

# Innovation Days Europe 2024

Connecting Technology with Policy  
July 1-2, Tartu, Estonia



# Europe's vision on data sharing to push the green transition

Marco Minghini

Digital Economy Unit  
Joint Research Centre (JRC)

Innovation Days Europe, 1-2 July 2024

# Presentation Outline

**01** EU policy context

**02** JRC activities on data spaces

**03** Support to the Green Deal data space

01

# EU policy context



# European Commission priorities 2019-2024

- **Twin green & digital transition** at the top of the policy agenda



## A European Green Deal

Europe aims to be the first climate-neutral continent by becoming a modern, resource-efficient economy.



## A stronger Europe in the world

The EU will strengthen its voice in the world by championing multilateralism and a rules-based global order.



## A Europe fit for the digital age

The EU's digital strategy will empower people with a new generation of technologies.



## Promoting our European way of life

Europe must protect the rule of law if it is to stand up for justice and the EU's core values.



## An economy that works for people

The EU must create a more attractive investment environment, and growth that creates quality jobs, especially for young people and small businesses.



## A new push for European democracy

We need to give Europeans a bigger say and protect our democracy from external interference such as disinformation and online hate messages.

# The European Green Deal



## Making the EU climate neutral by 2050

In 2021 the EU adopted its first [EU Climate Law](#). It set in stone Europe's goals to become climate-neutral by 2050, as well as a target of 55% less emissions by 2030, in comparison to 1990.

As required under the Climate Law, the Commission also recommended, in February 2024, an additional intermediate target of 90% less emissions by 2040, confirming our direction of travel.

<https://ec.europa.eu/stories/european-green-deal>

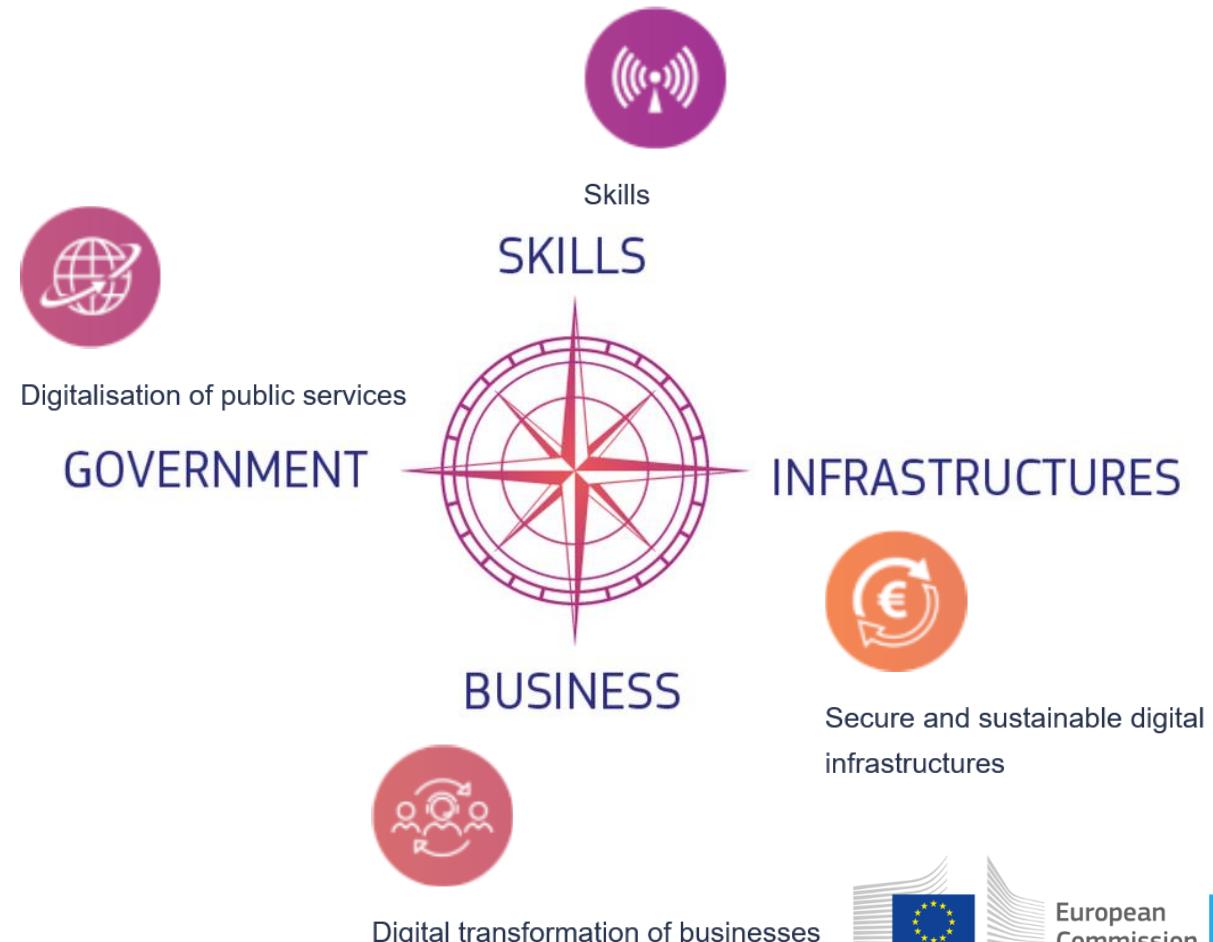
# A Europe fit for the Digital Age

## About

Digital technology is changing people's lives. The EU's digital strategy aims to make this transformation work for people and businesses, while helping to achieve its target of a climate-neutral Europe by 2050.

