by their science colleagues or external experts (somebody needs to translate specific data to ordinary journalists) because most do not have sufficient knowledge on nuclear issues. Media need two-sided information (risks-benefits, pro-contra…)
  - Even under uncertainty, society demands information after an accident or during an emergency and journalists need to prepare for that.
  - Try to understand that press cannot wait – it has short deadlines. They need to meet the deadline even if they may make a mistake.
  - Coordination of official information is important, but journalists cannot always trust the official information.

Lessons learned and good practices related to the information in communication of emergencies

- Each country has its own communication and interest specifics during an emergency. Communicators have to be aware of them. Similarly, it is important to *know your public (i.e. attitudes, risk perceptions, historical memory) and address these characteristics in your communication*.
- The nuclear –emergency information is the most newsworthy for the media at the beginning of the accident. At a later stage, media re-orientate the attention to other topics.

It is always interesting to *communicate contextual information such as evacuation plans, stress tests results, similar NPP, basic knowledge* (e.g. difference between contamination and irradiation) not only radiological risks.

- When appropriate, *compare radiological risks of the present accident with radiological risks of previous nuclear accidents*. Be well informed about all major nuclear accidents, since media as well as public make links between any nuclear event and major nuclear accidents like Chernobyl or Three Miles Island and information about them is always available on internet.
- Communicators have to respond to requests for information not only related to emergency but simultaneously also other non-emergency topics (such as energy shortage and supply, nuclear technologies, nuclear waste). In this regard, it is important to *remain impartial on related political topics* (e.g. when being asked to take a side related to a nuclear energy policy). In addition, it is important to communicate about water consumption issues, followed by farming products already during an early event although not contaminated. Food predicts and food chain are of great media interest. *Other topics* such as duration of sheltering of the population, measurement of people's contamination, especially of iodine in thyroid of children, and the use of iodine tablets as a prophylactic measure, *are also topics of great media interest. Evacuation has to be communicated intensively not only to evacuees but also to a global public worldwide*. Media are interested in evacuation since it can be presented as an event.
- *Develop and make available visual material in advance*; this should cover an *explanation of radiation doses and effects, and in perspective of other exposures and risks*. In addition, be consistent with units (e.g. mSv or roentgen) and understand that numeracy related to risk and safety is meaningful only to a limited number of journalists and people.
- In communication practice, nuclear emergency management needs to consider a broad spectrum of risks, such as: disease risks, ethical risks, risks from radiation protection countermeasures, psychological risks, etc. If risks are related to uncertainty, then nuclear emergency communicators need to learn how to *communicate uncertainty to the people*, e.g. acknowledge scientific dispute over the effects of long-term exposure to low doses of radiation, admit when knowledge is lacking, but *underline areas where there is scientific consensus*.

Lessons learned and good practices related to new mass media

- Use complementary animated graphics, multimedia and links to updates from other web and social media. Help readers to understand and *visualize complex topics with graphics, animated maps and comparisons* (e.g. radiation levels with CT scan, X-rays, annual doses for all sources and for natural source). However, context is essential and maps will usually not be sufficient.
- Expand from a one-way news provision from traditional media to *open for feedback by using internet* (e.g. comments, twitter feed) and *interactive internet pages* which incorporate readers' changes requests.
- Give media *training to experts* so they are able to explain events and be involved in on-line communication and explanation of ionizing radiation. Additionally, be prepared to have *expert-volunteers on line to establish dialogue with citizens* and with other experts having different opinions.
- Have a rumours control centre and *active response on rumours* disperse by new media.
- Use plain language versus scientific language in order to reach a wider audience. Organise *pseudo-events to attract the media attention*, for instance excursions to a contaminated site

or visits to waste disposal sites, and *stream them on-line* and publish them on YouTube or other social media channels.

- Organise *radiation seminars on line* for the public to help reduce anxieties in the post-disaster setting or public presentations on the technical aspects of the Fukushima nuclear accident for interested laypersons.
- *Establish relationships among the information sources long before the emergency* also by using social networks.

10 Final remarks

This section summarises the lessons learned and good practices from the decisions and actions undertaken during the radiological events described in this document and which appear to be effective in terms of public communication.

- Although nuclear emergencies have a low frequency, their potential high consequences make it essential to learn from previous experiences, including what worked well and what did not in the field of communication.
- In the triangle among governmental stakeholders (especially public information officers), scientists/experts and journalists, a partnership is of paramount importance. This partnership should be based on mutual respect, trust and honesty.
- Communication about ionizing radiation is too often seen as a one-directional transfer of information from a source to a receiver, inspired by the idea that the general public needs to be educated by explaining facts to them. However, nuclear emergency management should conceive and define the communication process as bi-directional or multi-directional, where citizens and the public play a more active role. Thus, the communication process needs to be expanded from a simple provision of facts to a recognition that mutual learning and transparency among all stakeholders should be encouraged.
- The radiological events raise public attention, which offer great opportunities for communicators to explain basic radiological concepts as well as the actions to be undertaken during an emergency.
- During an emergency, the communication process develops very fast, so there is no time for coaching spokespeople or for searching the best way of communicating to the public. Furthermore, more spokespersons than initially foreseen are often needed given the pressure on site (not only to public information officers) and the mass media communication. For this reason, training of spokespersons and preparation of material beforehand is crucial. Spokesperson needs to communicate with different groups (e.g. employees, local trade unions, local authorities, etc) and this demands skills to be developed before the emergency. Spokespersons need the full support of technical experts and others during all the duration of an emergency. Spokesperson needs to be part of the decision-making body. Additionally, preparation of communication material not only in the local language but in other world spoken languages (e.g. English) is advisable; taking cultural and political differences into account.
- Nowadays, corporate crisis communication strategies need to consider not only traditional but also social media. Internet and new media are a powerful channel and it should be used for public communication more efficiently.
- In the cases analysed for this report, the level of INES did not seem to make a difference regarding the need for an open and transparent communication of the event from the beginning. It seems clear though that the INES rating proves more effective if lower levels of the scale are also communicated (like events of level 1 or below). However, the extent

to which the INES rating helps in effective communication with the public need further research. From the previous research projects listed in Section 8, it has been shown that if the INES is used as a comparison criterion or reference with other radiological or nuclear emergencies, supplement with animated graphics, multimedia and links to updates from other websites is useful.

- Technical questions from the public are not the most challenging for public communication. The most challenging is to explain and justify a delay in communication. This delay in information may be the reason for the lack of trust and transparency. So, there is a need to communicate timely, even if related to an insignificant event.
- So far, in the cases studies provided in this report, the role of non-state actors, particularly radiation protection societies and associations, is irrelevant. However, it is worth noting that the International Radiation Protection Association (IRPA) is in the process to develop the "IRPA guiding principles for communicating and engagement with the public" to be presented in 2019.

11 Conclusions

This report describes seven radiological and nuclear events which have prompted different communication challenges and responses from European nuclear regulatory authorities. Furthermore, it synthesis the results of different European projects addressing communication in ionizing radiation. After considering the way communication was handled in the different cases, many lessons learned are summarized at the end of each chapter and good practices and which are context-specific and recommendations following the analysis are also highlighted. The different cases also point out at some contradictions or dilemmas faced in crisis communication. For instance, whilst in the event of Cs-137 contamination STUK considered it is very important to provide information fast, even if this is not verified and exhaustive, in other cases, like in the Slovenian Krsko nuclear power plant, the transparency policy and mistakes made in the communication led to losing trust from media and the public. The very special nature of crisis communication, where information should be provided as quickly as possible in an honest manner, should be prepared in advance through regular emergency drills and communication training exercises. Generalising good practices in specific settings may run the risk to underestimate the challenges involved in crisis communication. However, it is still possible to point out some general practices which may be applicable to different contexts:

- Establishing some kind of local pluralistic committee, like in the case of Tricastin in France, in the aftermath of the event, can be a good way to assess the situation and improve communication for future events in a participatory manner;
- Providing reliable and consistent information without delay as soon as possible may help to avoid speculation and rumours as in the case of Krsko, Slovenia.;
- Systematic training and emergency exercises involving communication departments, local stakeholders and journalists is an effective means to validate and assure specific communication plans in the event of an emergency, as it was done after the Fleurus case in Belgium;
- Publishing all information regarding a nuclear or radiological emergency in English, even if there might be grammar or language mistakes, like in the case of Cs-137 contamination in Finland;
- Combining the use of traditional media and social media helps to reach out a wider spectrum of the population and empower experts to communicate about the issue from their field of expertise, as it is done by STUK in Finland.

- Harmonized official response by nuclear safety authorities in the non-significant cases, sharing and verifying information, like in the case of an increase Ruthenium or Iodine in Europe.

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Annex E

DG Energy project: "Study on good practices in implementing the requirements on public information in the event of an emergency, under the Euratom Basic Safety Standards Directive and Nuclear Safety Directive"

Project Ref. Ares(2016)7037963

Deliverable D2.2:

Preliminary report on comparison of the requirements and practices in the EU non-nuclear industry

"What we can learn from non-nuclear hazard industries and how it is valuable for the Euratom Basic Safety Standards and Nuclear Safety Directives"

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Contents

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1 Context of the project and objectives

The European Union has developed an advanced legally binding and enforceable framework for nuclear energy grounded on the Spent Fuel and Radioactive Waste Directive (Directive 2011/70/Euratom), a revised Basic Safety Standards Directive (Directive 2013/59/Euratom) and the Nuclear Safety Directive 2009/71/EURATOM as amended by the Nuclear Safety Directive 2014/87/Euratom. The amended Nuclear Safety Directive 2014/87/EURATOM takes account of a review of the EU framework on nuclear safety in the light of the Fukushima accident in 2011 and the findings of EU stress tests. This Directive had to be transposed into Member States' legislation by 14 August 2017. The report concerning the implementation of the directive must be presented to the European Commission by 22 July 2020 at the latest. Additionally, the new Basic Safety Standards Directive must be transposed into Member States' national legislation and administrative measures by 6 February 2018.

The implementation of these two Directives provides opportunities amongst the EU Member States to review existing procedures and improve implementation measures in the area of public information and transparency requirements in the event of an emergency. Furthermore, Council Decision 87/600/Euratom on Community arrangements for the early exchange of information in the event of a radiological emergency stipulates the arrangements that apply regarding the notification and provision of information whenever a Member State decides to take measures of comprehensive nature in order to protect the general public in case of a radiological emergency.

This study assesses the current practices in public information and transparency in 28 EU Member States under the existing legal requirements and highlights the best practices. Furthermore, the study analyses the way and the extent to which the arrangements are implemented at a practical level, taking into account the points of view of various governmental and local authorities, licensees and other stakeholders. In addition, the planned changes and potential improvements for implementation of the recently adopted Directives to be transposed by the Member States in the near future are considered.

This project has the following objectives:

- Analysis of national legislative provisions and review of standards and guidance supporting the implementation of EU legislation in Member States (focus on the legal framework): i) A legal analysis of the provisions in the applicable EU legislation ii) a review of existing and latest drafts at international and European level standards and guidance that are available to support the implementation of the legal requirements; assessing their scope, detail and level of practicability and describing possible gaps, iii) a comprehensive survey of the existing legal framework for applying the public information requirements in all the EU Member States.
- Comprehensive overview of public information settings in the 28 EU Member States from the perspective of EU legislation, including public awareness of protective measures and public satisfaction with information (focus on the administrative and organizational aspects): Conducting a comprehensive survey of the existing administrative and organisational framework for applying public information requirements in all 28 EU Member States, specifically examining how these systems, procedures and practices have been set up and would work in practice.
- **Lessons learned from nuclear and radiological accidents:** Review different nuclear and radiological accidents worldwide and the way public information needs

were managed in order to identify the lessons learnt and their relevance in the European context.

- **Learning from non-nuclear hazard industries, non-nuclear requirements and practices:** Collecting experiences from requirements and practices in the European non-nuclear hazard industries, particularly chemical incidents and emergencies and natural disasters, for illustrative purposes. Extending the analysis to comparative requirements and practices in all hazards emergency communication (including industrial – chemical, nuclear, radiological- and natural disaster management – earthquakes, volcano eruptions, tsunami, etc) for illustrative purposes.
- **Collection of stakeholders' views, needs and recommendations:** Evaluating the effectiveness of the existing systems, procedures and practices in Member States at national and regional levels, particularly from a civil society perspective, pointing out the strengths and weaknesses of different approaches. SWOT analysis and case studies including cross-border arrangements and practices for implementing the requirements on public information in the event of an emergency.
- **Establishment of the Reference group:** The aim is to establish the Reference group as the consultative body to provide advice and expertise to the consortium. It will provide input, will be consulted on the work performed and will review the recommendations.

The following figure presents the interaction among the partners, stakeholders being consulted during the project and the Reference Group. Additionally, it shows the main methods used for collecting information from stakeholder groups as well as the main events where interaction is foreseen.

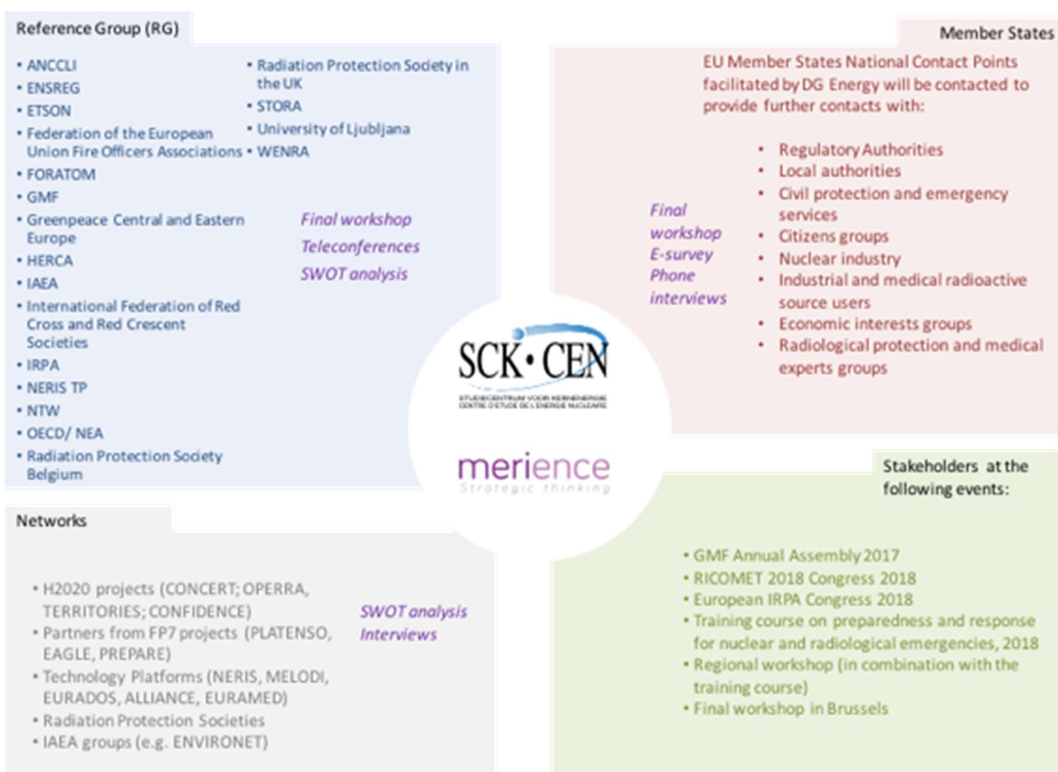


Figure 1. Interaction among the partners in the project

2 Introduction and methods

This report reviews practices of public information and communication from non-nuclear and non-radiological emergencies in Europe by examining existing documents and scientific literature (*document analysis*). The documents analysed include newspaper articles, social media posts, scientific articles, conference presentations, proceedings, emergency reports, log-books of emergencies, etc. The evolution of how communication and public information was managed, how traditional and social media reported the accident and the lessons learned regarding public information and communication were analysed for the following emergencies:

- earthquake,
- storm,
- man-made emergencies,
- oil spill,
- building explosion,
- chemical fire,
- chemical train accident,
- asbestos fire and
- industry fire.

The first chapter of the report provides a historical snapshot of severe chemical accidents and related communication challenges with their consequences. This brief overview comprises the following accidents: mercury poisoning (Iraq, 1971); release of cyclohexame at a chemical facility (UK, 1974); Seveso accident (Italy, 1976); gas explosion in Mexico city (Mexico, 1984); Bophal, India (1984); detonation of explosives (The Netherlands, 2000) and explosion in an ammonium nitrate and fertilizer factory (France, 2001). A graphical summary is provided for each case and the main lessons learned are briefly summarised. However, the radical development of information and communications technology imposes the need to take a more thorough analysis of recent accidents, where social media networks are widely used during crisis communication. In this regard, the second chapter provides insights on how public information was delivered during non-radiological emergencies occurred over the last 10 years: earthquake in Haiti (January 12, 2010); wildfire in USA (October, 2007); storm at pop festival Pukkelpop in Belgium (August, 2011); man made emergencies (shooter events and Paris attacks of November, 2015); the oil spill caused by BP in the Gulf of Mexico (April, 2010); building explosion in Liège, Belgium (January, 2010); a fire at the Chemie-Pack chemical plant, Moerdijk, the Netherlands (January, 2011); chemical train accident, Wetteren, Belgium (May, 2013); asbestos fire, Roermond, Netherlands (December, 2014) and industry fire Lantmännen, Londerzeel, Belgium (June, 2015). The purpose of this section is not to compare the different cases. Instead, the analysis of the cases is used for illustrative purposes to extract lessons learned with regards to revealing good practices in information provisions during an emergency.

