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Dirty Soil and Clean Consciences: Examining Communication of Contaminated Soil

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Abstract The identification and remediation of contaminated sites in Europe is a continuous undertaking that includes different aspects. There are many variables to take into consideration such as the nature of the contaminants, the risks they pose, the location of the site and possible future usages. Also, possible negative effects on the local residents or the environment have to be considered. Within this context, it is necessary to establish a communication between different actors, such as industry, authorities and municipalities, as well as with the surrounding public. This can be done in a variety of ways, where some are more useful and constructive than others. In the present study, eight different construction companies and municipalities were interviewed in order to elicit their views on and experiences of risk communication. The results show that even though most actors were seriously committed to involve and respond to the local populations' concerns and fears, there is certainly room for improvement in many areas. Concluding remarks call for an increased exchange of experiences with all actors involved in risk research and to develop better official guidelines for communicating risks that are specific for contaminated soil.

Keywords contaminated soil · expert · lay people · risk communication · risk perception

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1 Introduction

Through the years, industrial and other human activities have resulted in a number of areas with contaminated soil. The detection and treatment of contaminated soils has been made a priority for many agencies involved in environmental protection and has been made explicit within the European Union through efforts such as EUGRIS (European Groundwater and Contaminated Land Remediation Information System), CLARINET (the Contaminated Land Rehabilitation Network for Environmental Technologies in Europe) and NICOLE (The Network for Industrially Contaminated Land in Europe). Many efforts have been made to remediate areas that are heavily polluted to prevent further spread of environmental pollutants in order to restore the land and put it to other usage (Suèr, 2001).

In Sweden one explicit environmental goal is to identify all contaminates sites and properly classify them before the end of 2005, and that remediation of contaminated areas that may pose a risk to water

supplies or valuable natural sites should have been initiated before 2010. At present there are an estimated 50000 sites in Sweden that have been identified as contaminated and the work with remediation continues to be in high focus (Naturvårdsverket (Swedish Environmental Protection Agency), 2005). The current legislation states that the responsibility of restoration of contaminated land is placed on the owner of the land, following the "polluter pays" policy. However, if the original polluter cannot be identified, old contaminants can be "inherited" by a new owner and the level of contamination and costs for restoration are of importance for any business looking to purchase new properties. When determining the best way to remediate a site, the natural and technical, as well as economical, conditions need to be considered in order to reach the best possible solution for the specific site. It has been argued that this analysis should also include social and ethical considerations depending on the impact of local residents, local business and cultural heritage (Oughton, Forsberg, Bay, Kaiser, & Howard, 2004).

It also plays a role what the intended use of the property is. If the soil is meant to be restored and not used for further development, a different strategy might be used than if the property is to be used for new housing projects or other commercial developments.

1.1 Risk perception and risk communication

Risks are perceived in different ways depending on whom you ask. Studies have shown that men have a lower risk perception than women, and that risk perception also varies with age and education (Wester-Herber, 2004). Differences in risk perception between experts and lay people have been established in a number of studies concerning risk perception. This research has shown that experts tend to focus on the probability of a risk whereas lay people tend to focus on the consequence of the risk (Sjöberg, 2002). It has long been the belief from authorities that these differences are the result of the public not understanding the risk or acting emotionally or irrationally towards it (Irwin, 1995). This has in later research has been proven to be a misconception of how lay people judge risks, as it has been shown that risk perception is to a much greater extent influenced by attitudes rather than emotions (Sjöberg, 2002). Also, the trustworthiness of a source is of some importance. If a source is seen as not being credible, competent or concerned about the well-being of local residents, the communication can serve to further an already negative attitudes held by the audience (Hansen, Holm, Frewer, Robinson, & Sandoe, 2003).

There are also studies that focus on the characteristics of the risk itself where certain aspects, such as the novelty or memorability of a risk, affect risk perception (Fischhoff, Slovic, Lichtenstein, Read, & Combs, 1979). There is some debate within the field of risk perception, where different models of risk perception are proposed (see Sjöberg, 2002), but it is concluded here that there are differences in risk perception and these differences can make the task of communicating risks troublesome.