The Commission is determined to make this Europe's "Digital Decade". Europe must now strengthen its digital sovereignty and set standards, rather than following those of others – with a clear focus on data, technology, and infrastructure.

### • Digital targets for 2030



# A recent example

Council of the EU | Press release | 17 June 2024 11:13

## Nature restoration law: Council gives final green light

Today the Council formally adopted the – first of its kind – regulation on nature restoration. This law aims to put measures in place to restore at least 20% of the EU's land and sea areas by 2030, and all ecosystems in need of restoration by 2050.

It sets specific, legally binding targets and obligations for nature restoration in each of the listed ecosystems – from terrestrial to marine, freshwater and urban ecosystems.

The regulation aims to mitigate climate change and the effects of natural disasters. It will help the EU to fulfil its international environmental commitments, and to restore European nature.

(67) In order to monitor the progress in implementing the national restoration plans, the restoration measures put in place, the areas subject to restoration measures, and the data on the inventory of barriers to river continuity, a system should be introduced requiring Member States to set up, keep up-to-date and make accessible relevant data on results from such monitoring. The electronic reporting of data to the Commission should make use of EEA's Reportnet system and should aim to keep the administrative burden on all entities as limited as possible. To ensure an appropriate infrastructure for public access, reporting and data-sharing between public authorities, Member States should, where relevant, base the data specifications on those referred to in Directive 2003/4/EC of the European Parliament and of the Council<sup>92</sup>, Directive 2007/2/EC of the European Parliament and of the Council<sup>93</sup> and Directive (EU) 2019/1024 of the European Parliament and of the Council<sup>94</sup>.

(68) In order to ensure an effective implementation of this Regulation, the Commission should support Member States upon request through the Technical Support Instrument<sup>95</sup>, which provides tailor-made technical support to design and implement reforms. The technical support involves, for example, strengthening the administrative capacity, harmonising the legislative frameworks, and sharing relevant best practices.

<sup>90</sup> Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (OJ L 206, 22.7.1992, p. 7).

<sup>91</sup> Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on European Missions COM(2021) 609 final).

<sup>92</sup> Directive 2003/4/EC of the European Parliament and of the Council of 28 January 2003 on public access to environmental information and repealing Council Directive 90/313/EEC (OJ L 41, 14.2.2003, p. 26).

<sup>93</sup> Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) (OJ L 108, 25.4.2007, p. 1).

<sup>94</sup> Directive (EU) 2019/1024 of the European Parliament and of the Council of 20 June 2019 on open data and the re-use of public sector information (OJ L 172, 26.6.2019, p. 56).

<sup>95</sup> Regulation (EU) 2021/240 of the European Parliament and of the Council of 10 February 2021 establishing a Technical Support Instrument (OJ L 57, 18.2.2021, p. 1).

# European data spaces – Context

## 01 European Strategy for Data & horizontal legal framework



## 02 Investments in data spaces



## 03 Horizontal legal framework

## 04 Governance

# Common European data spaces

## The European Common Data Space

The European single market for the exchange, provision and use of data.  
A network of stakeholders, tech, rules, and agreements.  
All who provide or use data are part of the data space

### Sectoral data spaces



### Data applications and services

Applications and services using data from and share data to the dataspace, and abide by its agreements.



### Stakeholder single market interaction

All stakeholders sharing, using and exchanging data are de facto part of the data space. Building on the underlying interoperability, standards and aligned rules.