Finally, the concluding remarks highlight the main lessons learned and the good practices regarding communication and transparency which can be extracted from the non-radiological events analysed with attention points related to communication in social media and public information arrangements, procedures and practices in non-nuclear emergency management.

3 Requirements and practices in all hazards emergency communication

At the European level, the Seveso III Directive (Directive 2012/18/EU on major accident hazards involving dangerous substances) was updated in line with the Aarhus Convention on public information, public participation in decision-making and access to justice in environmental matters. Article 15 (6) also sets out public participation requirements in relation to plans and programmes in line with the strategic environmental assessment directive (Directive 2003/35/C). These requirements aim to improve the level and quality of information, particularly for people likely to be affected by a major accident, as the convention requires a more active provision of information rather than just providing it on request and the information should be made available electronically. Thus, the Directive defines obligations for operators and Member States authorities related to emergency planning where the public concerned should be consulted on the external emergency plan. Citizens may participate in decisions about industrial activities and their impact on health and the environment at an early stage.

Following OECD (2013) on chemical accident prevention at OECD, it is important to acknowledge and distinguish the different non-nuclear definitions of incident, emergency and disaster, as follows:

Incident: Situation in which people are potentially exposed to hazards to which they are vulnerable, with resulting public concern and the possibility of risks to health;

Emergency: Outgrowth of an incident, in which the affected communities' capability to react has been overwhelmed and where rapid and effective action is required to prevent further loss of life and livelihood.

Disaster: Situation in which substantial numbers of people are exposed to hazards to which they are vulnerable, with resulting injury and loss of life, often combined with damage to property and livelihoods.

The recently published report of the OECD/NEA entitled '*Towards an All-Hazards Approach to Emergency Preparedness and Response. Lessons Learnt from Non-nuclear Events*' (2018) provides very useful insights from different international experts on lessons learnt and good practices on emergency preparedness and response (EP&R) from a multidisciplinary perspective. The report is meant to be used in the nuclear field to build strong EP&R. Both the OECD/NEA and the IAEA through the General Safety Requirements (GSR No. 7) Preparedness and Response for a Nuclear or Radiological Emergency (IAEA, 2015) support the integration of the nuclear emergency management system into a comprehensive, all-hazards framework. The following guidelines, directly or indirectly related to public information in chemical emergencies, are provided in these documents:

- In the written emergency procedures, emergency contact details relevant to the type of the emergency situation should be provided. All parties involved in the emergency response process (e.g. fire brigade, police, medical services, etc.) should appear on the contacts list. The contact details should be placed in a visible and easily accessible location. The list should be kept up-to-date both on the flyer and in the emergency plan.
- Neighbouring facilities to the (industrial) site where the emergency occurs should be informed about the emergency situation.
- Improved co-ordination and communication between on-site and off-site emergency teams is necessary. Decision-making rules and procedures should be designed to ensure that emergency response is prompt and effective. For this, frequent and regular emergency

drills and training exercises should be conducted to know what to do and how to behave in an emergency.

- In addition to the emergency operations centre that is designated to facilitate communication between the on-site and off-site services, a media centre should be set up to share information and assist collaboration with the media in an organised way.
- Personal protection equipment should be available for all workers who have roles in the emergency response, including communication equipment. Each worker must be equipped with communication devices such as radio. The equipment should undergo a regular revision and test. Training and checks during the event should ensure that personal protective equipment is worn properly, based on the requirements of the emergency situation.
- Social media present opportunities to not only enhance crisis communication, but also come with new challenges. Governments should therefore develop dedicated crisis communication strategies for the use of social media in crisis management.
- Communication protocols between neighbouring countries should be established and exercised to ensure effective management of the consequences of an eventual accident with transboundary effects; not only through diplomatic channels, but also through joint civil protection exercises.

In addition, recommendation of the OECD Council on the Governance of Critical Risks (2014) on communication related aspects is that Members should encourage a whole-of-society approach to risk communication and facilitate transboundary co-operation using risk registries, media and other public communications on critical risks (OECD/NEA, 2018, p. 47).

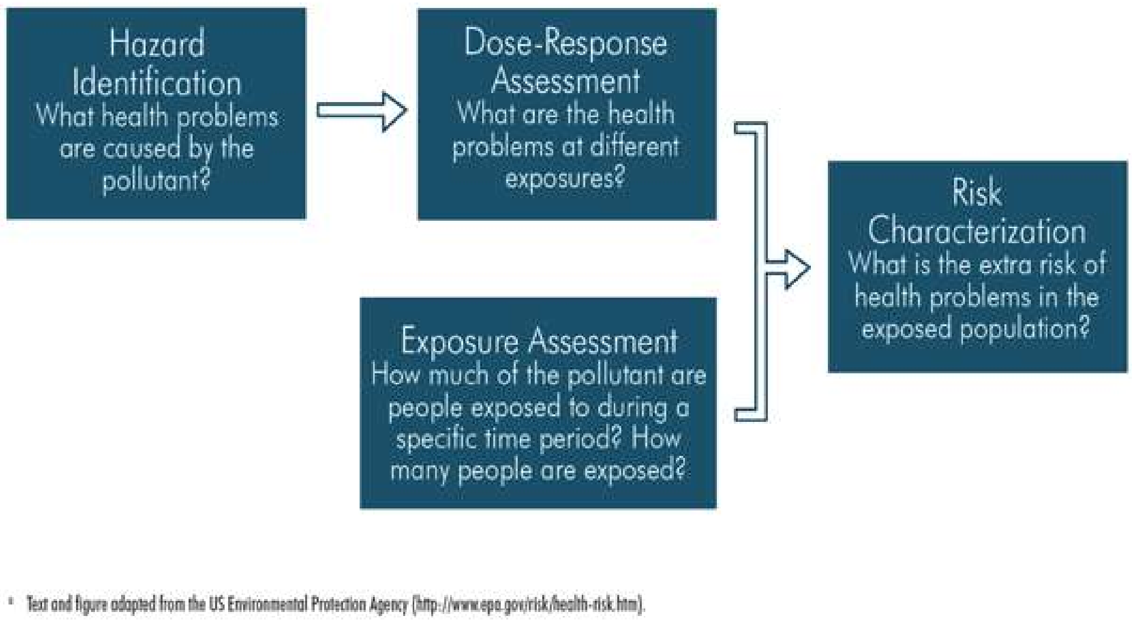
In the broader area of chemical, biological, radiological and nuclear (CBRN) emergencies, frequent and regular training and exercises are recommended for authorities and responders in order to test roles, responsibilities, capabilities and protocols and to provide opportunities for all agencies involved to develop an integrated response to a CBRN incident (NATO/OTAN, 2014; WHO, 2013). Rubin et al. (2011) also propose training as a means to ensure that personnel are adequately prepared to deal with psychological turmoil and anxiety. This is in line with OECD (2018) which proposes targeted training (included psychological aspects) as well as sufficient and adequate equipment to emergency teams. Furthermore, the report points out to the negative psychological consequences of evacuation (i.e. induced mental health problems), which are rarely taken into account in evacuation decisions.

The basic messages to be communicated in non-nuclear emergencies are presented in the figure below, which shows the four major areas of risk assessment process: hazard identification, dose-response assessment, exposure assessment and risk characterization, as described by US Environmental Protection Agency (EPA, 1992). All human health risk assessments of chemicals include these four stages. Risk communication is an integral part of the risk assessment processes, which aims to provide all stakeholders with knowledge and understanding of the processes and assumptions used in risk assessment to influence attitudes, decisions and/or behaviours. Following OECD (2003), "The affected stakeholders, including representatives of the public, should have a role in the risk assessment process, particularly with respect to the evaluation of the significance of the results. The decisions that are influenced by risk assessment may be of fundamental importance to, *e.g.,* employees, the public potentially affected in the event of an accident, and emergency response personnel.

- Involvement of stakeholders is important for reaching appropriate decisions, building confidence in the results, and facilitating open and constructive dialogue.

- The risk assessment process should be transparent, with awareness by all stakeholders of the strengths and limitations of the risk assessment process and the approaches/methods used.
- The fact that the people who make decisions concerning risk management may be different from those who assess risks dictates the need for transparency in the risk assessment process and a shared understanding of the concepts that underpin risk assessment terminology" (p. 39).

Figure 1. Four major areas of risk assessment



4 Historical chemical emergencies: brief overview of public information aspects

4.1 Mercury poisoning (Iraq, 1971); Release of cyclohexame at a chemical facility (UK, 1974); Seveso accident (Italy, 1976); Gas explosion in Mexico city, (Mexico, 1984); Bophal, India (1984); Detonation of explosives (The Netherlands, 2000); Explosion in an ammonium nitrate and fertilizer factory (France, 2001)

The following text provides a historical snapshot of significant chemical emergencies that occurred in different places worldwide, pointing out the year, place, the main characteristics and consequences. Examples of both chemical incidents and accidents occurred since 1974 worldwide are provided by the OECD/NEA (2013) and the WHO (2013). The consequences of some of these accidents are still being monitored. The examples show that besides the technical failures, poor coordination and communication by the different parties involved (e.g. plant operators, first responders, authorities, etc), there was an even higher exposure of the population to the chemical risk. As will be explained below, the new social media landscape has very much changed the rules of the game regarding emergency communication channels available and thus, the lessons learned and good practices need to be updated with more recent experiences.

Year	Place	Description	Consequences
1971	Kirkuk, Iraq	• Mercury poisoning • Farmers began to use seed grain, normally used for only planting, for eating. These grains has been dyed with methyl mercury fungicide, which is applied to seed grain to prevent it from spoiling. It had been dyed red as a warning of its toxicity. • Misunderstood skull and crossbones label caused mass poisoning in Iraq	• 6, 530 hospital admissions • 459 deaths

Year	Place	Description	Consequences
1974	Flixborough, UK	• Release of approx. 30 tonnes of cyclohexame at a chemical facility • Destroyed the facility and caused damage up to several km away • Cause: Inadequate design coupled with poor management	• 28 killed • 89 injured Loss of life would have been substantially greater had the accident occurred on a weekday when the administrative offices were filled with employees.

Year	Place	Description	Consequences
1976	Seveso, Italy	• Loss of the contents of the reactor • cloud of toxic and corrosive chemicals formed • Cause: dangerous operating practices • Because of poor communications with local authorities, civilian evacuation was not started until several days later.	• Approx. 410 cases of chemical burns • Evacuation of over 5,700 people • Large number of livestock killed as a precautionary measure


Year	Place	Description	Consequences
1984	Mexico city	• A 200 mm LPG pipe raptured • Gas cloud which ignited, causing an explosion and many ground fires • Cause: failure of the overall system of protection, including layout, emergency isolation, and water spray systems. The terminal's fire water system was disabled in the initial blast. The plant had no gas detection system	• 650 killed • 6400 injured

Year	Place	Description	Consequences
1984	Bophal, India	• Formation of poisonous cloud of methyl isocyanate that escaped from the plant no warning system as the plant emergency sirens had been switched off Cause: storage of large amounts of toxic intermediates (an inherently unsafe process design), lack of effective safety measures and controls, poor site management, and close proximity of the local population	• 3,000 killed • 170,000 injured Not knowing what to do, many people chose to flee and thus were exposed to the methyl isocyanate gas. If these people had known that the best protection against the chemical was to lie on the floor in an enclosed space with wet cloths on one's face. Many lives would probably have been saved if people had been aware of such a simple safety measure.

Year	Place	Description	Consequences
2000	Enschede, The Netherlands	• 100 tonnes of explosives was detonated by a smaller fire • Poor control of storage, as well as lack of control relating to the siting of the installation	• 21 killed • > 900 injured

Year	Place	Description	Consequences
2001	Toulouse, France	• An explosion in an ammonium nitrate and fertiliser factory • Poor control of storage, as well as lack of control relating to the siting of the installation	• 29 killed • Approx. 2500 injured

4.2 Lessons learned and good practices from historical accidents

The historical cases briefly reviewed above point out to a number of lessons learned and good practices (the latter in italics):

- The lack of public awareness and emergency preparedness aggravates the consequences of the incident or accident. *Appropriate training for the different stakeholders and the general public may help to lessen the effects of chemical accidents*.
- *Having an adequate, coordinated and tested system of alarms that the local community is able to identify can improve the response to the emergency*.
- A lack of communication or poor explanations regarding protective actions can lead to risk-enhancing behaviour among the population and therefore, contribute to increasing the fatal consequences of the accident. *Appropriate communication about protective actions may be useful to limit the consequences of the accident*.
- Risk communication to the population lays the foundation for effective crisis communication to mitigate the consequences of the incident. *Preparedness planning, including communication, should be in place before any chemical accident occurs*.
- *Providing continuous information during the emergency may help to reduce mental health effects*, which can also be suffered by people not directly affected by the accident.

5 Theoretical and practical overview of public information in recent emergencies

This chapter gives an overview on eleven non-nuclear emergencies: earthquake, storm, man-made emergencies, oil spill, building explosion, chemical fire, chemical train accident, asbestos fire and industry fire. There are important dissimilarities between the historical and recent non-nuclear emergencies, mainly characterised by different communication and media environments. Dissemination of public information in the historical accidents reviewedwas mainly delayed, censored, un-transparent, politicised, one-way and in general poor in many countries. In recent emergencies, local, national and international public can follow the emergency live and direct from their living rooms. In addition to traditional media channels, social media open new potentials for multi-way emergency communication, providing fast messages from a wide range of sources to a wide range of audiences and opportunities for self-correction and continuous update. Citizens play an active role in the process of collecting, reporting, analyzing and disseminating news and information through citizen journalism.

The examples of recent emergencies analysed below show how social media have increasingly been used for information exchanges during emergencies. Furthermore, social media have made (international) relief efforts easier to manage because information is available faster than before, making it simpler for international emergency-assisting authorities to focus their support efforts (Smith, 2010). After a qualitative analysis of Twitter, Smith found that users or the public "have unparalleled reach and access to information, and practitioners can help social media publics sort through the clutter" (Smith, 2010, p. 334). Information sharing and interaction facilitate relationships among emergency managers and potential users. Emergency managers who engage in online conversations should be able to provide useful insights that fulfil the needs of the users and may lead to further interaction. This may even create positive feelings towards the communicating organization, expressed by "liking", "following" or "friending" (Smith, 2010).

5.1 Earthquake in Haiti (January 12, 2010); wildfire in USA (October, 2007); Building explosion in Liège, Belgium (January, 2010); storm at pop festival Pukkelpop in Belgium (August, 2011); man made emergencies (shooter events, Paris attacks of November, 2015, Brussels terrorist attacks of March 2016); the oil spill caused by BP in the Gulf of Mexico (April, 2010); A fire at the Chemie-Pack chemical plant, Moerdijk, Netherlands (January, 2011); Chemical train accident, Wetteren, Belgium (May, 2013); Asbestos fire, Roermond, Netherlands (December, 2014) and Industry fire Lantmännen, Londerzeel, Belgium (June, 2015)

During the 2010 earthquake in Haiti (January 12, 2010), the combination of different social media involved a change in the way of acquiring, sharing, applying and maintaining knowledge in comparison to similar past response efforts. On the one hand, SharePoint sites were primarily oriented towards sharing knowledge within staff of the Air Force Common Admission Test, AFCAT (Yates and Paquette, 2011). The Microsoft SharePoint information infrastructure was used in a response by the AFCAT for the first time. It allows web pages to be created on the go by anyone in a team, although this option was not used. It also allows all contributions to be tagged with the contributors' name and information and to make comments or add information. On the other hand, other responding agencies developed specific Wiki pages. They used a common government MediaWiki platform called Intelink, where any agency could develop a shared website which was accessible to any user with access to Intelink (Yates & Paquette, 2011). MediaWiki is the free and open source system that Wikipedia and many other successful wikis are built on (White, 2011). Yates & Paquette (2011, p. 12) argue that wikis were oriented towards the relief effort as a whole. They found that the use of social media within formal organizations shows advantages for engagement and also for knowledge sharing and reusing: "properly employed, the benefits of social media support are faster decision cycles and more complete knowledge recourses" (*ibid*). They do, however, question whether these lessons can be transferred to other emergencies, since each circumstance comes with their unique characteristics and challenges.

A research from Sutton et al. (2008) investigated how in the wildfire in USA in October, 2007 social media were used as a "backchannel" source of public information. The authors define backchannel or peer-to-peer communications as the unofficial, informal communications to the public. Its relevance lies not especially in the focus on communication by members of the public but also on (un)official use by (members of) emergency authorities.