Very few remediation projects occur in total isolation from the surrounding community and a few issues should be noted. Although the site itself can be geographically distant from neighboring communities, there is always a social context to consider. Possible consequences of contaminated soil can "strike close to home" since it may involve risks to human health and/or the environment and these risks might be difficult for a layperson to detect. The remediation process itself can be very noticeable in a community, with an increase in transportation or usage of various equipments. Some studies in this area have shown that people react not only to the contaminants present but also to visual cues such as equipment used or how organized the site seems (Weber, 2001). If there are highly visible signs of remediation – large machines, lots of personnel and large fences surrounding the site – chances are that the project will not go unnoticed and that the local community will ask questions and want information regarding the process.

This means that all aspects of contaminated soil, whether a site is located within or just outside a community, can have an effect on the people residing there – ranging from risk assessment to the actual remediation processes – and these aspects need to be communicated from authorities to the local population. So what constitutes risk communication? Risk communication can be viewed as a process that takes place everywhere – in the local supermarket, neighbors talking over a backyard fence or a risk managers talking to local residents at a community meeting (Kasperson & Palmlund, 1989). This involves a certain amount of dialogue: that ideas and thoughts are openly shared and discussed without any con-

straints on what to discuss or who is allowed to participate. In a local context, risk communication has been proven to be an effective tool in identifying the concerns local residents or stakeholders can have regarding a risk related venture and as a means for establishing a dialogue with the community (Breck, 2002; Frewer, 2004). In an ideal situation this process would be included in the risk assessment process, where the concerns and opinions of local residents are incorporated and addressed at an early stage of the remediation process. Communicating openly and without bias can also serve to improve the relations with the surrounding community. Recent research has shown that transparent and open risk assessments, and the communication thereof, can improve relations with a community and make policy issues closer to citizens concerns (European Commission (EC), 2001). This is true even under conditions of uncertainty, as studies have shown that lay people are certainly capable of understanding complex technical information and issues of uncertainty (Drew et al., 2003; Frewer, 2004). However, definitions of key terms, such as risk, differ between experts and lay people (Sjöberg, 2002). This discrepancy can lead to problems when talking about and formulating messages about risk. Simply put, if two groups are to discuss a subject and before engaging in dialogue fail to agree on what the topic is, chances are that dialogue will not be very successful. In the case of risk communication, the agenda is in most cases set by the risk manager who decides which issues are appropriate to communicate about. This approach rarely works since it should be the concerns of the public that are addressed in such a way, rather than the technical aspects of risk assessment (Hansen et al., 2003).

It has been noted within the NICOLE projects that risk communication, when dealing with contaminated soil, has been the task of risk managers or engineers involved in site assessment, risk assessment and remediation. This might seem an unfortunate task for professionals who are not used to communicate issues outside their technical expertise. Still, in many cases these individuals find themselves in a position where they have to communicate risks to the local population. This process has been found by some risk managers to have both positive and negative aspects (Gouldson, Lidskog, & Wester-Herber, 2007). On the positive side, relations to the community and/or stakeholders can be improved and leading to an increased amount of trust between them. Some of the negative experiences following a more open and transparent processes can be increased scrutinizing and critique, and in some cases a sense of lost anatomy. Also, opening up the processes surrounding the particular risks associated with their ventures left the risk managers open for a wider range of risk related concerns, something described as a "lightning rod" effect. However, most risk managers found that open communication was better than little or no communication concerning risks.

Risk communication, in most cases, does not involve an exchange of information or concerns but is reduced to "risk information," where agencies and companies present technical information to local actors and no real form of communication is established (Frewer, 2004; Wester-Herber & Warg, 2004). This might be due to lack of time, funding or established strategies for doing this in a comprehensive way. However, in order for any communication effort to be worth undertaking, a few conditions should be met. There should be a clear goal with the communication, a clear analysis of the intended target audience and, under the best circumstances, an evaluation of the communication (Kasperson & Palmlund, 1989).