### Sectoral data spaces

Standards and common practices within sectors



### General data space governance

Generic data governance, interoperability and standards



### Networked Technology

Federated cloud services



# European Strategy for data – Horizontal legal framework

## 1. Data Governance Act

- Build trust in data sharing
- Data interoperability

## 2. Digital Markets Act

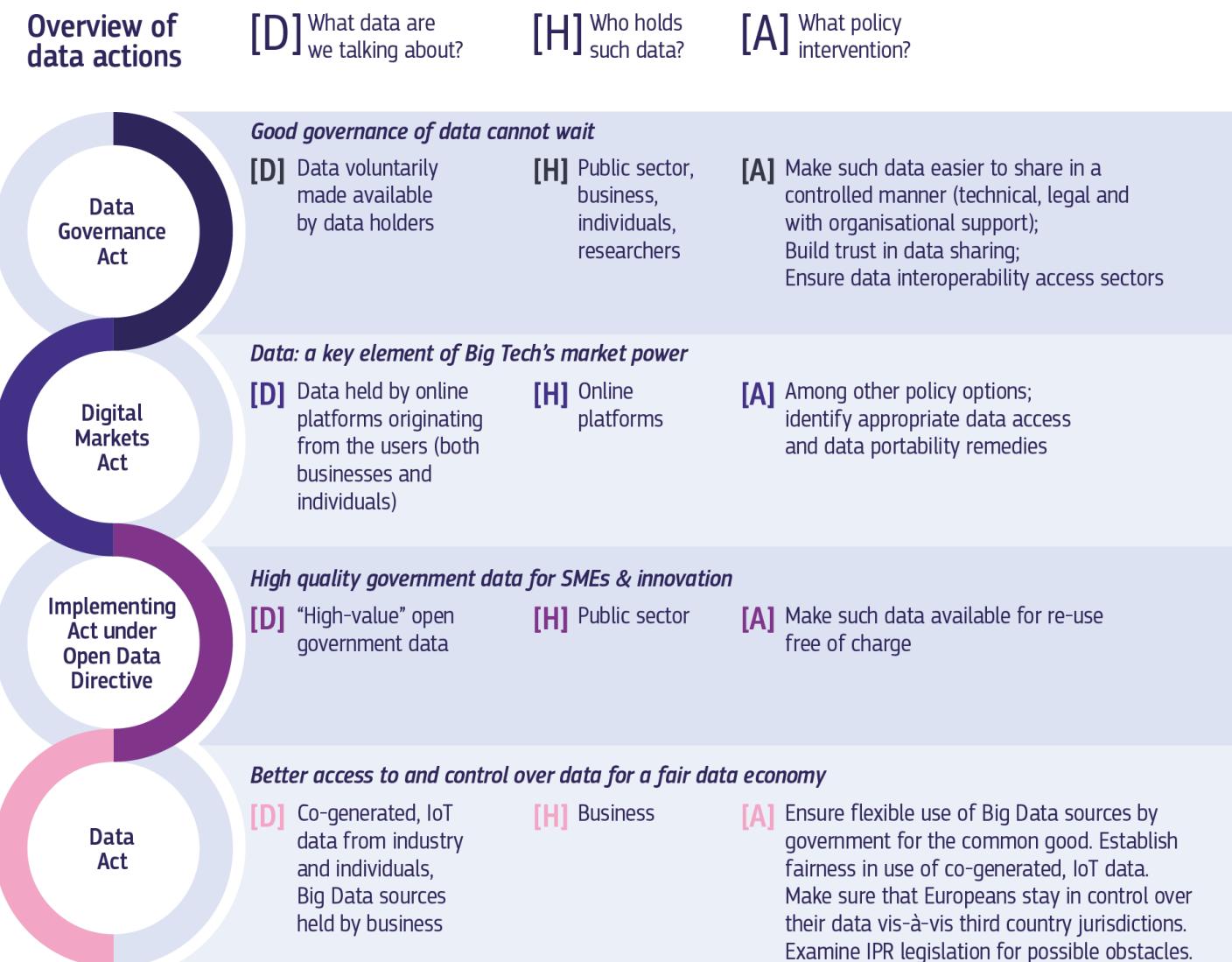
- Data portability
- Assure fair practices by ‘gatekeepers’

## 3. Implementing Act - Open Data Directive

- Increase data availability and access
- Reduce heterogeneity in licensing

## 4. Data Act

- Increase data availability to foster innovation / Incentivize data generation
- Fair access to and use of data
- Data sovereignty



# Other related legislation

## 1. Digital Services Act

- regulates online intermediaries & platforms
- prevents illegal and harmful activities online and the spread of disinformation
- ensures user safety & protection of fundamental rights

## 2. Artificial Intelligence Act

- sets different requirements for different risk levels (unacceptable, high, limited, minimal)
- sets transparency requirements
- requires national authorities to provide companies with regulatory sandboxes

## 3. Interoperable Europe Act

- strengthens cross-border interoperability & cooperation in the public sector
- requires interoperability assessments for changes in IT systems
- sets innovation & support measures such as sandboxes and GovTech cooperation

## 4. Cyber Resilience Act

- sets cybersecurity requirements for hardware and software manufacturers and retailers
- mandates conformity assessments to get CE marking
- informs and protects consumers

# Governance

- **Governance bodies established in legislation**

- European Data Innovation Board (EDIB)
- Interoperable Europe Board (IEB)
- Artificial Intelligence Board (AIB)



Council of the  
European Union

- **Projects funded by Digital Europe**

- Data Spaces Support Centre (DSSC)
- Coordination and Support Actions (CSAs) for sectoral data spaces
- Deployment Actions for sectoral data spaces
- SIMPL



- **Data space support organisations**



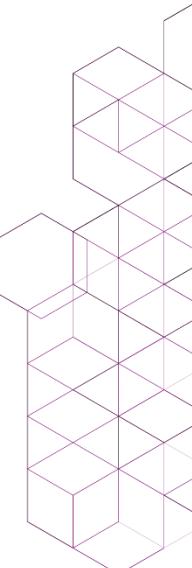
- **Member States governance bodies**



European  
Commission

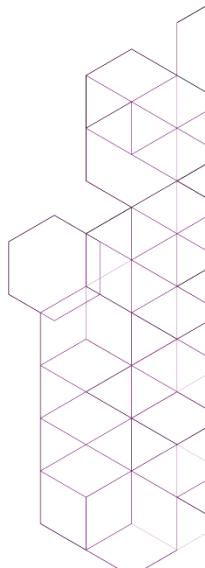
# Common European Green Deal data space

- **Commission Staff Working Documents on data spaces (2022 & 2024)**
  - 2 phases: preparation & deployment
  - alignment with horizontal legislation & Green Deal priorities
  - GreenData4All, Destination Earth, Digital Product Passport, EU Digital Twin Toolbox, etc.