The existence of backchannel communication in emergencies is related to the needs for information by residents. The relevance of national broadcasted news for local residents can be perceived as low, slow and inaccurate and therefore, not helpful (Sutton et al., 2008). In the wildfire case, residents sought new and different means of information. For instance, several online official information sources were cited as helpful, including the US Forest service website, the local fire authority's website and the local county's website. Sound, timely and open communication was mostly delivered through blogs, forums, Twitter, instant messaging or other text-based sharing sites. The information was provided by different kinds of people; some had personal networks that included government, fire-fighters or other official personnel, which gave them access to insider knowledge; others had special knowledge due to personal or professional experience. This kind of information eventually became a useful source for news media and even emergency authorities, who also adapted the use of social media tools besides their classical tools to provide and gather information (Sutton et al., 2008). There were some challenges indicated, like the need to get fast and updated information by specific communities at risk or communities that were evacuated. Some official websites were not prepared for online traffic and had technical problems (*ibid*).

In another study (Tang et al., 2015), a SWOT-analysis was performed on what were seen as the eight functions of social media in drought risk management on three social media sites (Facebook, Twitter and YouTube) from four state-level governmental agencies in the California Drought Task Force. These eight functions were: one-way information sharing, two-way information sharing, situational awareness, rumour control, reconnection, decision making, donation and volunteer management. Governmental agencies adopted the three major social media platforms, which delivered personalized posts that seemed attractive to citizens. Not all eight listed functions worked well in the case of the wildfire in the US and with all different social media. Through these social media however, the public could provide information that would be used in situational analysis and eventually in determining a course of action (Tang et al., 2015).

The explosion in building in Liège, Belgium occurred during the night of the 27th to the 28th of January, 2010 at 01.48 AM and the facades' collapsed at 07.02 AM. The explosion occurred in a building situated in the center of Liège in Léopold street. The explosion and then the building collapsing, damaged and destabilized approximately 100 buildings. This led to the evacuation and resettlement of 500 persons in more than 100 hotels and houses.

The first rescue services (the first discipline[1]) arrived at the location a few minutes after the explosion and the municipal phase was triggered at 02.15 AM. The trigger's rapidity was due to the proximity of this explosion to the City Hall (less than 100 meters) in which a municipal council was still held. The crisis response and intervention coordination lasted until 8th of February due to the difficulty of other buildings stabilizations and victims research and identification. As this event particularly traumatized the population, information management

[1] Corresponds to the fire services.

towards the media and the population but also the victims' relatives' reception and support took also a major place in the emergency response. From this event, fourteen people were deceased and around thirty injured.

The Léopold street is a famous and busy street in Liège, usually occupied by many cars, shops and walkers. The buildings concerned by the explosion were located just at the beginning of place Leopold used as a bus station and less than 100 meters of the City Hall. Fortunately, the explosion happened during the night and no passer-by nor vehicle was involved in the event. The buildings' inhabitants concerned by the explosion were mainly tenants coming from various countries (Minet, 2017). The public information management begun few minutes after the explosion occurred while the emergency response was still taking place and endured several months after the crisis. At 1.56 AM the media arrived at the location. They were quickly taken in charge by some members of the fifth discipline (D5=emergency responders responsible for communication) that were present at the municipal council meeting (CELINFO, 2010; Minet, 2017). Around 2.30 AM, a **reception center** opened in a place located a few hundred meters of the event. It firstly aimed at gathering and taking care of the evacuated population before their resettlement and then welcomed, informed and supported the victims' relatives. At 6.30, the **call center** was operational to answer all the questions coming from the population. The undetermined and evolving character of the event made the information to the population difficult. Through the accounts and information retrieved from the population phone calls to the call center, a provisory listing of the victims could be built (Minet, 2017). Indeed, many people phoned the call center to give the names of the buildings' tenants, etc. Around 05.00 PM, a **victims' information center** was opened in an administrative building to inform the people who suffered damage. Its mission was to ensure social, medical and administrative support to the victims; provisory accommodations and resettlement; and first line support on several issues (Minet, 2017). All these centers remained active for several weeks. As many victims were citizens from other countries, translators were engaged in emergency communication (Minet, 2017).

Besides the activation of those centers, other public oriented events were organized. During the first few days, 2 to 3 press conferences were organized at the City Hall. King Albert II visited the site in the afternoon of 28th of February. In this occasion, all the press was present and the rescue intervention stopped. This visit created tensions among some crisis management professionals and victims' relatives, who would have preferred to continue with the rescue (Minet, 2017). A ceremony in homage to the victims was organized on the 5th February at the *Cathédrale Saint Paul*. A wide panel of political authorities, personalities and media attended the ceremony.

Around 80 persons were involved in public information management throughout the crisis. This involved mobilising many municipal employees and the support of the provincial services of the governor. Following this event, several lessons have been highlighted in different debriefings and presentations. This crisis demonstrated that devoting important amount of resources can result in delivering efficient public information. However, some drawbacks were stressed. Firstly, the official visit of the King should have been better organised in order not to disturb the rescue. Secondly, there was lack of information to the victims and their relatives between the acute phase of the crisis management (victims identification, ceremony in homage to the victims) and the "post-crisis" with respect to the follow-up of the procedures (inquiry, assets recovery by the families, etc.) (Services du gouverneur de la province de Liège, 2010).

A severe storm occurred during the Pukkelpop festival in Belgium (August, 2011) near the city of Hasselt, which had sixty thousand visitors that year. At 18h15, there was heavy rainfall, hail and wind, causing festival visitors to take shelter in festival tents.

However, the Chateau tent collapsed and a lighting pole came down, which caused casualties. Five people died, another ten were heavily injured and more than hundred had minor injuries (Terpstra et al., 2012). The use of social media by citizens, and specifically Twitter, during the Pukkelpop storm was extensive. Terpstra et al. (2012) examined the tweets during the immediate period of the storm. The authors used a tool called Twitcident to automatically filter, search and analyse tweets regarding the Pukkelpop storm. They reached the following conclusions. First, there was no increase of twitter activity, except for a small peak of half hour before the event. This suggests that few people interpreted the dark clouds or the beginning storm as a threat to their safety, suggesting that people at the festival were taken by surprise. Second, a pattern of social norms was found related to preventing propagation of unverified information about delicate topics. Only when official news media confirmed rumours about deaths, an increase in number of tweets was noted. Before this, rumours were publicly questioned if no credible source was included. People who were at the festival site got more retweets when they tweeted about damage, concluding that they were more credible. Many of these tweets contained pictures, which made the identification of credible information easier. Third, thanks to the interactive possibilities of Twitter, a community resilience initiative was launched, providing shelter to the festivalgoers (Terpstra et al., 2012).

Terpstra et al. (2012) note that no tweets from official authorities were found during the Pukkelpop incident. Whilst they cannot explain why, the authors claim official authorities might have followed Twitter and other social media, but simply did not participate actively. A recent study in the Netherlands showed that crisis officials have positive attitudes towards the use of Twitter in times of crises. However, the level of acceptance is lower compared to other types of stakeholders for different reasons related to the perceived barriers, such as lack of experience. Other reasons that might prevent an extensive use of social media are the lack of knowledge of the potential of social media and lack of a clear institutional policy (Terpstra et al., 2012).

Mazer et al (2015) performed a large scale social media analysis of two shooter events on September, 2014 in the U.S. by investigating Facebook, Twitter, blogs, and mainstream news outlets. They found a spike of posts mostly from parents and students, especially in the first hour following the shooting and when important news facts were released. Twitter seemed to be most utilized, followed by Facebook. Mainstream news and blogs seemed, in comparison to the former two, to be presented in a rather small percentage. However, these sources were deemed important to understand how parents and students communicate, since this would help school crisis teams to enhance their crisis communication in the future. The chaos and uncertainty associated with this type of events result in people considering social media a quick and important source of information, although most posts have an emotional touch compared with (more) objective news media. Information is the main reason parents and students went on these media. Hence, most posts that were shared had informational intent. Finding the correct information may be tricky and requires critical minds. Anger, rumours and misinformation may cause additional emotional trauma. Therefore, Mazer et al. (2015) suggest that social media sources are monitored and corrected if necessary, to prevent additional and unnecessary negative emotional experiences.

Some studies on the effects of social media in crises point out at the self-correcting mechanism from users of social media, for instance, the Twitter community. This was found in a study about an incident with a gunman in a Dutch national television news studio, where a spike in Twitter-activity was noted. Different rumours about the scale of the incident were poster, however in retrospect these started as a misinterpretation of sarcastic or ironic messages. These rumours were fact-checked by other users who then also shared their findings online, causing the rumours to fade out, despite the echo-effect the rumours had. This "wisdom of the crowd" results in misinformation being corrected by users who strive for truthful information (Jong & Dückers, 2016).

Jong & Dückers (2016) report that during emergencies, users respect the authority of official government profiles and are likely to collaborate to spread the information they provide, even with an operational purpose. For instance, tweets of the National Police after the Paris attacks of November 13th, 2015 where the police asked users not to share information about on-going police operations, were retweeted over 26,000 times. Little is known scientifically about the cooperation between the public and government online, although examples like this show potential for future public information strategies.

Social media and the fact that citizens are more active and assertive is incorporated in the communication model used during the Brussels terrorist attacks of the 22nd March, 2016. Monitoring the public and their needs during a crisis is also part of this model. The team D5 in Belgium used the Work Process Crisis Communicaton (WPCC) model. As described by Geboers (2017), the WPCC model provides guidance during the crisis. In the middle of the model, there is a coordinator who activates and assembles the team. Around the coordinator, the model consists of four steps, with one person responsible for each step or the whole team working on one step, depending on the type of crisis: 1. "Outside world" perceptions/effect; 2. Data analysis of what citizens think and experience regarding the crisis; 3. Strategic Advice given and 4. Execution via spokespersons, webcare and telephonists. During the second and third steps, the method used for the analysis and to develop advice respectively is the so-called IBS model – Information, Behaviour, Sense-making. This model captures and categorises messages based on these three themes. In the analysis phase, information covers what individuals know and what kind of information is asked, while behaviour relates to how individuals act and Sense-making messages include evoked emotions and how are measures encountered. In the strategic advice phase, information category relates to the needed information to inform everyone and how this is most effectively delivered; behaviour related to the actions undertaken and the type of instructions that individuals need to prevent further damage and sense-making contains topics as how and by whom understanding and sympathy will be expressed.

According to Geboers (2017) during the Brussels attacks, approximately 30 people worked with the WPCC-model. However, it was found that probably if the team would have been smaller, the task divisions would have been clearer and the feeling of doing useful work higher. Working in shifts, greater coordination and more capacity for webcare are some of the elements that need greater attention in future events. Additionally, there were no guidelines for online communication, apart from broad advices like empathy and human communication. As there was not the capacity to answer each message individually, different techniques were used to respond to all the needs of the individuals and maintain a secure feeling. Another important issue found out by Geboers with regard to the webcare was the physical presence of the team D5 at the crisis centre (as they usually work remotely) ensured continuous and direct citizens interaction via social media.

Other lessons learned from the Brussels attacks point to the following issues (Geboers, 2017):

- the need for better interaction with international journalists who might not understand how emergencies are arranged in the country under the crisis event;
- confusion in the messages addressed to citizens, as there are different target audiences and there is a need to tailor the content of communication (e.g. parents who do not

know if they have to pick up their children at school, international citizens who have relatives in Brussels, etc);
- the need to focus more attention on the group directly involved in the event.

Another disaster which caused people all over the world to talk about it through mainstream news, blogs and social media sites was the oil spill caused by BP in the Gulf of Mexico on April 20, 2010. Both individuals and organizations used social media platforms for information sharing, sense-making and digital volunteerism. This accident was recognized as one of the worst oil spills in history. The explosion caused the death of 11 people and the resulting leak in caused massive amounts of oil and gas into the oceans during 87 days, affecting the oceanic and coastal environment. It also had a significant negative impact on birds, aquatic life, tourism and local business activities in the affected regions. There were concerns about health impacts of the leakage and the chemical dispersants that were used to disperse the oil. The incident was multi-dimensional. There are still many impacts that need to be studied from the biological, oceanographic and the economic point of view (Hall et al., 2012; Muralidharan et al., 2011; Starbird et al., 2015). Social media seem a good vehicle to address the wide implications of such big-scale incidents. Social media provide the public the possibility to express their concerns while giving the experts and authorities the platform to address these concerns and make available the proper information. However, backchannel communication could also have an impact on the possible spreading of false information and rumours (Sutton et al., 2008).

According to Starbird et al. (2015), people affected by crisis situations turn to these social media platforms to seek information from others, to coordinate community-based response efforts and to share information about event impacts. Sutton et al. (2013, p. 59) state that "these informal online communication channels are also being utilized for official communications in disaster context. Public officials use these to broadcast messages as well as to engage in direct communication exchange with individuals". They also point out that "online communications regarding the oil spill became one of the primary strategies of federal response agencies that established a single website (www.deepwaterhorizonresponse.com) to consolidate information dissemination and create a unified voice that linked to a number of social media technologies including Facebook, Twitter, YouTube, Flickr, and RSS feeds". In addition, "other agencies at the state and local level also utilized networked technologies to broadcast updates and interact with concerned individuals".

Sutton et al. (2013) focused their research on agencies representing official sources of information about the event response, resulting in a broad range of different government responding entities (at national and local level). They used Twitter as their information source and excluded accounts from profit and non-profit organizations, such as oil companies or Red Cross. One of their conclusions was that government responding agencies mainly used Twitter as a broadcasting mechanism (of internally sourced information) and barely send (or publish) direct public messages directed to certain personal or organizational accounts. They also barely retweet messages. Twitter seems, to these organisations, an additional, redundant, information channel, not a prioritized communication channel. The tweets researched often included external links (to informative websites for example), meaning the official accounts worked as a source of reliable information in a time of concern about the oil spill, where information-seeking citizens could rely on (Sutton et al., 2013). The use of hashtags (which they do at the same level as the public) makes it easier for the public to find information and increases the effectiveness and the range of the information spread. The appropriate Twitter hashtags make it easier to interact with, monitor and reach out to the public. This is particularly important in disaster-affected areas. Media organizations also have a role in this.

Official social media accounts may have a role as "myth busters" to test whether messages spread online are true (Bruns et al., 2013). Increasing interactivity in social media use by emergency managers is desirable. This could clarify events for the public, while being a trusted source for concerned citizens and helping them to get faster to the information they need. In other words, "the public, including the private sector and non-profits, must be included in the mitigation process and that means emergency managers, even at the federal level, will have to begin to trust 'the public and their devices', including Twitter" (White, 2011, p. 187).

Emergency managers from the private sector (in this case for instance, BP) also make use of social media to communicate. However, the profit sector always pays attention to the corporate image. Thus, in a public crisis communication, a company would try to maintain or to save as much as possible a positive corporate image (Muralidharan et al., 2011). This includes a strategy where BP would avoid a strategy of accepting blame. On their website, they did not seem to target the general public. Instead, they followed the profile of a technological, scientific organization, where their target audience appeared to be a mirror of itself. BP used a very technical language to explain the situation, as if they were addressing an expert public (Hall et al., 2012).

BP's use of social media, and mostly Twitter, as a crisis communication tool was analysed. It was revealed that five frames were used (information, update, social responsibility, attribution of responsibility, and all that can be done). BP used Twitter to try to control the company's damage and its reputation. Twitter allowed BP to provide basic information and updates quickly. However, the 140-character limit proved to be a limitation in the amount of detail that could be given to the public (Hall et al., 2012).

A fire at the Chemie-Pack chemical plant in 2011, located in the industry area of Moerdijk, Netherlands (the fourth biggest port area in The Netherlands), resulted in environmental harm and 170 people to be treated in hospital. The fire was initially caused by the use of an open flame in the unthawing of a blocked resin pump. Vapours caught fire and resulted in liquid resin igniting as well. This caused an extensive and large pool fire, involving warehouses and outside storage of dangerous goods. Due to the lack of capacity and the complex nature of the fire, it took several hours before the incident was brought under control. The scale and the gravity of the fire, and its vicinity to many chemical products, caused many people to be worried about the effects of the toxicity of the smoke and the impact on their health.

Due to a rather slow government online presence there was a rapid mass self-communication that resulted in a public crisis framing based on assumptions and speculations. In this case, social media were used as a tool to criticize the government crisis response (De Swaef, 2016). Even after the government started communicating, there was a problem with credibility and the lack of a consistent message, resulting in wide spread online criticism on the government response by the public (De Swaef, 2016). The way this emergency was presented in the news media was found to have an influence on the publics' view. The public however framed the crisis on a more personal level and largely criticized the government's approach. They actively expressed suspicion, particularly towards the possible health effects of the accident (van der Meer & Verhoeven, 2013). Moreover, the fact that emergency authorities did not communicate broadly about this emergency had a severe impact on the public trust and perception (De Swaef, 2016). There was no explanation to the public why certain countermeasures were not taken, which resulted in criticism and increased public fear. Furthermore, additional countermeasures were taken in a neighbouring region due to the wind blowing the ash cloud out of the region but this was not explained to the public.

The evaluation of this emergency resulted in changes in the emergency procedures and lessons were learned from the mistakes, which have been actively implemented in plans and practices. Nowadays, authorities try to send all messages through all communication channels available immediately, internet pages are prepared in advance and there is a responsible person in the municipality to be on site and be the eyes and ears for the crisis management team in the crisis centre. It was recognized that the local emergency system, news sites and Twitter feeds should be linked and that the approval procedure for the communicated messages should be as short as possible.