2 The Present Study

The purpose of this study was to investigate how a small number of actors concerned with remediation of contaminated soil viewed the task of risk communication and the interaction with local residents.

Five companies and three municipalities have participated in this study. They were selected because they all have experiences with the remediation of contaminated land in their communities or at their construction sites. Four out of the five companies were large construction firms and the fifth is the Swedish Railroad Administration (Banverket), a public agency responsible for railroad construction. The four companies were among the largest construction companies in Sweden, that all developed housing projects in areas that once were contaminated. The fifth company, Banverket, is the owner of many contaminated sites due to the development of the Swedish railway.

The three municipalities were located in different parts of Sweden but all had areas of contaminated soil they were responsible for. They were different in terms of size, with population sizes ranging from

7,000 to over one million. These discrepancies did not warrant the exclusion of any municipality or company since the purpose of this study was to investigate the reasons for engaging in risk communication on a broad basis, not to compare the different actors.

The main motivation for including these actors in the study was that they all had experience with contaminated soil but from different perspectives.

2.1 Method

All interviews were conducted by telephone, with complementary questions sometimes posed by e-mail, in the spring of 2005. The length of the interviews ranged between 20 min and 2 h, with an average of 45 min. For this study, an interview guide containing of some 20 questions was developed that focused on the following areas: risk communication, the role of the media and the development and dispersion of technical reports. The interview guide was developed by the researchers in collaboration with representatives from a leading environmental consultant firm. This contribution enabled the interviews to address concerns that might be felt within the expert community, such as the public not understanding technical information or reacting in a way that is not "rational." These concerns were addressed in order to investigate whether they were commonly felt among professionals dealing with contaminated soil.

The interviews were tape-recorded, transcribed and coded by three independent persons into the following categories:

- How risk communication was perceived and carried out focusing on issues such as preparation, implementation and evaluation of risk communication
- The goal of risk communication including issues of specific concern when dealing with contaminated soil
- The role of media as an antagonist or protagonist
- Questions of risk assessment information made public

3 Results

The results section is divided into three parts, starting with the view of and motivation for communicating risks. Following this is the particulars of communication about contaminated soil and ending with a section concerning the role of the media and issues of technical information.

3.1 Risk communication

3.1.1 Views on Risk Communication

Generally speaking, none the interviewed had a special plan or strategy for communicating risks to the public at large or interested stakeholders that were specific to issues of contaminated soil. There could be a department for information or one person identified as a communication director but no special attention was given to risk communication in particular. Of course, depending on the size and experience of each municipality or company interviewed, some had more developed strategies for communication overall than others.

> Or yeah, sure there are always some form of plan of how to communicate, but to call it a strategy is perhaps stretching it a bit far

(Municipality A)

In the cases where communication strategies were developed, this did not mean that they were utilized in projects concerned with contaminated soil, but are rather used if a situation developed where communication was needed.

> No, not if there are no specific reasons. It is not part of our routine to establish a communication strategy in every project

(Company X)

Some of the interviewed, both companies and municipalities, suggested that they were not used to communicating risks with the population in the affected communities. There was a lack of official guidelines for communication resulting in difficulties in preparing properly.

The majority of the interviewed made statements to the effect that communication entails dialogue, whereas a one-way information was described as a monologue and that communication benefits from both 'input' and 'output.' In most cases, the act of communication could be characterized as a form of dispensing information concerning risks to whoever was to be affected by either the immediate risks or those exposed to the process of remediation.