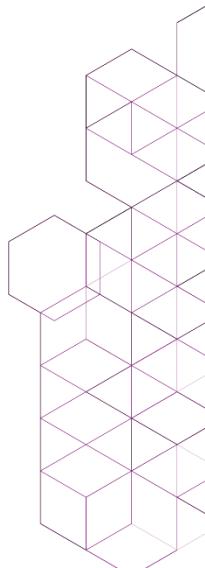
# Common European Green Deal data space

- **Commission Staff Working Documents on data spaces (2022 & 2024)**
  - 2 phases: preparation & deployment
  - alignment with horizontal legislation & Green Deal priorities
  - GreenData4All, Destination Earth, Digital Product Passport, EU Digital Twin Toolbox, etc.
- **Coordination and Support Action (2022-2024)**
  - blueprint of the Green Deal data space reference architecture
  - governance framework for the Green Deal data space
  - priority datasets
  - implementation roadmap



# Common European Green Deal data space

- **Commission Staff Working Documents on data spaces (2022 & 2024)**
  - 2 phases: preparation & deployment
  - alignment with horizontal legislation & Green Deal priorities
  - GreenData4All, Destination Earth, Digital Product Passport, EU Digital Twin Toolbox, etc.
- **Coordination and Support Action (2022-2024)**
  - blueprint of the Green Deal data space reference architecture
  - governance framework for the Green Deal data space
  - priority datasets
  - implementation roadmap
- **Call for proposals for the deployment (2024)**
  - DIGITAL-2024\_CLOUD-AI-06-GREEN DEAL – deadline 29 May, currently under evaluation
  - suggested use cases: forest ecosystems, circular economy for textiles, sustainability reporting and due diligence



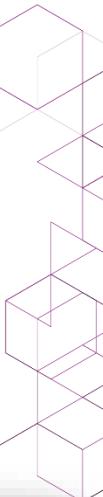
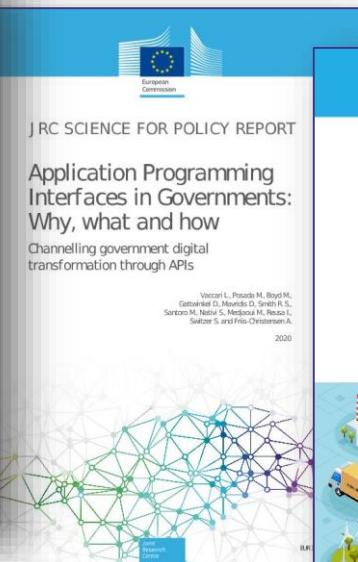
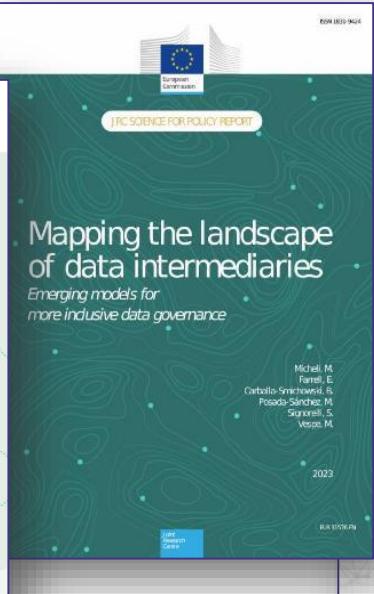
02

## JRC activities on data spaces



# Why the JRC?

- JRC is a **provider & consumer** of data space data
- Own **data assets**
  - 3500+ datasets, 500+ publications on data sharing
  - corporate data sharing culture incl. dedicated data strategy
  - own Big Data Infrastructure and LLM testbed
- Dedicated **scientific support** to data spaces





JRC SCIENCE FOR POLICY REPORT

## EUROPEAN DATA SPACES

Scientific insights into data sharing and utilisation at scale

2023

Farrell, Eimear; Minghini, Marco;  
Kotsev, Alexander; Soler-Garrido, Josep;  
Tapsell, Brooke; Michell, Marina;  
Posada, Monica; Signorelli, Serena;  
Tartaro, Alessio; Bernal, Jaime;  
Vespe, Michele; Di Leo, Margherita;  
Carbella-Silichowski, Bruno;  
Smith, Robin; Schade, Sven;  
Katarzyna Pogozelska;  
Gabrielli, Lorenzo; De Marchi, Davide