In May, 2013 on a Saturday night, a train transporting butadiene, triethylaluminium and acrylonitrile derailed in Wetteren, Belgium, resulting in explosions and fire. The freight train derailment led to toxic vapours of acrylonitrile and other harmful materials released in the environment. To avoid further explosions, water was used to cool intact tanks and to try to control and extinguish the fire. This caused the extinguishing water to join a stream next to the rail tracks, ending up in the sewers. Water was contaminated with acrylonitrile, leading to an immediate danger for over 2,000 residents living near the site of the accident or along the sewage system. One person died and 93 were injured by the fumes (Alexander, 2014). Some parts of the village had to shelter whilst others had to evacuate. Around 200 inhabitants of Wetteren went to the emergency services of hospitals in the nearby area (Van Nieuwenhuyse et al., 2014).

Social media were used and monitored, but the situation was so complex and the facts were not easy to obtain or were in dispute. Although not many citizens actively asked questions on-line, they often reacted to messages that could be disruptive and increase indistinctness (De Swaeft, 2016). The emergency authorities were displeased with the communication: much information that was spread by the public was inaccurate and there were difficulties to counter the rumours with the correct information. The public perception on the incident through social media was therefore negative (Alexander, 2014). It appears that the "wisdom of the crowd" (Jong & Dückers, 2016), the self-correcting mechanism by users on social media who want to provide correct information and reject misinformation, is more difficult in complex emergencies (Alexander, 2014).Sometimes, the authorities interfered in these reactions to frame information. It was indicated afterwards that interaction between citizens and emergency authorities could have been better and clearer. This interaction was perceived more neutral than emotional. They were also perceived as the most credible source of information, before news media (De Swaef, 2016). According to the citizens of Wetteren, follow-up through social media channels by the emergency authorities could have been better. Information sometimes came too fast, which had an impact on the consistency and reliability of the messages (Van Der Eecken, 2013). In this case, citizens mainly shared messages to inform friends and family about the incident rather than for emotional support. It was also found that the personal facebook account of the mayor of the neighbouring municipality was appreciated for its swift and frequent updates. Facebook was the most consulted social media channel before Twitter for the local public for gathering information (Van Der Eecken, 2013).

In December, 2014, large amounts of asbestos were released in the city centre of Roermond (Netherlands) due to a fire at a marina. The city centre had to be closed off for visitors until the asbestos particles were cleaned up, which had a big impact on the local businesses due to the time of the year and the vicinity of one of the largest outlets in The Netherlands (Bundschuh, Klingelhoefer, & Groneberg, 2015). This proved to be a great communication challenge for the crisis team of the municipality. Social media were used in an attempt to overcome this challenge.

The authorities published bundle information on a central place on their website and linked social media to this site. They communicated protective actions first and provided more specific details later. A special frequently asked questions page was relatively quickly set up on the website, with frequent updates and enhancements. Protective actions were presented and demonstrated on digital media. Information about the emergency is still available on the website, which may be helpful for other municipalities with similar types of emergencies.

They experienced some privacy issues with the email system and had difficulties due to the lack of personnel for media monitoring and collecting and responding to rumors and misinformation.

A heavy fire in the industry area of the town Londerzeel in 2015, Belgium caused soot and ash particles spread locally in the public area, gardens or grasslands. The fire started in a truck in a building of the company Lantmännen and quickly grew larger, causing the nearby highway exit to be temporarily being shut down and the entire industry terrain to have been inaccessible for a short time. Due to this, the fire had local economic impacts. The provincial emergency plan was activated for a short period of time and the entire building burned down. There were no victims. The environmental services were involved to ensure that locally grown products were not contaminated. Precautionary, people were told not to consume any garden grown food. The municipalities' crisis cell used social media in their media mix during the emergency to spread message and communicate with the public. The first communication proved to be very fast.

Traditional media, especially press, followed information published on the website, twitter and facebook. Twitter was used for short and clear protective actions. Information on the webpage and social media were updated every hour with information on the emergency process. Additional attention was given to consistent messages for surrounding municipalities through all different communication channels. Links to the website for more extensive information were shared on social media.

The authorities noticed that after the emergency there was a strong decrease in followers, which makes future communication before and after a crisis rather challenging. In addition, the emergency management pointed out a heavy workload related to monitoring and answering questions.

6 Conclusions: lessons learned and good practices from non-nuclear emergencies

The goal of this report is to identify lessons learned and good practices from the different cases on non-nuclear emergencies described in the section above. Apart from the general conclusions identified in the literature review of this report, lessons learned and good practices (the latter shown in italics) focus on communication aspects of social media and public information arrangements, procedures and practices in non-nuclear emergency management.

6.1 General conclusions

- Accidents usually attract spectators and media. Public behaviour during an accident has become a regrettable trend that people gather to see the accident, trying to record it and publish what is happening on social media networks. The *control of spectators is therefore an essential part of an off-site emergency plan and of a transport emergency plan*. The responsibility for such control rests with the police. The presence of media can cause extra workload and stress for emergency responders. A *media information centre* can be set up to serve the professionals' needs.

- It is clear that the effectiveness of public information and communication during an emergency can be enhanced. Conducting and evaluating *training exercises is essential for developing and improving all parties' capacities to cope with crises and emergencies*. It is important during these exercises and evaluation, to take into account the different cultural frames of reference of the parties involved and citizen groups who may be directly or indirectly affected in the event.
- The communication strategy of an emergency should consider individuals or group of individuals who are unable to comply with an evacuation or other protective actions, for instance, individuals who are not able to act without assistance. This might include people with limited official language knowledge, as shown in the case of Liège described above, but also others (e.g. elderly people, those with disabilities or medical conditions, people with hearing and sight impairment, homeless or people unable to access social media, people without access to private vehicles, individuals who are impoverished, chemically dependent, and those with emotional or mental disabilities, minor children left alone at home after school until the parents or caregiver arrives).

6.2 Conclusions and good practices related to social media

- Social media have great potential to support two-way crisis communication at a low cost and with high efficacy and can maintain trust in government by developing a direct relationship with citizens at a time when expectations are high. The challenges of using social media in crisis communication include: the multiplicity of players, the amount of information generated, the question of open data, privacy and confidentiality, the question of liability, the expectation of the population, and the issue of security. Social media present opportunities to enhance the effectiveness of crisis communication but also involve challenges that need to be carefully addressed. *Social media can be used as a communication tool to convey information but also as an interactive platform for public involvement through supporting crowd-sourced information*.
- Using social media effectively in crisis communication requires avoiding certain pitfalls, and appropriate resources need to be devoted to the management of social networks before during and after a crisis to ensure responsiveness. *Ensuring the reliability of information circulating through social networks, managing rumours and avoiding panic are fundamental* to success.
- Dedicated *social media response teams* and the *use of crisis communication models* (like WPCC used by D5 team in Belgium) can be very useful *for sharing crisis information with citizens*, since in the age of social media both essential and false information is communicated widely from a large number of sources. *Combining social media with traditional ways of communication* is needed since certain population groups do not make use of modern social media.
- Information overload can cause distractions for crisis managers. *Ensuring the coordinator function and a clear division of responsibilities and roles during the crisis communication* is essential to avoid overlapping roles and unclear directions.
- Certain crises may entail damage to telecommunications networks and thereby disrupt access to many social media platforms. In addition, in many emergencies, emergency responders were not able to maintain good communication with each other throughout the

response effort because of a lack of mobile phone network coverage. *Multiple means of communication* should be foreseen for these cases.

- There are *three main complementary ways that social media are used in non-nuclear emergency management* and can also be used in nuclear and radiological emergencies: i.) as a situation awareness tool by monitoring eye-witness reports (*bottom-up*); ii.) as a state communication tool to convey official statements of what is known, about a situation, what is unknown, and what actions the public should take (*top-down*); iii.) as an interactive platform to support crowd-sourced verification of events (*interactive*).
- OECD/NEA (2018) suggests that governments should foster *citizen-led social media use* and enable communities and individuals to *self-initiate and volunteer in emergency efforts* through the development of technological platforms and tools.

6.3 Conclusions and good practices related to public information arrangements, procedures and practices

- During a crisis, it is important to *take a proactive approach in order to maintain public trust*, and not be limited to confirming or denying the information provided by the media.
- Ability to e*ngage a big team of communicators in a relatively short time and for a longer period* can be considered a good practice. Thus, the *continuation of communication, even when the emergency has been managed*, is also a good practice. Discipline 5 (D5) is one of the five disciplines in Belgian Crisis Management and is tasked with providing information to the public regarding the crisis. They try to actively implement social media in their crisis communication strategy. Their priority lies with the monitoring and analysis of information, rumours, pictures or videos online, to stay abreast with the perception of the public of the crisis. If there is no staff-shortage, D5 can actively follow up and correct online content regarding the crisis. If a crisis takes place on the municipal level, members of TeamD5 from the federal level can provide (temporary) reinforcement for the communication team, even from a distance. During monitoring (and sending out messages), D5 divides messages in three categories according to the I-B-S principle: messages that provide information (facts about the crisis), messages that describe behaviour (reaction to the crisis or action perspectives), and messages regarding sense making (emotional reaction to the crisis). The I-B messages are most important when the emergency is happening, since people involved want to know what is going on and what is being done to prevent further harm. Ideally, a crisis communication-team consists of an analyst, a strategist, a team-coordinator, an editor, and someone in the field. In big crises, which might be the case when a nuclear accident occurs, more staff is required to perform efficiently (Marynissen et al., 2015).
- *Use of translators in public information center* to ensure good reception and acceptance of information by affected people from different language groups is important.
- *Emotional support to the victims' relatives* should be offered, although the professionals involved in providing this support should be well *trained and prepared* to cope with traumatized people.
- The failure to adequately communicate risk and countermeasures to the population contributes to increasing their uncertainties and therefore, their level of trust in the authorities can be lost rather quickly. In this regard, *there is a need to inform people at the outset about what has happened and prepare them for what they might expect* is critical.

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Annex F

DG Energy project: "Study on good practices in implementing the requirements on public information in the event of an emergency, under the Euratom Basic Safety Standards Directive and Nuclear Safety Directive"

Project Ref. Ares(2016)7037963

Report
Final project workshop:
'Public information and transparency in case of a radiological emergency according to new Basic Safety Standards and amended Nuclear Safety Directive: Collecting Good Practices'

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Task 3.2: Organising national, regional and international workshops.
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Contents

DISCLAMER:

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1. Context of the project and objectives

The European Union has developed an advanced legally binding and enforceable framework for nuclear energy grounded on the Spent Fuel and Radioactive Waste Directive (Directive 2011/70/Euratom), a revised Basic Safety Standards Directive (Directive 2013/59/Euratom) and the Nuclear Safety Directive 2009/71/EURATOM as amended by the Nuclear Safety Directive 2014/87/Euratom. The amended Directive 2014/87/EURATOM takes account of a review of the EU framework on nuclear safety in the light of the Fukushima accident in 2011 and the findings of the EU stress tests. This Directive had to be transposed into Member States' legislation by 14 August 2017. The report concerning the implementation of the directive must be presented to the European Commission by 22 July 2020 at the latest. Additionally, the new Basic Safety Standards Directive must be transposed into Member States' national legislation and administrative measures by the 6 of February 2018.

The implementation of these two Directives provides opportunities amongst the EU Member States to review existing procedures and improve implementation measures in the area of public information and transparency requirements in the event of an emergency. Furthermore, Council Decision 87/600/Euratom on Community arrangements for the early exchange of information in the event of a radiological emergency stipulates the arrangements that apply regarding the notification and provision of information whenever a Member State decides to take measures of comprehensive nature in order to protect the general public in case of a radiological emergency.

This study assesses the current practices in public information and transparency in 28 EU Member States under the existing legal requirements and highlights the best practices. Furthermore, the study analyses the way and the extent to which the arrangements are implemented at a practical level, taking into account the points of view of various governmental and local authorities, licensees and other stakeholders. In addition, the planned changes and potential improvements for implementation of the recently adopted Directives to be transposed by the Member States in the near future are considered.

This project has the following objectives:

- Analysis of national legislative provisions and review of standards and guidance supporting the implementation of EU legislation in Member States (focus on the legal framework): i) A legal analysis of the provisions in the applicable EU legislation ii) a review of existing and latest drafts at international and European level standards and guidance that are available to support the implementation of the legal requirements; assessing their scope, detail and level of practicability and describing possible gaps, iii) a comprehensive survey of the existing legal framework for applying the public information requirements in all the EU Member States.
- Comprehensive overview of public information settings in the 28 EU Member States from the perspective of EU legislation, including public awareness of protective measures and public satisfaction with information (focus on the administrative and organizational aspects): Conducting a comprehensive survey of the existing administrative and organisational framework for applying public information requirements in all 28 EU Member States, specifically examining how these systems, procedures and practices have been set up and would work in practice.

- **Lessons learned from nuclear and radiological accidents:** Review different experience from nuclear and radiological accidents worldwide and the way public information needs were managed in order to identify the lessons learnt and their relevance in the European context.
- **Learning from non-nuclear hazard industries, non-nuclear requirements and practices:** Collecting experiences from requirements and practices in the European non-nuclear hazard industries, particularly chemical incidents and emergencies and natural disasters, for illustrative purposes. Extending the analysis to comparative requirements and practices in all hazards emergency communication (including industrial – chemical, nuclear, radiological- and natural disaster management – earthquakes, volcano eruptions, tsunami, etc) for illustrative purposes.
- **Collection of stakeholders' views, needs and recommendations:** Evaluating the effectiveness of the existing systems, procedures and practices in Member States at national and regional levels, particularly from a civil society perspective, pointing out the strengths and weaknesses of different approaches. SWOT analysis and case studies including cross-border arrangements and practices for implementing the requirements on public information in the event of an emergency.
- **Establishment of the Reference group:** The aim is to establish the Reference group as the consultative body to provide advice and expertise to the consortium. It will provide input, will be consulted on the work performed and will review the recommendations.

The following figure presents the interaction among the partners, stakeholders being consulted during the project and the Reference Group. Additionally, it shows the main methods used for collecting information from stakeholder groups as well as the main events where interaction is foreseen.

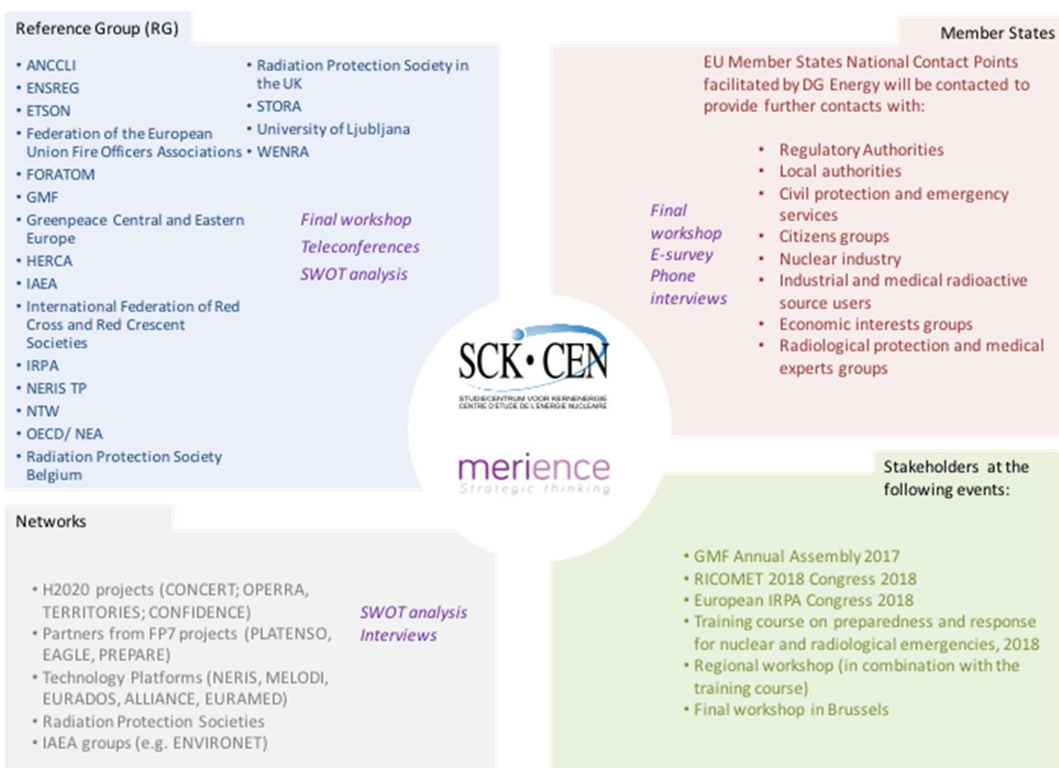

Figure 1. Interaction among the partners in the project

2. Introduction

This report summarises the good practices raised by participants and presenters as part of the two-day workshop on ‘Public Information and Transparency in case of a radiological emergency according to the new Basic Safety Standards and amended Nuclear Safety Directive: Collecting Good Practices’ held on 11 and 12 June 2018 at the University of Antwerp, Belgium. The objective of the workshop was to collect the views, opinions and experiences of the participants on public information and transparency in the event of a nuclear or radiological emergency. For this, the workshop included:

a) presentations from invited speakers focusing on good practices from communication in different countries and contexts;
b) presentations from the consortium members based on the results of the study on good practices on information and transparency in case of radiological emergencies;
c) interactions and open discussion with the participants during and after the presentations;
d) two working group sessions to facilitate the exchange of experiences and the discussion based on questions raised after the consortium members’ presentations[1].