3.1.2 Preparing Risk Communication

The work that had gone into preparing risk communication, in the event that it might be needed, can be said to have been more of an attempt to try to anticipate what people might want to know about the project, how they might react, identify which possible groups might have an interest in the project or even oppose to it. In some cases communication had been between the company's main office and the staff on site, with little or no contact with the local population. In other cases there had been attempts to provide the local staff, especially those concerned with technical environmental assessment, with more information concerning the specifics of risks to humans or the environment, as they were the ones believed to come into contact with the local population. This preparation was done by trying to anticipate what information people could want either by drawing on personal experience (what would I want to know if this happened in my community?) to preparing what would happen in a worst-case scenario (e.g., if the groundwater is contaminated). This was thought to prepare the technical staff on site to answer questions a concerned public might pose to them. In only one case, preparing the risk communication was delegated to external public relation firm that attempted to identify possible issues people would be concerned about. For one company, this option was reserved in case the remediation project was to develop into a conflict.

When asked about whom the intended recipient of the communication was, the public was defined as the local population, both those directly affected by the remediation process, and also other groups that were indirectly affected. These groups included local environmental groups or stakeholders. One municipality pointed out that who to invite and inform needed to be logical so that parents with children in day-care near the local site were informed even though their place of residence was further away.

3.1.3 Implementing Risk Communication

In a majority of cases, local EIA meetings were organized in accordance with legislation. These were advertised either in local newspapers or by announcements that were sent out by mail. After these meetings were held, no other form of organized communication or evaluation was performed. These public meetings were on the whole seen to be a good opportunity to gather information from the local residents, providing an air of openness where no topic was off-limit. However, some of the interviewed parties expressed some frustration over the lack of interest among the public to attend these meetings. It was also unclear how much of the information gathered at these meetings was incorporated into the project.

> Yes, it is always done in the local meetings, that the issues that come up [there] are incorporated into the assessment. It can always be discussed to what extent they really do. Or to which degree they are included. But that's the way it has to be.

(Company Y)

Some of the companies and municipalities had more elaborate communication strategies. Brochures had been printed, regular briefings to the local media were made and Open Houses were organized. Notice boards were used in local communities, where postings on current developments were placed. Some also had posters at the site itself. One municipality had a letterbox posted in connection to the contaminated sound where the local residents could drop off comments or suggestions in an easy way. Also, updated information leaflets had been printed, and websites had been prepared, although this option was used less frequently.

The evaluation of the impact and follow up of communication, if it was done, was performed on a continuous basis during the project or after the projects was completed. This mostly had a focus on customer satisfaction where the pubic rarely was involved or asked.

Two municipalities wanted to learn if the communication had worked in order to improve routines and content of the information. In the end, this was possible for only one of the municipalities as the other ran out of resources at the end of the project.

> ...if we encounter a lot of calls, that people don't understand this, then we have to look at it. It becomes a re-connection, that this is bad. Did we do a bad job? What needs to be improved?

(Municipality B)

In most remediation projects that were carried out the public had a way of communicating with the company or municipality by phoning, e-mailing or

writing to a contact person that was provided through the written information. For the companies' part, this person was usually the project manager and for the municipality it was usually the local environmental officer.

3.1.4 Motivation for Communicating Risks

The participants in this study stated that the primary motivation for communicating risks was to calm the local population. The public was considered to make their risk judgments based on subjective facts that were influenced by personal concerns, such as the risks to oneself and ones family, rather than risks to the ecosystem.

> Risks to the public are personal risks. Can I get sick from this, can my children get sick from this?

(Municipality C)

The general perception was that most people were worried for reasons that were unmotivated and that communication of the "real" risks could reduce this anxiety.

> It is maybe to get rid of all the anxiety that people have and there are many that are worried about what's going to happen. Good to tell them so people are aware that something's going to happen, that we do this to make it as safe as possible. [ ] But then you can also create some anxiety too, if you tell too much. There's a risk with that too.

(Municipality B)

The public at large was also believed to amplify risks that were judged to be small by the objective risk assessment and that these judgments were based on ignorance, low risk acceptance and medial influence. However, both companies and municipalities were aware that these subjective and biased judgments could and should be given room at a later stage of the project. In this way, communication could be used as a way of building trust and to show that the actors involved in the remediation process were sincere. Besides calming the local population, most interviewed also saw this as an opportunity to show their commitment to the environment and that the once contaminated area could come to serve the public. A number of companies and municipalities mentioned the aspect of avoiding "resistance" among the public and other stakeholders. In this way, risk communication could be used to minimize conflict, saving both time and money.