# JRC Science for Policy report



<https://europa.eu/RBQXmx>

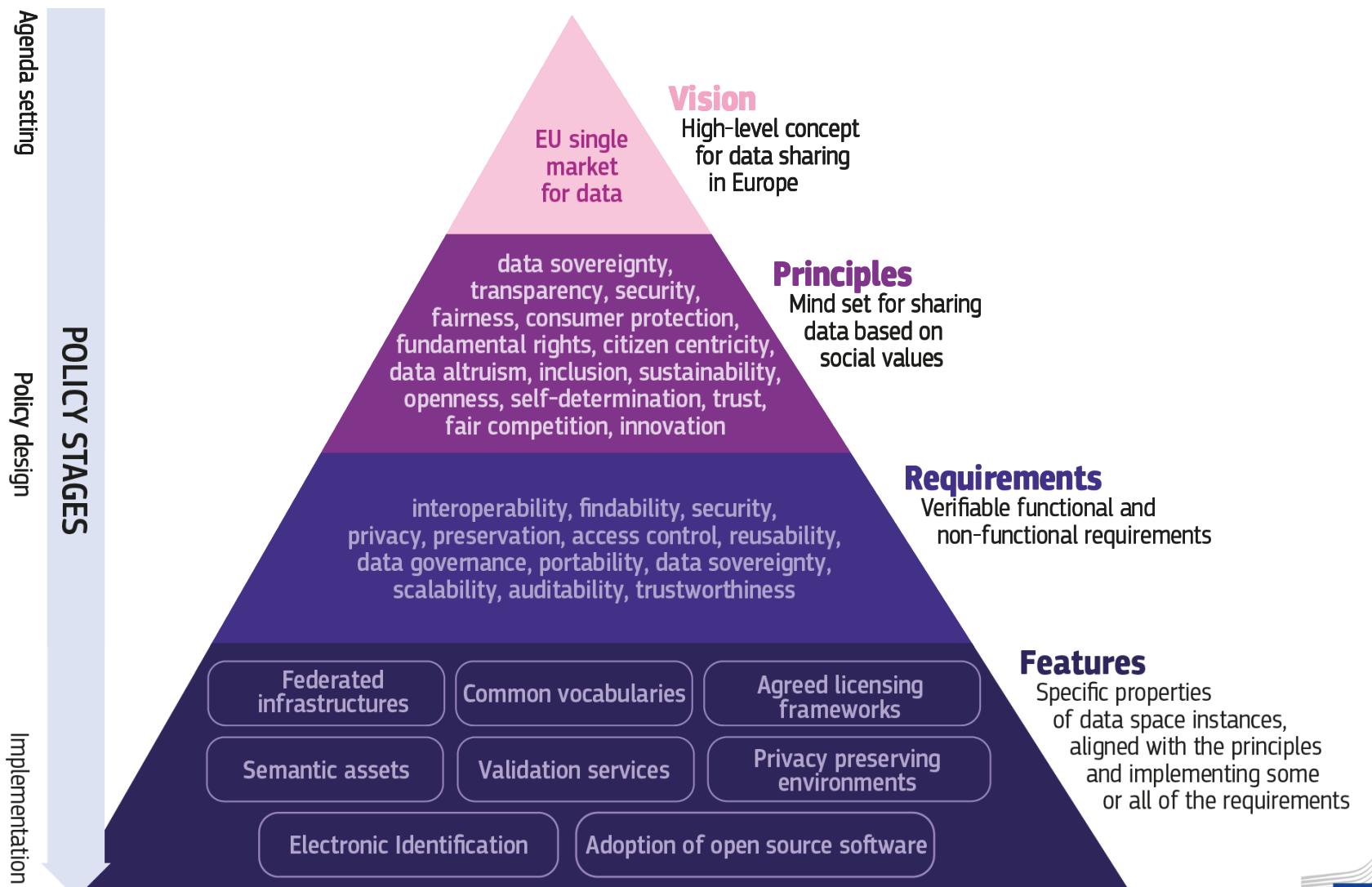
## What?

- Scientific **techno-socio-economic perspective**
- Non-binding **recommendations/good practices**
- **Complementary** to other data space resources

## How?

- Input by **18 co-authors**
- **Co-creation** and **validation**
  - Within JRC
  - With policy DGs
  - Other stakeholders

# Analytical lens





# Multi-level considerations on the governance of European data spaces

- Horizontal legal frameworks (*EU, international, national*)
- Sectoral legislation and sectoral data space-related legislation
- Data-related legislation and data governance
- Principles and requirements elicited from EU policy documents
- Individual data space governance frameworks (including organisational aspects)
- Institutional mechanisms

# How-to's on technical and organisational aspects of data sharing

How-to Information Sheets		Data Space Theme
1	How can stakeholders benefit from synthetic data in a data space?	Synthetic data
2	How to choose the best software stack for a data space?	Software stacks
3	How to ensure clear access and use conditions for a dataset in a data space?	Licensing
4	How to ensure that datasets shared by different actors in a data space can be used together?	Interoperability
5	How to ensure that technical requirements and standards are being followed?	Data validation
6	How to facilitate the discovery of data in a data space?	Data discoverability
7	How to select the most appropriate standards for a data space?	Data standards
8	How to ensure that digital resources and data are uniquely referenced in a data space?	Data registers
9	How to provide access to data in a data space?	APIs for data access
10	How to preserve privacy and protect personal data and sensitive business data in a data space?	Privacy enhancing technologies
1	Which actors are providing what types of data in scope of a data space?	Data Actors
2	How to foster a people-centred approach to data in a data space?	Citizen data
3	How can business benefit from sharing data in a data space?	Benefits to business in data spaces
4	How can governments access private sector data of public interest?	Accessing data (B2G)
5	How can data transparency for AI systems be increased in a data space?	Transparency – AI data in data spaces
6	How to leverage voluntary data sharing in a data space?	Voluntary data sharing
7	Which legal aspects should be considered when creating, providing or using novel data-driven solutions in data spaces?	Legal