Participants were encouraged at the end of the workshop to continue sharing good practices with the consortium members via email and to identify European countries which have applied these good practices.

The agenda of the workshop is shown in Annex I. Presentations are available on-line through the link to the RICOMET2018 Conference: http://ricomet2018.sckcen.be/en/Presentations.

The workshop was held before the RICOMET Conference on Social Sciences and Humanities in Ionising Radiation as a pre-conference workshop (http://ricomet2018.sckcen.be/en/Pre_conference_workshop). It was publicized through the RICOMET website and also an invitation was sent to the nuclear regulatory organisations (NROs) contacted during the study to complete a questionnaire on the specific national situation with regard to public information and transparency in emergency situations. The invitation to the NROs is shown in Annex II. Reference Group participants were also invited to the final workshop to give their feedback.

The workshop was attended by 54 participants from 15 different countries. The participants included representatives from international organisations, (OECD/Nuclear Energy Agency), international associations (Atomic Reporters, International Radiation Protection Association, IRPA, International Federation of Red Cross and Red Crescent Societies, IFR, SAFECAST in Japan), NGOs (Greenpeace), European associations (Nuclear Transparency Watch, NTW, Group of European Municipalities with Nuclear Facilities, GMF), national associations (national association of local information commissions, ANCCLI in France, firefighters association in Belgium), local communities (MONA, STORA, Beveren from Belgium), regulatory authorities (Federal Office for Radiation Protection in Germany, STUK in Finland, ISPRA in Italy, Environment Agency in the UK, EPA in Ireland), Technical Support Organisations (IRSN), European Commission and Joint Research Centre, academics and

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[1] The question to be discussed in the first working group was: *Can you indicate **practical and effective approaches** of responsible organisations (at local, regional or national levels) for informing the public prior to and in the event of a nuclear or radiological emergency?* The questions to be discussed in the second working group were: *Can you **share specific good practices regarding open, transparent and timely public information provision** in the event of an emergency in your country/ locality/from your experience? Can you share specific good practices regarding stakeholder involvement in the event of an emergency in your country/locality/from your experience?*

researchers from universities (University of Milan, University of Antwerp), members of radiation protection platforms (NERIS), research institutes (SCK·CEN in Belgium, VUJE in Slovakia, Karlsruhe Institute of Technology, KIT in Germany, Central Research Institute of Electric Power Industry in Japan), consultancy companies specialized in communication (Merience, Mesh & Moser Situation Management), governmental authorities (Federal Ministry of Health in Belgium), radioactive waste management agencies (Radioactive Waste Management Plant in Poland) and professionals in the field of communication in nuclear and radiological emergencies (Belgian Radiation Protection Society, UK Society for Radiological Protection) and individuals with an interest in the topic. Annex III lists the participating organisations to the final workshop.

3. Overview of the selected good practices raised

Good practices raised during the workshop were collected and presented during the two day's discussion and in the wrap-up session in order to validate that the good practice had been applied in a specific country in Europe. If no example could be found that the good practice had been applied, then, it is not considered as a good practice in the summary below.

Good practices were recognized by the participants to have worked well and produce good results in a context specific situation.

The compendium of good practices was presented under four topics: information, transparency, media relations and collaboration and involvement.

3.1. Public Information

- In some cases, BSS has been interpreted as an opportunity to develop a new communication plan for nuclear and radiological emergencies. New regulation on public information in case of emergency exposure situations (Sweden); Govt. Decree on the rules of public communication in nuclear or radiological emergency (Hungary).
- Messages should be concrete and simple. In Germany, the regulatory authority developed a leaflet on iodine tablets which was tested by school children to check whether the information was clear and understandable. In Slovakia, for example, the regulator developed a calendar with simple emergency activities to be undertaken by the public (e.g. check that iodine tablets are available) with the aim to increase awareness on emergency protective actions.
- Local communities can reinforce national information campaigns. The local partnership STORA in Belgium developed videos and flyers to reinforce the national campaign on protective measures to be taken in case of a nuclear or radiological emergency.
- Before undertaking communication activities, it is important to investigate public needs and concerns. This can be done through different means, such as surveys undertaken by IRSN in France and Ireland. Additionally, different institutions (e.g. SCK·CEN in Belgium, CIEMAT in Spain or IRSN in France) publish regularly national barometers on the level of knowledge on protective actions, the level of information regarding emergencies, the level of trust in institutions addressing emergencies, etc.
- The communication on emergencies should be done, not only in the national language, but also in English. In Germany, the decisions on emergencies is published in German, English and French.
- Involvement of students of journalism in nuclear emergency exercises (Belgium).

- It is important to deal with misinformation, like it is done in France and Finland by using social media to gather, respond and follow misinformation and rumors. They have dedicated and trained personnel for this task.
- Public information sessions on emergencies are regularly held in France, the United Kingdom, etc.
- Testing whether dispersion maps are understood by decision-makers and the lay public is a good practice undertaken in Slovakia. Austria has also developed dispersion mapping on the basis of the FLEXRisk modeling and is actively sharing this with civil society and authorities in other European countries. Indicating uncertainties and the use of a map to point out conclusions is done by IRSN and BfS and could be considered also a good practice.
- Effect of visualization of evacuation maps on public understanding of protection actions is tested in Finland by using public opinion surveys.
- Communication is integrated in emergency drills in Ireland.
- Emergency messages and alerts are transmitted by using mobile phones in Belgium through Be-alert or in the Netherlands through NL-alert. This system will be generalized at the European level based on the Decision No 1313/2013/EU of the European Parliament and of the council of 17 December 2013 on a Union Civil Protection Mechanism.
- Ireland, Lithuania, Luxembourg and the Netherlands test whether the communication material they normally use results in people understanding the emergency or protective actions on different scientific ways: focus groups, surveys, stakeholder panels, web-tests, etc.
- Action plan in Ireland addresses communication aspects much more in detail than national legislation (e.g. engagement with affected population), beyond the requirements of the Basic Safety Standards Directive.

3.2. Transparency

- Nuclear regulatory organisations may report annually on transparency and public information, following the principles of the ENSREG; this was indicated to happen in France and Slovakia.
- Measures of the effectiveness of transparency and openness is undertaken through surveys in France. The IAEA organised a workshop in the early 2000s, where the transparency policies and reports from nuclear regulatory authorities were commented by a panel of critical stakeholders, like Greenpeace and Friends of Earth, in order to surface weaknesses and improvements.
- Public questions on EP&R and FAQs are routinely shared with the public in Austria, Sweden, Lithuania Slovakia, Ireland, Greece, Germany, France, Finland and the Czech Republic by using different mass media, including social media.
- In Germany, the KatWarn is a public warning system originated from competent government agencies or responsible safety and security organisations who decide on the content, timing and extent of issued warnings.
- Citizens' radiation measurements are publicly available on-line through SAFECAST (www.safecast.org).
- Radiation measurements are publicly available on-line in Germany, France and Belgium. This practice is done in all EU countries and summarized on the EC EURDEP website.[2]

[2] https://remon.jrc.ec.europa.eu/Services

- Documents for public information related to nuclear emergency have to be agreed in advance with other organizations e.g. industry, other government agency in Hungary, Italy, Germany, Ireland, Slovenia and Slovakia.
- In Germany, the overall responsibility for informing the general public lies within the authorities of the Länder. In some cases, special independent commissions are established, on requests of citizens, to inform actively in regular sessions on safety, etc.
- In order to ensure transparency, a rationale for what information must be withheld related to an emergency (e.g. aspects of site security plans, threat information, commercial interests, etc) is under review in Germany.

3.3. Media relations

- The involvement of journalists in emergency preparedness as well as their training in protective actions against radiological risk is considered a good practice by Atomic Reporters. NGOs, like Green Cross, Red Cross and Greenpeace, train journalists in radiation protection before they are going into (potentially) contaminated areas.
- The use of social media (e.g. twitter, facebook, blogs, etc) should be done in conjunction with traditional media (e.g. journals, TV, radio, sirens, etc) during an emergency in order to reach all the different audiences.
- STUK, the nuclear regulatory organization in Finland has developed a social media policy, where all 240 employees are encouraged to use social media in their relations with journalists and the public.
- Atomic Reporters published one page "Recommendations for improving communication with journalists to enhance public safety in the event of a nuclear or radiological emergency" which could be used by different organisations to improve their relationship with media.[3]
- In Slovenia and Slovakia, the NRO's Chairperson, the Director and the spokesperson receive media training.
- Public relations (PR) persons from Finland and Greece take all opportunities for training and education and participate at different expert conferences/meetings.
- In order to correct erroneous coverage related to emergencies, Greece establishes personal communication with journalists and writes letters to editors.
- Some NROs or crisis centers have an internet dark site that becomes active in the event of an emergency (e.g. Finland).
- In France, ASN organizes 5 drills a year with media pressure, involving journalists and texts consistency and coordination of messages, quality of messages during speeches, etc.

3.4. Collaboration and stakeholder involvement

- The nuclear regulatory authority collaborates with civil protection in the field of public information as is the case for example in Slovenia.
- Different stakeholder groups were engaged in EP&R during the EC roundtable discussions on Aarhus Convention. Also, schools are engaged in EP&R since different institutions, like IRSN in France explain and discuss risks with the teachers and students.

[3]http://www.atomicreporters.com/wp-content/uploads/2016/06/RotterdamJournalistsRecommendations616LR2.pdf

- Local representatives, like Local Information Commissions (CLIs) in France, attend staff exercises as observers. Also, in the UK, local communities have been involved in emergency exercises and the general public have been engaged in evacuation exercises.
- Local communities have regular meeting with the nuclear operators through a direct relationship between the mayor and the director of the nuclear facility, like in Slovenia and in Spain.
- STUK supports in-house communication culture that encourages all employees to engage in dialogues with stakeholders. This way, they reinforce the institutional message, allowing people to have a more personal perspective and thus, moving from "institutional trust to peer trust".
- Communicators can be supported by research results through the collaboration between authorities and citizen science. For example, the RICOMET conference held annually since the last four years provide a great opportunity for communicators to be aware of research results from European and international projects in the area of ionising radiation.
- There are on-going citizen engagement programmes at IRSN in France.
- Citizens are involved in radiation measurements in France, the UK, and the Netherlands.
- The collaboration and co-ordination of all emergency actors, where there are many voices but one message in case of nuclear or radiological emergencies is considered a good practice. In Spain, during Fukushima, the collaboration among institutions was strengthened when various university laboratories around the country engaged in measuring and monitoring radiation, forming a network which provided information to the public and reinforcing the opinion from the public authority.
- The identification of contact networks of respected / trusted groups is crucial before an emergency: e.g. medical and pharmacy communities; journalists, etc. which was indicated to occur in France, Slovenia, the Netherlands and Germany.
- Inviting critical stakeholders, like NGOs or independent experts, to discuss their reports with management and expert staff or for consultations has been a good practice implemented by ASN and IRSN. For instance, they invited Greenpeace to discuss on security aspects. Similarly, the case of the round tables discussions on the Aarhus Convention with ANCCLI.
- In Italy: the prefect of the province with the participation of local administrations (regional and municipal administration and health services) prepare prior information to the public about nuclear and radiological risks.

Cross-border arrangements for public information

- Agreement with neighbouring countries on predefined statements and press releases during peaceful times is arranged in Luxembourg and Slovenia-Croatia.
- The Nordic public communication group (FI, SE, NO, DK and IS) meets regularly and exchanges information on issues which may cause concern.
- Using professional translation tools or embassies to publish swift information in other languages (FR, Lux).
- Although in most countries, information of an emergency in the country would be published only in the national language in some cases the information would be published also in English. In Poland, in the official languages of neighboring countries.

Annex I. Agenda

Workshop

'Public Information and Transparency in case of a radiological emergency according to the new Basic Safety Standards and amended Nuclear Safety Directive: Collecting Good Practices"

11th and 12th of June 2018

University of Antwerp, Stadscampus

Building D

Hof Van Liere

Prinsstraat 13

2000 Antwerpen

Classroom: D228-D328

Monday, 11th of June 2018		
11:00 – 12:00	Registration and sandwich lunch (*Get to know each other*)	
12:00 – 12:10	Welcome speech	Klaas van der Meer, (SCK·CEN)
12:10 – 12:30	Opening speech Basic Safety Standards and Nuclear Safety Directives: Status of transposition and implementation	Michael Huebel, (DG ENER, EC)
12:30 – 12:40	**Study on public information and transparency in case of a radiological emergency:** legal basis and analysis of international guidance	Verena Ehold, the project legal expert
12:40 – 13:10	**Study on public information and transparency in case of a radiological emergency:** Identification of good practices in Member States	Tanja Perko (SCK·CEN); Meritxell Martell (Merience)
13:10 – 14:00	Collecting Reference Group views on good practices on public information and transparency in nuclear and radiological emergencies	Reference Group members (5 minutes each representative)
14:00 – 14:30	Refreshments break	

14 :30 – 14 :45	International guidance on public information and transparency during nuclear and radiological emergencies	Ted Lazo, Nuclear Energy Agency (OECD/NEA)
14:45 – 15:00	Learning from good practices from communication in a chemical accident: Communication with the affected public and emergency responders	Geert Arno (Ministry of Health, Belgium); Erwin van Damme (Belgian association of firefighters)
15:00 - 15:10	**Findings from the study on good practices from non-radiological emergencies**	Meritxell Martell (Merience) ; Tanja Perko (SCK·CEN)
15:10 – 15:30	Open discussion: Collecting good practices on communication and transparency from other non-radiological emergencies	All participants
15:30 – 15:50	Good practice from Finland: Open, transparent and timely public information and use of social media	Kaisa Raitio, STUK
15:50 – 16:10	**Findings from the study: Existing arrangements, procedures and practices in Member States at (local) national and regional levels**	Tanja Perko / Meritxell Martell
16:10 – 17:00	Working group discussion on effectiveness of existing arrangements, procedures and practices in Member States at (local), national and regional levels	All participants/WG
17:00 – 18:00	Collecting good practices: Recommendations effectiveness of existing arrangements, procedures and practices in Member States at (local), national and regional levels	Moderated rapporteurs session
18:00 – 19:00	Reception: *Informal discussion between participants on addressing challenges for applying good practices*	

Tuesday, 12th of June 2018		
8.30 – 9.00	Morning coffee: *Informal discussion between participants on addressing challenges for applying good practices*	
9:00 – 9:15	Good practice from citizen science and engagement during an emergency: the case of SAFECAST in Japan (and Europe)	Azby Brown (SAFECAST)
9:15 – 9:30	Dilemmas on what is public and what is expert information: the case of Fukushima	Shin-etsu Sugawara, Central Research Institute of Electric Power Industry (CRIEPI)
9:30 – 9:45	Good practice from France: Engagement with local communities to enhance emergency preparedness	Ilma Choffel de Witte, IRSN
9:45 – 10:05	**Findings from the study on open, transparent & timely public information and stakeholder involvement**	Tanja Perko / Meritxell Martell
10:05 – 11:05	Working group discussion on good practices in transparency and stakeholder involvement in EP&R public information	All participants/WG
11:05 – 11:30	Refreshments break	
11:30 – 12:15	Collecting good practices: Recommendations on transparency and stakeholder engagement in EP&R public information	Moderated rapporteurs session
12:15 – 13:00	Wrap-ups to be included in the final project report as **identified good practices for the effective implementation of public information & transparency provisions under the new Basic Safety Standards and amended Nuclear Safety Directive**	Moderated panel discussion
13:00 – 14:00	Lunch: *Networking to enhance collaboration on public information & transparency during radiological emergencies*	
14:00	Closure of the workshop by Klaas van der Meer, SCK·CEN	

Annex II. Invitation to nuclear regulatory organisations

Dear colleagues,

We would like to thank you again for participating in the EC funded study on good practices in implementing the requirements on public information in the event of an emergency, under the Euratom Basic Safety Standards Directive and Nuclear Safety Directive, by filling in the survey for your country.

We would like to take the opportunity to invite you to participate at the final workshop on good practices in implementing the requirements on public information and transparency in the event of an emergency, from **11th to 12th June 2018** at the **University of Antwerp**, Belgium, where the results of the study will be presented.

The event is free of charge but registration is obligatory.

Further information can be found at:
http://ricomet2018.sckcen.be/en/Pre_conference_workshop

Kind regards and hope to meet you in Antwerp.