> And in that way you run into fewer problems with the authorities for example. Less resistance to, from the public and others. That is the primary reason, is to get a smooth process.

(Company Z)

Risk communication was also perceived as a tool to strengthen the relations to the surrounding public. One municipality stated that a dialogue with the public could serve as a two-way exchange where the public felt that their fears were addresses and have confidence in their local government, and the municipality could gain access to the knowledge held by local residents concerning the historical perspective on the contaminated site.

3.2 Communicating contaminants of contaminated soil

Overall, four factors seem to have influenced the communication effort. First, if the process of remediation was large, larger resources were placed in communication efforts. Second, where the contaminated site was located played a role. If it was in a populated area, as compared to an isolated industrial site, more effort was put towards communicating with interested parties. Third, the more attractive an area was for future development more effort would be placed on communication. Fourth, if there was low media attention and little or no public opinion expressed surrounding the site, less effort would go into communication as compared to large medial attention and a noticeable public debate.

Some attention was paid to what contaminants were present at the contaminated site. Examples of these were carcinogenic substances, pesticides, asbestos and dioxins. If there were carcinogenic contaminants present, the act of communication was seen as more urgent since there was a perception that the assessment and management of these risks are difficult for the public to understand. Other matters that were perceived as important to communicate about were substances where the dose–response ratios were not certain.

The perception in one company was that dioxins and pesticides were more frightening to the general

public than other contaminants since these are both highly toxic and have received much attention in the media. It was felt that when a substance was given much public attention it was automatically connected with a higher risk perception. This made a "rational" communication concerning this substance difficult. This also meant that even though the risk assessment could be made objectively and the remediation process could ensure that the contaminants are within acceptable levels, the remediation process was often exaggerated. This was done in order to make sure that the level of contaminants left in the soil was lower than that of the original risk assessment. Both municipalities and companies found it important to communicate the reality of their projects – that remediation does not remove all contaminants but instead makes the levels of contaminants acceptable. This was of great importance since if this was not clear, it might give the impression that the remediation process was poorly done or that the municipality or company did not care about the safety of the local residents.

However, it was not only the contaminants that were of concern when dealing with contaminated soil. It was mentioned by some of the interviewed that there were also economic and social risks associated with contaminated soil. The economic risks were primarily relevant from the companies' perspectives. If a large part of the budget was spent on the remediation of a site that was to be developed as housing projects but no one chooses to live there, the company risked losing both money and reputation.

Connected to the economic risks were social risks. Contaminated sites were thought to easily become symbols for stigma, a symbol of degradation of both society and the environment.

> But most of all it was a social risk, this area. It was a symbol for all of life's miseries, it spread like rings on water that made this healthy society quickly degrade. So there was this social risk that was very important for this municipality. But there were also the risks to the ecosystem and the risks to health. But it was it as the social risk being most apparent.

(Municipality C)

Most companies in this study preferred to use outside consultants for the risk assessment of the contaminated site in order to guarantee that the risk assessment was unbiased. One of the perceived benefits with this was to be able to demonstrate to the public that the risk assessments were better and highly objective, compared to an assessment that was done by the companies themselves.

3.3 The role of the media

Media was perceived as important for both the companies and the municipalities as the media was seen as a useful tool to get information out to a large audience. Also, since the media was thought to have a large impact on peoples' perception, it was important to be on good terms with representatives of the press and that the information given was accurate. For the municipalities, media was seen as means to show the local residents how their tax money was being spent, implying that the money was used to improve the local environment.

All companies and municipalities had established guidelines for how to handle the media. Even so, openness and honesty was though to be of great importance since it was in the companies and municipalities interests that nothing damaging leaked to the press.