TECHNICAL

ORGANISATIONAL

The document is a whitepaper from the European Commission, dated 2022. It features a blue header with the European Commission logo and a purple decorative background. The title is prominently displayed in the center. Below the title, there is a 'Problem statement' section, a 'Example' section with a diagram of server racks and a laptop, and a 'Recommendations to stakeholders (indicators)' section with several bullet points for providers, data users, and authorities. At the bottom, there are sections for 'Additional resources (JRC)' and 'Contact'.

**WHAT IS THE BEST WAY TO ENSURE THAT DIGITAL RESOURCES AND DATA ARE UNIQUELY REFERENCED IN A DATA SPACE?**

**Problem statement**

A common challenge associated with the reusing and sharing of data, especially when different providers are involved, is related with the appropriate use of terms, creation values and other digital assets. This is further amplified if different natural languages are used, and the data are intended to be shared over the web.

**Example**

The INSPIRE Directive aims to create a European Union spatial data infrastructure for the purposes of EU environmental policies and pan-European spatial information systems. In order to support the implementation of the Directive and the environment, the INSPIRE Infrastructure maintains a number of items, which require clear identification and the possibility to relate them to the specific requirements of the Directive. Examples for such items include INSPIRE themes, code lists and application schemas. The INSPIRE Registry provides a central access point for these items and links them to specific registers, which contain descriptions of these items (including labels, definitions and other relevant properties) in different languages. These descriptions are mapped to the items to them. The content of the registers is based on the INSPIRE Directives, Implementing Rules and Technical Guidelines.

**Recommendations to stakeholders (indicators)**

- Providers**
  - Always provide licensing information together with datasets and APIs
  - Consider changing system licenses to facilitate reuse of data
  - Adopt machine-readable licenses in order to facilitate the automated use of the data
  - License alternative licenses maximize the benefits and opportunities for data reuse
- Data users**
  - Consider licensing information when using datasets and generating new products
- Authorities**
  - Prevent the use of licenses that would maximize the benefit generated from the reuse of the datasets
  - Explicitly require licensing information when procuring data

**Additional resources (JRC)**

- INSPIRE Registry
- Pereira A, Lutz M. Interoperable Registers and Registers in the EU: Perspectives from INSPIRE. In: Conference Proceedings Joint W3C/OGC Workshop on Linking Geospatial Data. World Wide Web Consortium, 2014. JRC80979

**Contact**

# An example: How to select the most appropriate standards for a data space?



## What is the problem?

- Standards are enablers of interoperability
- Often they are chosen blindly without the necessary considerations
- Poor/immature standards that are not supported by clients and communities can do more harm than good

## Scenario

- A business company needs to perform machine-learning analyses to evaluate the accessibility of green areas located across districts within a city.
- Collected data show a high degree of fragmentation:
  - data encodings are different, including non-standard formats & standard formats historically used by different communities and following different data models
  - ETL conversion is hard or impossible
  - some standards are new and software tools to retrieve and consume the data do not exist yet

1



## Proposed solution(s)

- Prioritise well-known standards adopted by global communities
- Give preference to standards developed by international SDOs
- Consider the existence of a community behind standards
- Prioritise standards developed in a participative, agile and collaborative way
- Choose mature standards, avoiding standards in draft or not yet published

## Recommendations

- Data providers
- Data Users
- Intermediaries

2

## Additional Resources



Open  
Geospatial  
Consortium



W3C®



3

# Dashboard: JRC resources mapped to requirements for European data spaces

JRC Resources Relevant to Data Spaces

Created by S.4, T.1, T.4 BDAP European Commission

Data Transfer & Exchange	Identity, Authentication, Access Control	Data Publication & Discovery	Privacy preserving mechanisms / Data protection
Data Interoperability	Usage Control Policies	Data Compliance and Auditing	Data Federation, Orchestration and Portability
Data Processing & Analytics	Data Pooling and Collaboration	Data Governance	Data Storage

Retrieve publications

Related terms

- data governance
- fair data
- private sector data
- public sector data
- data protection impact ...
- dpia
- data policy
- data governance
- data management
- data security
- data sharing
- risk governance