Meritxell Martell (Merience) and Tanja Perko (SCK·CEN)

Annex III. Participating organisations

Organisation / institution	Country
ANCCLI	France
Atomic Reporters	Austria
Belgian Association of Firefighters	Belgium
Belgian radiation protection society (BVS-ABR)	Belgium
Bundesamt für Strahlenschutz	Germany
Beveren municipality	Belgium
EIMV	Slovenia
Environment Agency	United Kingdom
EPA	Ireland
European Commission	Luxembourg
Federal Ministry of Health	Belgium
Federal Office for Radiation Protection	Germany
Group of European Municipalities with Nuclear Facilities (GMF)	Spain/Belgium
International Radiation Protection Associations (IRPA)	United Kingdom
IRSN	France
Institute for Environmental Protection and Research (ISPRA)	Italy
International Federation of Red Cross and Red Crescent Societies (IFRC)	Switzerland
Joint Research Centre (JRC)	Belgium
Karlsruhe Institute of Technology (KIT)	Germany
Merience SCP	Spain
Mesh & Moser Situation Management	Austria
MONA partnership	Belgium
NERIS platform	Germany / Spain
Nuclear Transparency Watch (NTW)	Belgium
OECD/NEA	France
Radioactive Waste Management Plant	Poland
SCK·CEN	Belgium
STORA partnership	Belgium

STUK	Finland
Tokyo Denki University	Japan
UK Society for Radiological Protection	United Kingdom
Universidad Politécnica de Madrid (UPM)	Spain
VUJE	Slovakia

Annex G

DG Energy project: "Study on good practices in implementing the requirements on public information in the event of an emergency, under the Euratom Basic Safety Standards Directive and Nuclear Safety Directive"

Project Ref. Ares(2016)7037963

Stakeholder consultation: Feedback from NERIS platform members

Task 2.3: Collection of stakeholders' views, needs and recommendations

Authors:
Tanja Perko, SCK•CEN, Belgium
Meritxell Martell, MERIENCE, Spain
Catrinel Turcanu, SCK•CEN, Belgium

Date: 18 May 2018

ENER/2017/NUCL/SI2.756526

Contents

DISCLAMER:

This report has been produced by the consortium SCK·CEN/Merience under a contract funded by the European Commission. The views, conclusions and positions contained therein are those of its authors and do not represent the views or the official position of the European Commission. The European Commission does not guarantee the accuracy of the data included in this report, nor does it accept responsibility for any use made thereof.

1. Meeting with the NERIS platform

The mission of the NERIS Platform is to establish a forum for dialogue and methodological development between all European organisations and associations taking part in decision making of protective actions in nuclear and radiological emergencies and recovery in Europe. The platform has 59 supporting organizations (see Annex IV).

On 25-27 April 2018 in Dublin, the NERIS Platform organised its 4th Workshop in cooperation with the Irish Environmental Protection Agency. The Workshop gathered 130 participants and 40 papers dedicated to the issue of "Adapting nuclear and radiological emergency preparedness, response and recovery to a changing world", among others also a presentation and discussion in a context of our project.

In the framework of the NERIS working group on information, participation and communication held in Dublin on 25 April 2018, the members of the NERIS platform and participants at the meeting were consulted on two basic questions:

- *How should MS interpret the public information requirements from the amended Basic Safety Standards (BSS) and Nuclear Safety Directives (NSD)?*
- *Can you point out a specific good practices at national level regarding information provision and transparency in case of an emergency?*

Three working groups were set up to discuss different projects, one of them related to the 'study on good practices in implementing the requirements on public information in the event of an emergency, under the Euratom Basic Safety Standards Directive and Nuclear Safety Directive on information and participation' with the two questions formulated above. Due to time restrictions, two working groups were able to discuss the questions above. The following sections summarise the feedback received from these two working groups.

2. Feedback from Working Group 1

- Member States seem to follow two possible directions on the interpretation of BSS: they can interpret it minimally or they can go beyond. Some countries say they already fulfil the requirements and there is nothing more needed. Other countries see BSS as a chance for improvement, try to rethink, develop a new communication plan in the area, etc. Germany follows the second approach but not really in the public information area. Germany translated the requirements into a new radiological protection law, but requirements for public information arrangements do not go beyond BSS. However, in general, the BSS provides a chance to think of an improved way forward and try to come up with national emergency communication plan for these emergencies. There is a good practice in Austria, where they have developed a new communication plan for nuclear and radiological emergencies, to clarify roles and responsibilities. In this case, it is a clear response to the requirements of BSS.
- In Ireland, the legislation does not go beyond the requirements in BSS and the Ministry is reluctant to do this but the action plans go beyond. In practice, officials decide what level to go and they always go beyond, implementing good practices. There is a national plan – all hazards - and there are arrangements for stakeholder engagement in the plan. During emergencies key stakeholders are involved (representative organisations from different sectors depending on the emergency, not members of public). Stakeholder involvement is

new in the plan but the practice has been going on for a while. The panel has existed for a number of years, after PREPARE project.

- There will be a symposium in October at IAEA to identify important issues on stakeholder engagement. Currently IAEA is developing social media exercises, but these are only used for internal exercises.
- The previous directive was asking for provision of information in case of emergency as a proactive obligation – to provide information without demand of citizens. It is difficult to regulate in advance stakeholder involvement and provision of information. CODIRPA in France, the Steering committee for the management of the post-accident phase of a nuclear accident or a radiological emergency, involves a pluralistic group of stakeholders and their approach includes many stakeholder involvement issues. At the national level, in a post-accident situation, the TSO will be in a situation of distress but still people need information on how to cope with the emergency. We plan to put in place some forum to organise the information. Although it is not in the law, the plan of IRSN is to put in place "information centres" to provide information and help as soon as possible during an emergency, so that people can ask questions and have the support needed.
- In Switzerland there is a permanent tool, a "call centre" in case of crisis, where people from the medical field answer questions. This call centre is independent from authorities but have some connection to them. It is official and citizens do not ask questions to the administration but to the call centre (whatever the crisis). Citizens are confident about this call. For specific crisis, the people responding might not have the skills.
- It is important to experiment measurements with devices (e.g. SAFECAST) in order to make radioactivity visible. A good practice can be to support citizen science – members of the public can take their own measurements. It is a very good means to help people understand radiation.
- In Hungary, there is a new national emergency plan and the communication plan will be part of it – it is not yet official. BSS was an opportunity to include a communication plan in the emergency plan.

3. Feedback from Working Group 2

- In Spain there is no change in BSS. The draft of BSS related to public information contains the same words as in the past. There are no new elements regarding information to the public. It is focused on public information and provision of information but not communication.
- The Directive is flexible to give room for countries. In practice, in France, there is a framework and people try to apply it as much as possible according to the situation. ASN and IRSN have a commitment with ANCCLI and it depends on the specific situations.
- There is a difference between transposing a directive and interpreting the directive. Another thing is implementation and we don't know if something is going to change in practice. From the experience during Fukushima, we saw that the traditional ways of informing were either you issue press releases to inform public or you open an specific website for specific purposes (IRSN for environmental monitoring, for example). At ASN we monitored what NROs were doing during Fukushima. OECD gives tools for countries to apply good practice, also in communication: one on recovery and another on protective actions.

- ENGAGE could make some recommendations on how to put this into practice to harmonise communication and transparency at European level on BSS.
- Requirements on BSS on information and transparency are already implemented. There is no chance to improve. In terms of regulation, there are no new requirements. You need to go further in terms of practice and you can interpret differently the regulation. In France, in emergency exercises, they try to involve now representatives of local liaison commissions, local representatives. From the feedback in Fukushima, we see that local population needs to be involved because they have to take decisions. It is not only at national level, it is more complex. In practical exercises you can see which kind of information you can share. This can be considered a good practice.
- The new BSS is not a trigger. There seems to be three main triggers: Fukushima, social media and NGOs. Fukushima was a trigger, as there were a lot of initiatives after Fukushima and even social media was the trigger. Also the level of expertise of NGOs – they check everything, all data, the level of comments indicate that they spend a lot of time reviewing. Sharing public data about measurements is good practice.
- There are NEA documents on emergency preparedness, but not specific to the nuclear sector: Trends in risk communication policies and practices OECD; NEA reports on all-hazards approach lessons from non-nuclear domains.

4. Conclusions: Good practices identified

Most of the countries don't go beyond BSS and NSD and they transpose only the requirements, recognized by the NERIS members only as a minimum. However, there are countries that take BSS and NSD as a chance for improvement, try to rethink, develop a new communication plan in the area and improve public information and transparency in radiological emergencies. In addition, it has been pointed out many times, that international 'exchange' events such as IAEA symposium and NERIS workshop help to recognise and develop good practices, thus such events are a good practice itself.

There is a good practice in Austria and Hungary, where they have developed or is under development a new communication plan for nuclear and radiological emergencies, to clarify roles and responsibilities.

In Ireland, the legislation does not go beyond the requirements in BSS and the Ministry is reluctant to do this but the action plans go beyond. In practice, officials decide what level to go and they always go beyond, implementing good practices. There is a national plan – all hazards - and there are arrangements for stakeholder engagement in the plan. During emergencies key stakeholders are involved (representative organisations from different sectors depending on the emergency, not members of public). Stakeholder involvement is new in the plan but the practice has been going on for a while.

A good practice related to social media use has been recognised at the international level; IAEA is developing social media exercises, but these are only used for internal exercises.

CODIRPA in France, the Steering committee for the management of the post-accident phase of a nuclear accident or a radiological emergency, involves a pluralistic group of stakeholders and their approach includes many stakeholder involvement issues. This approach has been recognised as a good practice. In addition, ASN and IRSN have a commitment with ANCCLI and it depends on the specific situations.

Another good practice comes from France. Although it is not in the law, the plan of IRSN, France is to put in place "information centres" to provide information and help as soon as possible during an emergency, so that people can ask questions and have the support needed.

Established "call centres" have been recognised as a good practice in Switzerland. There is a permanent tool, a "call centre" in case of crisis, where people from the medical field answer questions independently from the authorities, however in close collaboration with emergency management.

Supporting citizen science, as done in France for the case SAFECAST, has been recognised as a good practice by general NERIS membership participating in Dublin.

Involvement of representatives of local liaison commissions and local representatives in nuclear emergency exercises, as done in France, has been recognised as a good practice as well.

5. Annex I: Introduction to the workshop: Abstract submitted to NERIS

Communication and Transparency related to radiological emergencies according to New Basic Safety Standards and amended Nuclear Safety Directive: Are we prepared?
Tanja Perko, SCK•CEN, Belgium and Meritxell Martell Lamolla, MERIENCE, Spain
The implementation of new Basic Safety Standards Directive and amended Nuclear Safety Directive provide opportunity amongst the EU Member States to review existing procedures and improve implementation measures in the area of public information and transparency requirements in the event of an emergency. Furthermore, Council Decision 87/600/Euratom on Community arrangements for the early exchange of information in the event of a radiological emergency stipulates the arrangements that apply regarding the notification and provision of information whenever a Member State decides to take measures of comprehensive nature in order to protect the general public in case of a radiological emergency. This study assesses the current practices in public information and transparency related to radiological emergencies in 28 EU Member States under the existing legal requirements, and highlights best practices. Furthermore, the study analyses the way and the extent to which the arrangements are implemented at a practical level, taking into account the points of view of various governmental and local authorities, licensees and other stakeholders. In addition, the planned changes and potential improvements for implementation of the recently adopted Directives to be transposed by the Member States are considered. This study involves document analysis of applicable EU legislation, as well as the on-going and planned implementation in national legislation of the 28 EU Member States. In addition, it conducts an on-line survey with regulatory bodies (nuclear safety authorities or other responsible authorities) to collect and assess the national legal frameworks for applying the public information requirements in all the EU Member States. Through this on-line questionnaire (with open and closed questions) an assessment of the scope and practicability of these national provisions and international and European standards and guidance is carried out and gaps are identified. Moreover, a number of national case studies are analysed in greater detail to highlight, e.g. which national or regional authorities are responsible for public information in the event of an emergency, framework for stakeholder involvement, timing of issue for the holding statement (first public information about an emergency), etc. Specific emergency cases are studied (e.g. ^{137}Cesium event in a laboratory in Finland (2016)) from the communication and public information point of view. The way public information needs were managed, the lessons learned and their relevance in the EU context are investigated. Acknowledgement: The research has been conducted in the context of the *BSS radiological emergency, public information and transparency* project, which has received funding from European Commission DG Energy, under grant agreement ENER/2017/NUCL/SI2.756526.

6. Annex II: Agenda of the meeting

NERIS

European Platform on Preparedness for Nuclear and Radiological Emergency Response and Recovery

Agenda

NERIS WG Information, Participation and Communication

Wednesday 25th April 2018

17.00 – 18.30

Dublin Castle - Dame Street - Dublin 2, Ireland

1. Introduction. Review of past activities of NERIS WG on Information, Participation and Communication *-Eduardo Gallego (10')*

2. Short summary of activities of TERRITORIES and CONFIDENCE on participation of stakeholders and communication of uncertainties *– Marie Simon-Cornu + TBD (10')*

3. Discussion on the following topics (20 min each, 3 groups, rotation of topics):

   3.1. Frameworks and rationales for stakeholder engagement, *ENGAGE project, moderated by Bieke Abelshausen*

   3.2. Knowledge base for stakeholder engagement, *ENGAGE project, moderated by Tatiana Duranova*

   3.3. Participation, information and transparency in practice, notably in light of – but also beyond - the new BSS and new Safety Directive *– Project: Public information & transparency in radiological emergencies, moderated by Tanja Perko*

   - How member states should interpret the public information requirements from BSS and new nuclear safety directive?

   - Can you point out a specific good practice at the national level regarding the information provision and transparency in case of emergency?

4. Redesigning of the NERIS WG-IPC objectives and activities (future of the NERIS knowledge data base)*- Eduardo Gallego (15')*

7. Annex III: Members of the NERIS platform participating in Dublin

1. APA - Agencia Portuguesa do Ambiente (Portugal)
2. BfS - Federal Office for Radiation Protection (Germany)
3. CEPN - Nuclear Evaluation Protection Centre (France)
4. CIEMAT - Research Centre for Energy, Environment and Technology (Spain)
5. DTU - Technical University of Denmark (Denmark)
6. EPA - Environmental Protection Agency (Ireland)
7. FOPH - Federal Office of Public Health, Radiological Protection (Switzerland)
8. GAEC - Greek Atomic Energy Commission (Greece)
9. IRSN - French Institute for Radiological Protection and Nuclear Safety (France)
10. IST - Instituto Superior Técnico, the Lisbon School of Engineering, Science and Technology (Portugal)
11. KIT - Karlsruhe Institute of Technology (Germany)
12. MUTADIS (France)
13. NCSRD - National Centre for Scientific Research "Demokritos" (Greece)
14. NCBJ - National Centre for Nuclear Research (Poland)
15. NMBU - Norwegian University of Life Sciences (Norway)
16. NRPA - Norwegian Radiation Protection Authority (Norway)
17. PHE - Public Health England (United Kingdom)
18. PDC - Prolog Development Center (Denmark)
19. SCK.CEN - Belgian Nuclear Research Centre (Belgium)
20. STUK - Finnish Radiation and Nuclear Safety Authority (Finland)
21. SURO - National Radiation Protection Institute (Czech Republic)
22. Tecnatom (Spain)
23. UNIMI - University of Milan (Italy)
24. University of Warwick (United Kingdom)
25. UPM - Universidad Politécnica de Madrid (Spain)
26. VUJE - Nuclear Power Plants Research Institute (Slovakia)

27. AgroParisTech - Paris Institute of Technology for Life, Food and Environmental Sciences (France)
28. AIT - Austrian Institute of Technology (Austria)
29. ANCCLI - National Association of Liaison Committee (France)
30. ASN - French Safety Authority (France)
31. BIR - Bundeswehr Institute of Radiobiology (Germany)
32. DEMA - Danish Emergency Management Agency (Denmark)
33. DZZZ - Office for Radiological and Nuclear Safety (Croatia)
34. ENEA - Italian National Agency for New Technologies, Energy and Sustainable Economic Development (Italy)
35. EVIRA - Finnish Food Safety Authority (Finland)
36. ENEA - National Agency for New Technologies, Energy and Sustainable Economic Development (Italy)
37. GRS - Gesellschaft für Anlagen und Reaktorsicherheit (Germany)

38. Hungarian Academy of Sciences Centre for Energy Research (Hungary)
39. Institute of Environmental Geochemistry under NAS (Ukraine)
40. IFIN HH - National Institute of Physics and Nuclear Engineering (Romania)
41. ISGlobal - Barcelona Institute for Global Health - (Spain)
42. JSI - Jozeph Stefan Institute (Slovenia)
43. ISP NPP - Institute for Safety Problems of Nuclear Power Plants (Ukraine)
44. ISS - Istituto Superiore di Sanità (Italy)
45. KWR - Watercycle Research Institute (Netherlands)
46. MBS - University of Manchester (United Kingdom)
47. NAEA - National Atomic Energy Agency (Poland)
48. NPP-OSI -NPP Operation Support Institute (Ukraine)
49. NRG - Nuclear Research and Consultancy Group (Netherlands)
50. PMA - Pays de Montbéliard Agglomération (France)
51. Regional Environmental Center (Slovenia)
52. RIKILT - Institute of Food Safety (Netherlands)
53. RIR - Research Institute of Radiology (Belarus)
54. RIVM - National Institute for Public Health and the Environment (Netherlands)
55. SCN - Institute for Nuclear Research (Romania)
56. SNSA - Slovenian Nuclear Safety Administration (Slovenia)
57. SSTC NRS - State Scientific and Technical Center for Nuclear and Radiation Safety (Ukraine)
58. TRPA - Taiwan Radiation Protection Association (Taiwan)
59. UBB - University babes-Bolyai (Romania)
60. UCEWP - Ukrainian Center of Environmental and Water Projects (Ukraine)
61. UJV Rez, as - Nuclear Research Institute Rez (Czech Republic)
62. UOI - University of Ioannina (Greece)
63. UV - University of Valencia (Spain)
64. UVM.BWL - Ministerium für Umwelt, Naturschutz und Verkehr Baden-Württemberg (Germany)

Annex H

DG Energy project: "*Study on good practices in implementing the requirements on public information in the event of an emergency, under the Euratom Basic Safety Standards Directive and Nuclear Safety Directive*"

Project Ref. Ares(2016)7037963

GMF workshop report

Authors:
Tanja Perko, SCK•CEN, Belgium
Meritxell Martell, MERIENCE, Spain

Date: 17 November 2017

ENER/2017/NUCL/SI2.756526

DISCLAIMER:

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Contents

1. Introduction

The study on good practices in implementing the requirements on public information in the event of an emergency was presented to representatives of local communities in the framework of the General Assembly of the Group of European Municipalities with Nuclear Facilities (GMF) held in Madrid on 5th October. Ms. Martell presented the objectives, scope and methods of the project and highlighted the importance of mayors as key local stakeholders to provide real and practical information on how citizens would respond to a nuclear and radiological emergency.