> You should be able to tell the truth without being hanged. [ ] Do not sneak around with anything but be honest to the media. See it as an opportunity when you get jumped by the media. Make sure you have a message for them.

(Company X)

3.3.1 Reports Made Public

In most cases, scientific reports were written and produced by the external consultants that were hired for the risk assessment. Still, most companies and municipalities spent some time on making sure that the reports were well presented and written. There was an ambition that the reports should be easy to read, at least not overly complicated. The reason for this was so other interested parties can take part of the reports and understand the information given. The majority of the interviewed viewed it as an asset that the reports were clear, informative and made public since it minimized the risk of being perceived as hiding something or not doing a thorough risk assessment. There was also some concern that the

information might give rise to anxiety among the public, but not to the point where information was withheld but rather considerable effort was put into formulating reports that would be easy to understand.

> [ ] But it should be written in a way so that it can't be misinterpreted. And that's really the most important. That the information is correct.

(Company X)

There was no standard of adding a non-technical summary to these reports, with the exception of some summaries describing the Environmental Impact Assessment as required by legislation. It was believed that the reports should be easily accessible in their original form and that no special explanation was needed.

4 Discussion

All companies and municipalities stated that they believed risk communication to be an important issue, relevant to their activities. When asked to describe how risk communication was implemented, it became clear that there were few strategies developed to ensure communication in practice. These findings are somewhat contradictory – interest in communication was said to be high but the attempts to communicate was quite low. Communication, even though the participants defined it as a dialogue, usually took the form of one-way information campaigns with few ways for the public to interact or participate – reducing the communication to "risk information." This means that even though communication was perceived as involving "input" and "output," in reality this did not take place. Moreover, in most cases, communication was not prepared as a regular feature to be included as part of the entire remediation project but was something that could be done if the project ran into opposition or local objections. That the companies and municipalities express somewhat vague and unspecific views of what risk communication is and what it should be about shows that this area, although prioritized in policy, is not observed in practice.

The participating companies and municipalities communicated risks primarily to "calm people down," demonstrating an attitude that people are worried about risks rather than reacting to the risks or project for any other reason. However, studies have shown that people can react for other reasons rather than that they are worried (Sjöberg, 2002; Wester-Herber, 2004; Wylie et al., 2001). This implies that any other reactions, based on anger, curiosity, attitude towards a specific local politician/risk manager or a desire to be informed, were not considered and not prepared for. This implies that the topics of discussion were already set without the input of the public and there is, in realty, no way for the public to get their issues put on the agenda. It also seems that the real purpose of risk communication was to avoid conflicts based on fear and by engaging in communication, preventing any possible problems this might cause.

In most cases, there was no one person that had a special role to act as a communication liaison between the company/municipality and the public. The task of communicating fell on the project manager or the environmental officer as one part of their other responsibilities. There could be economic reasons for this, that in order to save money within the project little effort was put on communication or involving external consultants to assist in the risk communication effort. It is of course better to have one person committed to communication than none at all. However, allowing this person some form of further education or opportunity to take part of the relevant findings from other areas of risk research may prove to be a sound long-term investment for future situations if there is a genuine concern about including and respecting the citizens.

In the case where risk communication was somewhat prepared, the intended audience included all residents that were in some way affected by the remediation process. There were no formal constraints on who could participate in a dialogue or what could be discussed (that is – if there was any form of dialogue). This is a good strategy but needs better formal guidelines on how to incorporate these concerns if it is to be worth the effort. Anticipating who might be interested and trying to guess the information preferences of this group based on personal experience and painting out worst-case scenarios is highly subjective and perhaps not the most appropriate method. It would seem unlikely that this kind of inventory or assessment of possible concerns that are based on speculation, personal preferences and experiences would be conducted in order to determine the level of contamination in a soil or other technical aspects of a remediation project. The public is a highly

heterogeneous group (Wester-Herber, 2004) and what might be important for one group may not be relevant for another. There are numerous studies indicating which concerns are most common among parts of the public (Drew et al., 2003; Hansen et al., 2003) and also a number of studies and suggestions on how risk communication is best achieved (Frewer, 2004; Grey & Ropeik, 2002) that could serve as a useful tool at an early stage in planning a remediation project.