INDEX	TITLE	YEAR
1	Event-specific Method for the Quantification of Maize Line MON 88017 Using Real-time PCR - Validation Report, Validated Method and DNA Extraction	2017
2	Forest Fires and Adaptation Options in Europe	2016
3	Assessment of Mixtures - Review of Regulatory Requirements and Guidance	2017
4	Integrating Network Analysis with the Production Function Approach to Study the Spillover Effects of Transport Infrastructure	2016
5	An indicator framework for assessing ecosystem services in support of the EU Biodiversity Strategy to 2020	2016
6	Smart Cities Governance: the need for a holistic approach to assessing urban participatory policy making	2016
7	Urban public transport	2016
8	A knowledge-based approach to estimating the magnitude and spatial patterns of potential threats to soil biodiversity	2016
9	The global Landsat archive: Status, consolidation, and direction	2016
10	Future Internet technologies for environmental applications	2016
11	NORMAN interlaboratory study (ILS) on passive sampling of emerging pollutants;	2016
12	The role of forest certification for biodiversity conservation: Lithuania as a case study	2016
13	Reply to "The new assessment of soil loss by water erosion in Europe. Panagos P. et al., 2015 Environ. Sci. Policy 54, 438–447—A response" by Evans and Boardman [Environ. Sci. Policy 58, 11–15]	2016
14	Behavioural Insights Applied to Policy - European Report 2016	2016
15	Nanomaterials as a potential environmental pollutant: Overview of existing risk assessment methodologies	2016
16	Mapping regional patterns of large forest fires in the Wildland-Urban Interface areas in Europe	2016
17	Stakeholders' engagement beyond the EDP: The working-groups on governance and human resources in Eastern Macedonia and Thrace	2016
18	Institutions on the verge: Working at the science policy interface	2016
19	Covenant of Mayors: Monitoring Indicators	2016
20	Reports of the Scientific, Technical and Economic Committee for Fisheries (STECF) – Merging of the BT1 and BT2 gear categories in the North Sea (STECF-16-02).	2016
21	Next Generation Air Quality Platform: Openness and Interoperability for the Internet of Things	2016

Publications: 1435

Filter by match and by years:

- Title
- Keywords
- Abstract

Occurrences per year:

2016 2019 2020  
2022 2017 2016  
2018 2021

1 236

# Special Issue on common European data spaces

CALL FOR PAPERS

## Common European Data Spaces

Enabling data-driven innovation at scale

DEADLINE FOR SUBMISSION  
20 December 2024

Special Issue  
*Data in Brief*

QR code

Guest Editors: **Marco Minghini**, PhD (European Commission, Joint Research Centre, Ispra, Italy) · **Alexander Kotsev**, PhD (European Commission, Joint Research Centre, Ispra, Italy) · **Matthijs Punter**, PhD (TNO, Amsterdam, The Netherlands) · **Paolo Mazzetti**, PhD (Italian National Research Council – Institute of Atmospheric Pollution, Florence, Italy) · **Tuomo Tuikka**, PhD (VTT Technical Research Centre of Finland, Espoo, Finland) · **Edward Curry**, PhD (University of Galway, Galway, Ireland) · **Natalie Bertels**, PhD (KU Leuven, Leuven, Belgium).

European Commission

03

## Support to the Green Deal data space

# Scoping of the legal framework for the European Green Deal data space

INSPIRE Directive  
(2007)

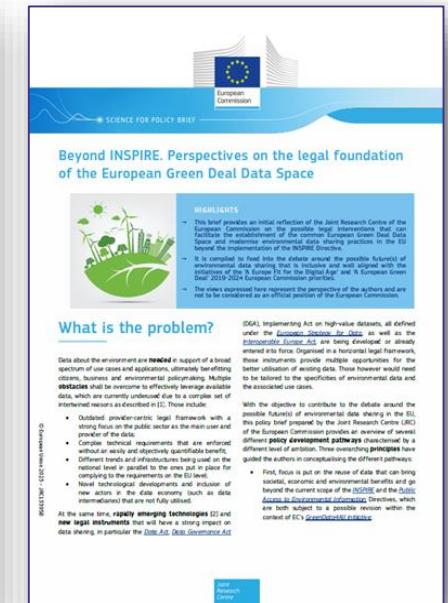


European Green  
Deal data space

- INSPIRE: Directive establishing a pan-European **Spatial Data Infrastructure (SDI)** for environmental policies
  - the largest geospatial data sharing effort ever
  - JRC as the technical coordinator
- **Lessons learnt** from implementation & **vision**
- **Policy development pathways**
- Input for **INSPIRE evaluation** (2021) and ongoing **revision** (GreenData4All)