The agenda of the GMF Assembly is shown in Annex I and the presentation is shown in Annex II.

2. Participants

Members from GMF include municipalities with nuclear facilities or in the area of nuclear facilities in Belgium, Bulgaria, Czech Republic, France, Germany, Hungary, Lithuania, Netherlands, Poland, Romania, Slovakia, Slovenia, Spain and Sweden. At the General Assembly in Madrid, there was a total of 86 participants from the following countries:

- 1 representative from Belgium;
- 35 representatives from Hungary;
- 2 representatives from Slovakia;
- 1 representative from Slovenia;
- 39 representatives from Spain;
- 5 representatives from Sweden.

In addition, three members from NuLeAF (Nuclear Legacy Advisory Forum) in the United Kingdom, also attended the Assembly as they will become members of GMF in the following weeks.

3. Discussion

An open discussion was organised after the presentation of Ms. Martell to gather information from the local representatives regarding the arrangements for public information in case of an emergency. A number of open questions were posed, such as whether municipalities are involved in drills or exercises of emergency preparedness and response, whether the population is involved in such exercises, which are the mechanisms established for local authorities to communicate an emergency to the citizens, to what extent are mayors aware if a possible nuclear and radiological emergency, etc. In order to systematise and get detailed information, further interviews will be conducted with representatives of the local communities from the different countries in the following weeks.

Some of the points which arose in the open discussion were the following:

- It is important to take into account the role of social media and how to counteract false information during an emergency. How to ensure that the public listens to local authorities and not to others?
- In some countries drills are regularly conducted (for instance every 2 years in Sweden), whilst in others, this is not a regular exercise (like in Hungary). When drills are conducted, in some cases they involve the public (for instance, school evacuation) whilst in others the public is not involved.
- Lessons can be learned from other events (e.g. terrorist attacks, hurricanes, chemical accidents, etc).
- In Spain, there was a national study evaluating municipal emergency plans. This was coordinated by the Spanish Association of Nuclear Areas (AMAC). This study led to an agreement between AMAC and civil protection to reinforce information and training of first responders and those involved in an emergency at local level (e.g. schools, hospitals, residence for the elderly, etc). Municipalities demand more exercises and drills.
- In late 2013, the Cáceres Urgent Response International Exercise (CURIEX 2013) took place to test the nuclear emergency plan of Cáceres with the collaboration of both national and international support teams (France, Belgium, Italy and Portugal with intervention modules and teams). The full scale exercise project proposal was based on a nuclear power plant accident located in the town of Almaraz, close to the Portuguese border. Regarding communication, an objective was to promote the general public involvement in nuclear emergencies, by testing the effectiveness of previous information given to affected population. Another objective was to check crisis communication management and local media involvement.
- Some municipalities in Spain have developed “interest groups” to inform the neighbours regarding the measures to be undertaken in case of a nuclear emergency.
- There will be an exercise in Sweden around November – December 2017. The local community in Östhammar is available for more questions on the exercise.

Annex I. Agenda of the GMF Assembly and Conference

GMF
GROUP OF EUROPEAN MUNICIPALITIES WITH NUCLEAR FACILITIES

AGENDA
GMF Assembly
5nd October 2017
Madrid
Spain

The members of GMF are hereby noticed to attend the Annual Assembly of GMF at Conference in Madrid

Agenda:

1. Opening of the meeting by Mr Roland Palmqvist, President of GMF.
2. Acknowledgement of the agenda.
3. Presentation of the Annual Report from the latest General Assembly until now.
   Report of ENWD-GMF meeting last June in Brussels and proposal for a next meeting in Brussels and Dessel in March 2018
4. Current economic situation of GMF.
5. Presentation of the IAEA International Conference.
   Mr. Masahiro Tachibana. "Learning from Experience of Local Involvement in Radioactive Waste Management Programmes'
6. NuLeAf. Nuclear Legacy Advisory Forum
   Mr. Philip Mattheus. .
7. Merience Strategic Thinking.
   Mr. Meritxell Martell
   " Basic Safety standars requirements on public information in the event of an emergency: a European project to investigate how well prepared we are"

8.- Presentation of the Auditors Report for the 2016 Accounts

9. Decision upon discharge from liability for the members of the Presidium and the General Secretary
10. Definition of a strategy for the activities of GMF 2018-2019 by General Secretary and President.
11. Budget for the year 2018
12. Election of the Presidium members
13. Next Assembly, time and place
14. Closure

Agenda. GMF Assembly 2017. Madrid , October 2017

Annex II. Presentation

information & transparency
radiological emergencies

European Commission

Basic safety standards requirements for public information in the event of an emergency: a European project to investigate how well prepared we are

M. Martell & T. Perko
GMF Assembly, Madrid, 5 October 2017

STUDIECENTRUM VOOR KERNENERGIE
CENTRE D'ETUDE DE L'ENERGIE NUCLEAIRE

Background

- Call for tenders Nº ENER/D3/2016-409
- The revised **Basic Safety Standards Directive 2013/59/Euratom** must be transposed by February 2018.
- The amended **Nuclear Safety Directive 2014/87/Euratom** has to be transposed by August 2017.
- These two Directives provide an opportunity to review existing procedures and improve implementation measures in the area of **public information** and **transparency** requirements in the event of an **emergency**.

Basic Safety Standards Directive 2013/59/EURATOM

- **Annex XII. B.** Information **to be provided to the affected members of the public** in the event of a**n** ~~radiological~~ emergency ~~referred to in Article 6~~

  1. On the basis of the ~~intervention~~ **emergency response** plan~~s~~ previously drawn up in the Member States, the ~~population~~ **members of the public** actually affected in the event of a**n** ~~radiological~~ emergency ~~will~~ **shall** rapidly and regularly receive:
     a. information on the type of emergency which has occurred and, where possible, its characteristics (e.g. its origin, extent and probable development);
     b. advice on protection**,** which, depending on the type of emergency, ~~might~~**may**:
        - cover the following: restrictions on the consumption of certain foodstuffs and water likely to be contaminated, simple rules on hygiene and decontamination, recommendations to stay indoors, distribution and use of protective substances, evacuation arrangements,
        - be accompanied, where necessary, by special warnings for certain ~~population~~ groups **of the members of the general public**;
     c. announcements recommending cooperation with instructions or requests by the competent authorities.

- ➔Legal obligation to include emergency communication for „affected“ members of the public in emergency response plans.
- ➔No information requirements to the „unaffected“public.

Basic Safety Standards Directive 2013/59/EURATOM

2. If the emergency is preceded by a pre-alarm phase, the ~~population~~ members of the public likely to be affected in the event of a radiological emergency ~~should~~ **shall** already receive information and advice during that phase, such as:
   - an invitation to the ~~population~~ **members of the public** concerned to tune in to ~~radio or television~~ **relevant communication channels**,
   - preparatory advice to establishments with particular collective responsibilities,
   - recommendations to occupational groups particularly affected.
3. This information and advice ~~will~~ **shall** be supplemented, if time permits, by a reminder of the basic facts about radioactivity and its effects on human beings and on the environment.

- ➔ Legal obligation to inform public ("likely to be affected") already in a "pre-alarm" phase, if any.

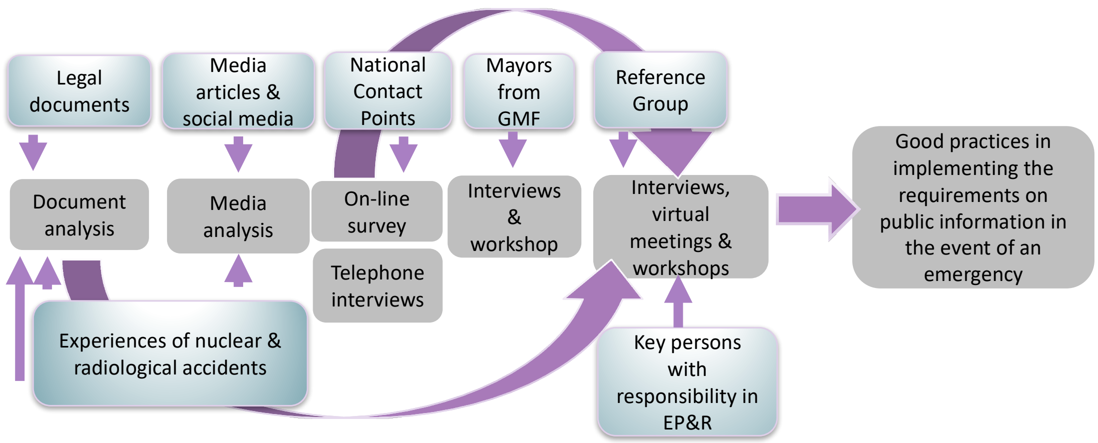
(amended) Nuclear Safety Directive 2014/87/Euratom

- Article 8 ~~Information to the public~~ **Transparency**

1. Member States shall ensure that **necessary** information in relation to the ~~regulation of~~ nuclear safety **of nuclear installations and its regulation** is made available to ~~the~~ workers and the general public, **with specific consideration to local authorities, population and stakeholders in the vicinity of a nuclear installation**. ~~This~~ **That** obligation includes ensuring that the competent regulatory authority **and the licence holders, within their fields of responsibility, provide in the framework of their communication policy: (a)** information **on normal operating conditions of nuclear installations to workers and the general** ~~the~~ public ~~in the fields of its competence~~; **and (b) prompt information in case of incidents and accidents to workers and the general public and to the competent regulatory authorities of other Member States in the vicinity of a nuclear installation**.
2. […]
3. […]
4. *Obligation to let the public participate effectively in decision-making on licensing.*

- ➔ Enhanced legal obligation of regulator and operator to provide routine and emergency information to the public.

Methodology



GMF: Group of European municipalities with nuclear facilities
EP&R: Emergency, Preparedness & Response

Role of municipalities

- You are a key stakeholder to provide real and practical information on:
  - Is the local authority responsible for providing ***prior information*** to the public on radiological and nuclear emergencies? How is this information communicated (brochures, public meetings, training courses, etc)? To whom (how are these potential members of the public defined – local boundaries, emergency planning zone, etc)?
  - Have local authorities defined responsibilities for informing the public in the ***event of an emergency***? Are arrangements for coordination of emergency response and protocols between operators and local, regional and national governments developed?
  - Are there arrangements in place for cross-border cooperation in EP&R?
  - Is civil society involved in emergency preparedness exercises? How? How often?
  - …..

Output

Final workshop to be held in June 2018 in Brussels

Thank you for your co-operation!

Contact:
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Annex I

DG Energy project: “Study on good practices in implementing the requirements on public information in the event of an emergency, under the Euratom Basic Safety Standards Directive and Nuclear Safety Directive”

Project Ref. Ares(2016)7037963

Report from local communities’ point of view on public information in case of a nuclear emergency

Task 2.3: Collection of stakeholders’ views, needs and recommendations

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Contents

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1 Introduction

The study on good practices in implementing the requirements on public information in the event of an emergency was presented to representatives of local communities in the framework of the General Assembly of the Group of European Municipalities with Nuclear Facilities (GMF) held in Madrid on 5th October 2017. Through the GMF Secretariat, Ms. Martell sent a survey to the members of GMF asking them to answer questions regarding the level of knowledge of the local population in case of a nuclear emergency, the organization of emergencies at local level, exercises and their level of knowledge on the Basic Safety Standards Directive. The survey was also sent to the members of ANCCLI through the representative of the Reference Group in the project, Ms. Anne-laure Maclot from CLI Cattenom. The survey is shown in Annex I.

2 Participants

The survey was sent by email with a link to *jotform* to enable respondents to answer online. It was sent twice to all members of GMF (120 members[1]) via the GMF Secretariat: on 14 December 2017 and 2 February 2018. In addition, personal emails were sent to GMF representatives from Belgium, Germany, Hungary, Sweden, Slovenia, Slovakia and Spain to remind them to fill in the questionnaire. The survey was also sent to ANCCLI through the representative of the Reference Group, Ms. Anne-laure Maclot in January 2018. Six people from six different countries – Belgium, France, Germany, Hungary, Spain and the United Kingdom, responded to the survey. While this number is not representative of the situation at local level, it is illustrative of how information aspects on nuclear emergencies are addressed at local level.

The respondents to the survey represent different positions with regards to nuclear emergency at local level: three mayors, one local councilor in charge of civil protection, the secretary of the Local Information Commission and the vice chair council executive and chair of the liaison committee. In case of a nuclear emergency, the respondents declare that they would be responsible for the safety and warning the inhabitants and inform and disseminate information to citizens and media. In Belgium, the mayor states that in case of a nuclear emergency, the governor of the province takes over. In all cases, the respondents feel that they are more informed about a possible nuclear emergency at the nearby nuclear facility than the citizens in their municipalities.

3 Discussion

The survey (in Annex I) addressed the following topics which are discussed below:
- Information at local level
- Organisation of emergencies
- Emergency situations
- Exercises
- Basic Safety Standards Directive.

[1] Some members are associations of municipalities and they distribute the information to their members themselves (like ASKETA in Germany) whilst in other associations (like AMAC in Spain), all members are also members of GMF and receive the information directly from GMF.

3.1 Information at local level

When the respondents were asked to what extent they personally trust the different actors to provide useful information about the measures to protect people in case of a nuclear accident, the responses differ. Whilst the majority trusts the nuclear safety authority, the rescue services (firefighters, civil protection, police) and the crisis centre, the level of trust in media and environmental organisations is very different depending on the respondent. In all cases, the least trusted source of useful information is social media (e.g. twitter, Instagram, facebook, etc), whilst the level of trust in traditional mass media is usually higher. In fact, three of the respondents point out that the weakest point regarding communication of a nuclear emergency is social media and the spread of rumours and false information. The other respondents state that the weakest point is informing the whole population, not receiving information and sending the emergency alarm in time.

The way citizens may discuss or participate in communication aspects related to preparedness plans for nuclear emergencies is through their involvement in drills (in Almaraz, Spain during a Curiex exercise in 2013), municipal meetings, meetings of Local Information Commissions in France or meetings of the local partnerships in Belgium. Particularly, in the case of Belgium, the local partnership STORA, which includes representatives of local politicians, businesses, representatives of local associations, etc, follows up all nuclear activities in the municipality. STORA launched a campaign for the people from Dessel and Mol to reinforce at the local level a national campaign (http://www.nucleairrisico.be/) launched in March 2018 to inform the Belgian population on nuclear risks and safety measures. Additionally, STORA organised an enquiry in 2017 to assess the level of knowledge of local population regarding safety measures. Around 30% of the almost 500 interviewees could not name a single emergency measure on what to do in case of a nuclear emergency. In April 2018 STORA distributed a leaflet with information on what to do in case of a nuclear emergency to every household in Dessel and Mol. Furthermore, the survey on knowledge regarding nuclear emergencies will be conducted again in June 2018 (Geert Lauwen, email communication, 20 April 2018).

The case of France seems outstanding, as found out by the Nuclear Transparency Watch (2015), in that local information committees are legally anchored in a broad set of emergency preparedness and response (EP&R) activities (p. 32). However, in general, the study found out that the lack participation of the local public and citizens' organisations in the EP&R planning, exercises and implementation is one of the main deficiencies for proper preparedness in the event of a nuclear emergency.

In the case of Spain, there are information activities at local level organised by the local authority on nuclear emergencies, but with a very low level of participation. These meetings should be more participatory rather than only one-way information (AMAC, 2015).

3.2 Organisation of emergencies

Local authorities have defined responsibilities for informing the public in the event of an emergency in their local plans. All the respondents think that the arrangements in place for the coordination of an emergency response is sufficient as they include the necessary measures to protect citizens and include procedures on what they should do in an emergency situation. However, in the case of the CLIs in France, it is noted that CLIs only have the right to attend nuclear exercises as observers and they should be involved as facilitator for disseminating information.