In practice, most communication that was done between company/municipality was done in accordance with the EIA. This tool was developed, in part, to ensure that the opinions of local residents or stakeholders are included in the overall environmental impact assessment (Soneryd, 2002). A suggested by the results, it is unclear whether or not the opinions and concerns expressed at these forums are included in the EIA or in any other part of a project. Only in one case was there an evaluation of the risk communication effort, but in all the other cases it was either not considered or not included as part of the project. This means that even if people were invited to participate, there was no way for them to clearly see that their views make a difference, suggesting that the motivation for participating declines. At the same time, many of the companies and municipalities interviewed stated that they felt somewhat frustrated that people did not attend the Open Houses or public meetings. If interest is lacking from both parties, this might of course makes risk communication more difficult. However, the responsibility for initiating and carrying out communication must lie with the organizations involved in remediation, be it a company or a municipality, since they are responsible for managing possible risks.

Those who seem to put most effort into the act of communicating in this study are the municipalities. This suggests that the relations between municipalities and the population can be slightly different than those between companies and the local population. The municipalities might have longer relationships with the public as compared to companies who are active in the area for the duration of a specific project. The municipalities might also feel that since they manage taxpayers' money they need to be more communicative than companies that operate by private means. From the companies' perspective, the communication effort was reserved for emergencies where possible opposition became an economic strain on the project. However, municipalities seem to have less experience with communication and overall dealing with contaminated soil than the large construction companies who encounter these types of situations more often. Perhaps with more clear guidelines, in combination with the experience of the companies and the relation with the public that the municipalities on information exchange sites such as EUGRIS or NICOLE, have can prove to be mutually rewarding, especially for the public themselves.

5 Conclusions

Communication and perception are just two terms that can be interpreted quite differently; just as the concept of risk have a number of different connotations. It has not been to purpose of this paper to take sides and argue that one definition is superior to another, but rather to point at some paradoxes and give some advice on how to make some progress if risk communication is to be taken seriously.

The first suggestion would be not to rely on stereotypical or personal beliefs about what concerns and worries the local population might have and build a communication strategy based on this rather limited and perhaps unfounded basis. That the municipalities and companies divert so little of their resources to better understanding possible concerns the public might have can be interpreted as a lack of experience in doing so, or a lack of interest in these issues. If risk communication is primarily seen as a means to get the project accepted and carried out without any delays or interruptions, a communication strategy built on assumptions of "irrationality" and "emotions" will certainly not improve the situation if the project runs into difficulties.

The second suggestion would be to make sure that there are ways for the public or concerned stakeholders to see that their concerns are met and addressed by transparency in the risk assessment process and by allowing all concerns to be included – however irrational or emotional they might seem. Chances are that these concerns are rooted in an analysis of consequences, rather than probability. Better use of public meetings, such as mandatory EIA meetings or other forms of Open-House activities can open up avenues for dialogue. It can be said that a proactive strategy, engaging in dialogue before a

conflict arises, is preferable to a reactive strategy when a company is forced to act after an incident has occurred. Reliance on the media to do this job should be handed with caution since a third party might have their own interests. Headlines reporting on conflict and confrontation tend to increase sales, rather than reports on compromise and agreement.

The third suggestion would be to make better usage of all research conducted within the risk field and offer these insights specifically to technical experts involved with risk communication. Initiatives such as EUGRIS or NICOLE can be better explored and used in order to find similar cases and draw on the experiences of others that are active in the same field. This advice applies in equal measures to engineers, natural scientists, and social scientists.

In conclusion, it seems risk communication is still used as a tool for merely keeping risk managers' consciences clean; the present challenge for the field of risk communication is to get down and dirty.

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