From most of the responses to the question "*are there any arrangements in place for cross-border cooperation in emergency preparedness and response?",* local representatives think that cross-border cooperation does not apply to their territories but it is rather a national issue. However, the representative from Belgium replied affirmatively and stated that in case of emergency management, the mayor takes part in the head office together with the governor, the head of police, the head of firefighters and the head of the ministry of health.

In case of a nuclear emergency, mayors state that they would inform the citizens, even if no actions would be needed in the area. The systems they would use to inform citizens include acoustic loud speakers placed in the municipality, loud speakers in the vans, local radio, local TV, BE-alert, text messages, press releases, social media, speeches, phone calls, municipal website, etc.

3.3 Emergency situations

In all cases, the respondents replied that it would take a maximum of 30 minutes from the moment the nuclear emergency is declared for the affected citizens to get information about protective actions. The types of communication channels to inform about the nuclear emergency, however, differ. The respondents were asked if they know which are the preferred modes of communication during a nuclear emergency for residents in the municipality and which communication modes they would use to provide information during a nuclear emergency. The responses widely vary among countries, as shown in the table below:

Table 1. Preferred and used modes of communication during a nuclear emergency

Preferred / Used	Belgium	France	Germany	Hungary	Spain	UK
Landline phone calls		Preferred / Used				Used
Mobile phone calls						Used
Text messaging	Preferred / Used			Preferred / Used	Preferred / Used	
Email	Preferred / Used					
Social networking	Preferred / Used	Preferred / Used			Preferred / Used	Used
Sirens, loud speaker systems				Preferred / Used	Preferred / Used	Preferred
Others: Radio				Preferred	Preferred / Used	Preferred

Others: TV				Preferred		
Others: KatWarn			Preferred Used			

As shown in the table above, in some cases the preferred modes of communication are not the same as the used models of communication. However, it is worth pointing out that it is important to use different communication methods to reach different groups, like youth, rural communities, people who are displaced during an emergency, tourists, etc. For this reason, it is important to consider communication methods which may not be preferred but could save lives in an emergency when access to internet is scarce, electronic devices are ruined or power is out. In these cases, the use of landline telephones can be a life saver although it may not be the most popular option for communication. Similarly, when a person cannot be reached through a mobile phone call, a text or email message may still be able to reach a specific destination.

In Germany, the KatWarn is a public warning system originated from competent government agencies or responsible safety and security organisations who decide on the content, timing and extent of issued warnings. Similarly, the CrisisCentre in Belgium launched BE-alert to disseminate messages in emergency situations.

In general, one of the main concerns at the local level is how to address social media. Particularly, one of the respondents claimed that social media is likely to spread ungrounded rumours and they do not know how to address this.

3.4 Exercises

According to the local representatives, the communication aspects about protective actions in exercises and drills is not regularly trained and depends on the country considered. In Spain, for instance, in late 2013, the Cáceres Urgent Response International Exercise (CURIEX 2013) took place over three days to test the Nuclear Emergency Plan of Cáceres with the collaboration of both national and international support teams. It was a full-scale emergency drill in response to a nuclear accident in Almaraz nuclear power plant and one of the aims was to encourage the participation of citizens and the media in emergency exercise situations (Gallego and Montero, 2016). The exercise involved the regulatory authority, first responders, local citizens, schools, NGOs, civil protection, national and international representatives and media. Until then, there have not been any further exercises and the civil servant in charge of civil protection updates the municipal plan for nuclear emergencies.

In Hungary, there are exercises every two years involving the regulatory authority, first responders, the operator and civil protection. The municipality leaders are invited to participate in the drills organised by Paks Nucler Power plant and the National Disaster Management Directorate. In Belgium, there are exercises once a year and these involve the regulatory authority, first responders (medical services, firefighters, police), the operator and hospitals. In the UK, exercises involve regulatory authorities, first responders, operator, schools, civil protection, national representatives from the parliament and senate and the military-navy.

The respondents from France, Germany and the UK state that they have not been involved in exercises where communication aspects have been tested.

3.5 Basic Safety Standards

Regarding the Basic Safety Standards (BSS) Directive, two out of six local respondents declare to be aware of the new BSS Directive. The description of BSS according to one of the mayors is: "the maximum radiation that is allowed for people and environment and tools to protect people, e.g. by informing safety people how they have to act and what they have to do. It also asks the Member States to have safety plans and regulations". The two people that claim to know about the BSS think that the directive will not make any changes in the field of nuclear emergencies in their municipalities.

3.6 Conclusions and good practices identified

In the framework of Task 2.3., the views, needs and recommendation of local communities have been collected through a survey sent to the Group of European Municipalities with Nuclear Facilities (GMF) and to ANCCLI through a member of the Reference Group. Despite the low response rate to the survey (6 people replied to the survey from 6 different European countries out of 120 members from 15 countries), some conclusions and good practices related to public information and transparency in nuclear emergencies can be pointed out.

Representatives from the local communities claim that the least trusted source of useful information for them is social media (e.g. twitter, Instagram, facebook, et) whilst the most trusted source is the nuclear safety authority and the rescue services (firefighters, civil protection and police).

The way citizens may discuss about or participate in communication aspects related to preparedness plans for nuclear emergencies is through their involvement in drills (in Almaraz, Spain during a Curiex exercise in 2013), meetings of Local Information Commissions (CLIs) in France or meetings of the local partnerships in Belgium. The case of France with the CLIs and Belgium with the local partnerships seem to be outstanding as the involvement of citizens in discussing communication in preparedness plans in other European countries does not seem to be common practice.

Exercises involving local stakeholders in testing communication aspects are seldom conducted. However, as pointed out by OECD/NEA, 2007, "involving local and municipal governments and NGOs in planning a national exercise programme can identify larger issues and facilitate workable solutions. As an example, a conclusion from the INEX3 exercises that was observed due to the involvement of a broader range of stakeholders was that international guidance is of no value if not accepted by the relevant stakeholder community during the emergency response" (p. 24).

Thus, a good practice which can be highlighted is the involvement of citizens in discussing communication aspects in the event of an emergency, through local meetings and/or involvement in exercises. The need to conduct more exercises where communication aspects are tested is pointed out as a good practice that needs to be implemented.

One of the main concerns at the local level is how to address social media, as it is perceived as being one of the communication modes preferred by the residents. The modes of communication perceived by the respondents as being preferred by residents may differ in the modes of communication used in the case of an emergency (e.g. radio, TV, sirens, SMS, etc). However, it is important to bear in mind that in some cases, different modes of communication need to be implemented depending on the conditions (e.g. electricity down, non-operational operational electronic devices, etc). The warning systems BE-alert in Belgium and KatWarn in Germany are considered good dissemination tools to inform the population in nuclear areas about a nuclear emergency and to communicate about protective actions.

References

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Gallego, E. and Montero, M. (2016) Experience in Spain with local-national for a for better post-accident preparedness. Radioprotection 51 (HS1), S31-34.

Nuclear Transparency Watch (NTW) (2015) Report of NTW Working Group on Emergency Preparedness & Response (EP&R)

OECD/NEA (2007) Strategy for Developing and Conducting Nuclear Emergency Exercises. NEA No. 6162. Organisation for Economic Co-operation and Development, Nuclear Energy Agency, Paris, France.

Annex I. Survey

In this annex, the questionnaire as it was sent to the mayors of GMF and the CLI representative in the Reference Group is shown.

GMF

GROUP OF EUROPEAN MUNICIPALITIES WITH NUCLEAR FACILITIES

BSS

information & transparency radiological emergencies

Dear mayor / local councillor,

We are contacting you because you represent one of the responsible authorities that would take care for public health and protection of your inhabitants in case of a nuclear emergency. We are undertaking a European funded study to improve public information to protect your citizens in case of a nuclear emergency. At the GMF Assembly held in Madrid on 5th October, we presented this project on public information and transparency requirements in the event of an emergency, based on the new revised Basic Safety Standards Directive and Nuclear Safety Directive.

We would be extremely grateful if you could take some time to answer the following questions, which would help us to advise the European Commission on to improve the transposition of these Directives in order to be effective. The survey consists of 25 questions organised in the following 4 sections:

- information at local level;
- organisation of emergencies at local level;
- emergency situations;
- exercises;
- basic safety standards.

The survey will serve as a starting point and will be followed up with short interviews and document analysis.

We thank you in advance for your collaboration.

Background information

Country

Municipality

Position of the respondent

Responsibilities of the respondent in case of a nuclear emergency

Information at the local level

1I. How well informed do you personally feel you are about a possible nuclear emergency at the nearby nuclear facility?

	1	2	3	4	5	
Not at all informed	○	○	○	○	○	Very well informed

2I. How well informed do you think the citizens in your municipality are about a possible nuclear emergency at the nearby nuclear facility?

	1	2	3	4	5	
Not at all informed	○	○	○	○	○	Very well informed

3I. What would be your personal role regarding the provision of public information during an emergency?

4I. To what extent do you personally trust the following actors to provide useful information about the measures to protect people in your municipality in case of a nuclear accident?

Environmental organisations

	1	2	3	4	5	
No trust	○	○	○	○	○	Complete trusted

Traditional mass media (e.g. TV, newspaper, radio, etc, including electronic versions)

	1	2	3	4	5	
No trust	○	○	○	○	○	Complete trust

Social media (e.g. tweet, instagram, facebook, etc)

	1	2	3	4	5	
No trust	○	○	○	○	○	Complete trust

Nuclear safety authority

	1	2	3	4	5	
No trust	○	○	○	○	○	Complete trust

Medical doctors (general practitioners, family doctors)

	1	2	3	4	5	
No trust	○	○	○	○	○	Complete trust

Rescue services (Firefighters, Civil Protection, Police)

	1	2	3	4	5	
No trust	○	○	○	○	○	Complete trust

Research organisations

	1	2	3	4	5	
No trust	○	○	○	○	○	Complete trust

Scientists from Universities

	1	2	3	4	5	
No trust	○	○	○	○	○	Complete trust

Red Cross

	1	2	3	4	5	
No trust	○	○	○	○	○	Complete trust

Crisis Centre

	1	2	3	4	5	
No trust	○	○	○	○	○	Complete trust

Members of parliament from your region

	1	2	3	4	5	
No trust	○	○	○	○	○	Complete trust

Elected politicians from your municipality

	1	2	3	4	5	
No trust	○	○	○	○	○	Complete trust

Other (please specify)

5I. How fast do you think would you get essential information on the nuclear emergency in order to inform about the necessary protective action in your municipality?

○ Maximum 30 minutes from the moment the nuclear emergency is declared

○ Between 30 minutes to 1 hour from the moment the nuclear emergency is declared

○ 24 hours after the nuclear emergency is declared

○ Other (specify):

6I. What do you think would be the weakest points / limitations in the communication of a nuclear emergency in your area?

7I. How well informed do you think citizens of your municipality are about protective actions in case of a nuclear emergency?

	1	2	3	4	5	
Not at all informed	○	○	○	○	○	Very well informed

8I. Do citizens in your municipality discuss about or participate in communication related to preparedness plans for nuclear emergencies?

○ Yes

○ No

○ Other (specify):

9I. If yes, how (in local information commissions, safety committees….) and how often?

10I. Has there been any stakeholder participation activity in your municipality in order to improve preparedness and response to nuclear emergency? Can you describe it?

Organisation of emergencies

1O. Have local authorities defined responsibilities for informing the public in the event of an emergency?

- ◯ Yes
- ◯ No
- ◯ Other (specify):

2O. If yes, which ones?

3O. How are these defined (in a legal document, in a protocol, municipal plan, etc)? Please specify.

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40. Is your local authority involved in the coordination of emergency response?

- Yes
- No
- Other (specify):

50. From your point of view, are these arrangements sufficient?

- Yes
- No
- Other (specify):

60. Why?

70. Are there any arrangements in place for cross-border cooperation in emergency preparedness and response?

- Yes
- No
- Other (specify):

80. If yes, are municipalities involved and how?

Emergency situations

The followig questions are related to different scenarios of an emergency situation.

1E. Imagine you have just heard the news that a nuclear accident has taken place at the nearby nuclear facility and radioactivity has been released into the air. What would be your first concern as mayor/local councillor?

2E. Suppose that authorities advise that people in the neighbouring municipality should stay indoors, but no actions are needed in your area. What would you do? How would you inform your citizens?

3E. Suppose that authorities advise that people in the neighbouring municipality should leave the area (evacuate), but people in your area should stay indoors. What would you do? How would you communicate to your residents?

4E. How long would it take for affected citizens to get information about protective actions (i.e. what to do and how to do it)?

- ◯ Maximum 30 minutes from the moment the nuclear emergency is declared
- ◯ Between 30 minutes and 1 hour from the moment the nuclear emergency is declared
- ◯ 24 hours after the nuclear emergency is declared
- ◯ Other (specify):

5E. Do you know which are the preferred forms of communication during a nuclear emergency for residents of your municipality?

- ☐ Landline phone calls
- ☐ Mobile phone calls
- ☐ Text messaging (sms, WhatsApp)
- ☐ Email
- ☐ Social networking sites (facebook, twitter)
- ☐ Other (specify):

7E. What communication forms would you use to provide information during a nuclear emergency?

- ☐ Landline phone calls
- ☐ Mobile phone calls
- ☐ Text messaging (sms, WhatsApp)
- ☐ Email
- ☐ Social networking sites (facebook, twitter)
- ☐ Other (specify):

8E. We will now go through a number of actions that authorities may advise people to do in case of a nuclear accident. Can you tell me for each of the following actions which communication channels would you use, what communication material do you have available in your municipality and what would be the
main challenges regarding information provision related to the following protective actions:

	Communication channels used (social media, sirens, radio, TV, etc)	Communication material available (video, flyer, poster, etc).	Challenges in communication
Stay indoors or go indoors			
Avoid the use of phone			
Leave children at school			
Take iodine tablets			
Give iodine tablets to children at schools			
Do not consume local food products			
Leave the affected area for a few days			
Do not drink tap water			

Exercises

1X. Did you / do you personally train / exercise / drill communication about protective actions?

- ◯ Yes
- ◯ No
- ◯ Other

2X. If yes, how often?

3X. Which organisations and institutions participate in these exercises?

- ☐ Regulatory authority
- ☐ First responders (firefighters, police, medical services)
- ☐ Local citizens
- ☐ Neighbouring countries
- ☐ Operator
- ☐ Schools
- ☐ Non Governmental Organisations
- ☐ Hospitals
- ☐ Farmers
- ☐ Civil Protection
- ☐ National representatives (parliament, senate, etc)
- ☐ Media
- ☐ Other (specify):

Basic Safety Standards Directive

The Council Directive 2013/59/EURATOM of 5 December 2013 lays down basic safety standards for protection against the dangers arising from exposure to ionising radiation. This new Basic Safety Standards Directive must be transposed into Member States' national legislation and administrative measures by February 2018. The updated Directive broadens the application to the whole range of radiation sources and categories of exposure and also strengthens requirements for emergency preparedness and response.

1B. Are you aware of the new directive on Basic Safety Standards?

- ◯ Yes
- ◯ No

2B. If yes, can you describe in your own words what this is?

3B. If yes, will this directive make any changes in your municipality in the field of nuclear emergencies? What kind of changes?

Final comments and observations

Would you recommend any other person to supply additional information on these matters?

Is there any communication issue important for your municipality in case of a nuclear emergency that you would like to point out to us?

In case you would like to share additional documents related to the topics of this questionnaire:

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Annex J

DG Energy project: “*Study on good practices in implementing the requirements on public information in the event of an emergency, under the Euratom Basic Safety Standards Directive and Nuclear Safety Directive*”

Project Ref. Ares(2016)7037963

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3	ANCCLI	Anne Laure Maclot	CLI Cattenom
4	Atomic Reporters	Peter Rickwood	Founder
5	ENSREG (European Nuclear Safety Regulators Group)	Chiara McMahon	WG3 transparency arrangements
7	Federation of the European Union Fire Officer Associations	Albert Vilanova	Delegate
8	FORATOM	Berta Picamal	Executive advisor to the DG and Senior Manager
9	Greenpeace Central and Eastern Europe	Jan Haverkamp	Consultant
10	GMF (Group of European Municipalities with Nuclear Facilities)	Yves D'Eer	Member of GMF
11	HERCA* (Heads of the European Radiological Protection)	Karla Petrová	Chairperson
12	International Federation of Red Cross and Red Crescent Societies	Martin Krottmayer	Senior Officer, Risk and Vulnerability CBRN
13	Mesh & Moser Situation Management**	Patrick Meschenmoser	Founder and owner
14	International Radiation Protection Association	Roger Coates	President
15	OECD/NEA (Nuclear Energy Agency)	Edward Lazo	Committee on Radiation Protection and Public Health
16	NERIS (European Platform on Preparedness for Nuclear and Radiological Emergency Response and Recovery)	Wolfgang Raskob	Management board member and coordinator of CONFIDENCE project
17	NTW (Nuclear Transparency Watch)	Nadja Zeleznik	President
18	Radiation Protection Society Belgium	Gilbert Eggermont	Ethics and communication working group
19	The Society for Radiological Protection (UK)	Phil Tattersall	Chair of the Society for Radiological Protection (SRP) Source Security and Emergency Preparedness Committee
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