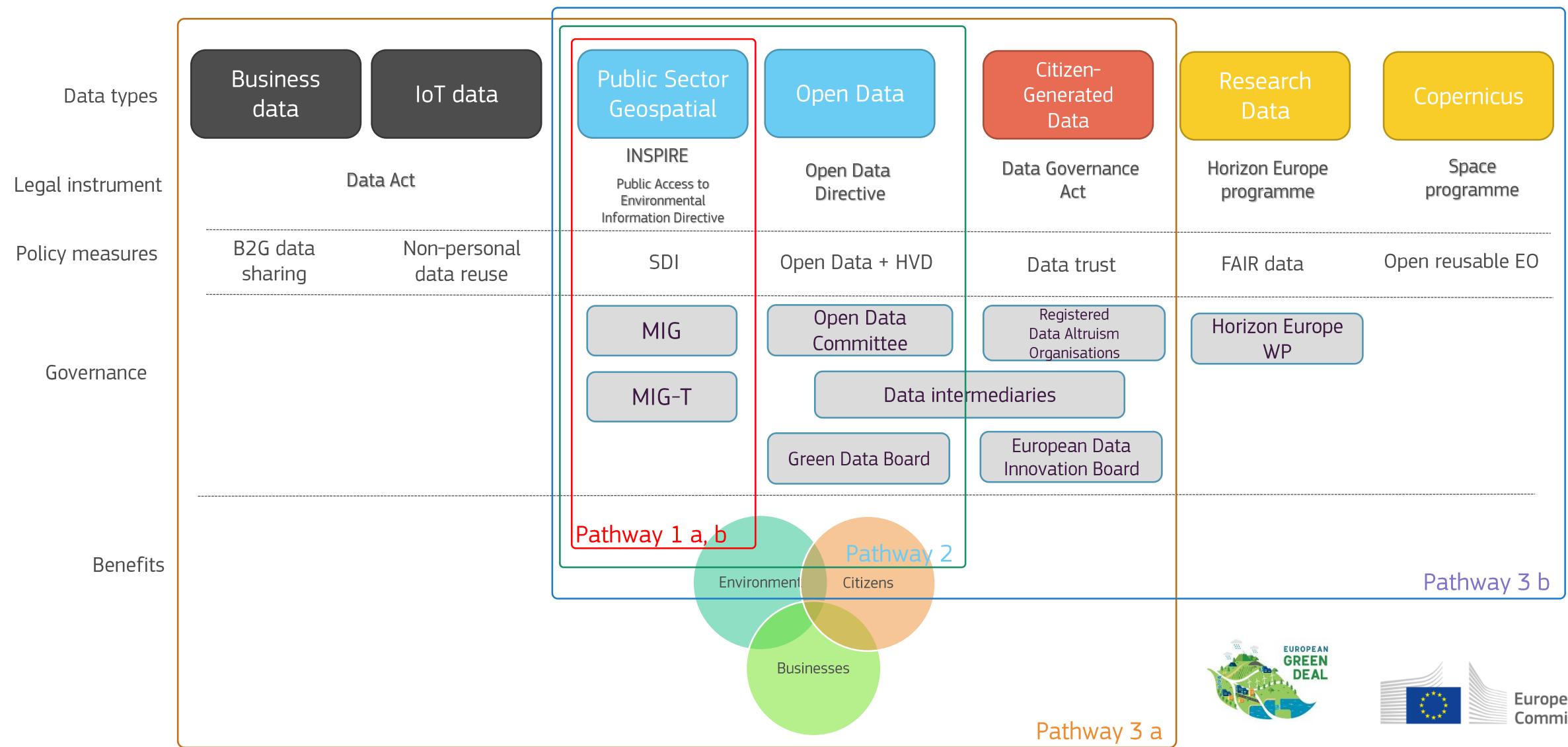


<https://europa.eu/!8qH67V>



<https://europa.eu/!Hyf3mf>

# Scoping of the legal framework for the European Green Deal data space



# Support to Implementing Act on high-value datasets under the Open Data Directive

- High-value datasets
  - datasets the **re-use** of which is associated with important **socio-economic benefits**
  - to be made available **for free**, under **open license** (CC BY 4.0 or less restrictive), in **machine-readable formats**, via **APIs** and (when relevant) as bulk downloads
- Categories of high-values datasets:



*Geospatial*



*Earth  
observation and  
environment*

*Meteorological*

*Statistics*

*Companies and  
company  
ownership*



*Mobility*



# Support to Implementing Act on high-value datasets under the Open Data Directive

- Support to drafting the Implementing Act for **(geospatial) high-value datasets**:
  - list of datasets, granularity, geographical coverage, key attributes, licenses, formats

## 1. GEOSPATIAL

### 1.1. Datasets in scope

The geospatial thematic category includes datasets within the scope of the INSPIRE data themes Administrative units, Geographical names, Addresses, Buildings and Cadastral parcels as defined in Annex I and Annex III to Directive 2007/2/EC of the European Parliament and of the Council (<sup>1</sup>). In addition, it includes Reference parcels and Agricultural parcels as defined in Regulation (EU) No 1306/2013 of the European Parliament and of the Council (<sup>2</sup>) and of Regulation (EU) No 1307/2013 of the European Parliament and of the Council (<sup>3</sup>) and the related delegated and implementing acts (<sup>4</sup>). Their granularity, geographical coverage and the key attributes are listed in the table below. If datasets are not available at the scale indicated in the table below, but are available at higher spatial resolution(s) (<sup>5</sup>), they shall be provided at the available spatial resolution.

Datasets	Administrative units	Geographical names	Addresses	Buildings	Cadastral parcels	Reference parcels	Agricultural parcels
Granularity	All levels of generalisation available with a granularity up to the scale of 1:5 000. From municipalities to countries; maritime units.	N/A	N/A	All levels of generalisation available with a granularity up to the scale of 1:5 000.	All levels of generalisation available with a granularity up to the scale of 1:5 000.	A level of accuracy that is at least equivalent to that of cartography at a scale of 1:10 000 and, as from 2016, at a scale of 1:5 000, as referred to in Article 70(1) of Regulation (EU) 1306/2013.	A level of accuracy that is at least equivalent to that of cartography at a scale of 1:10 000 and, as from 2016, at a scale of 1:5 000, as referred to in Article 70(1) of Regulation (EU) 1306/2013.
Geographical coverage	Single or multiple datasets that shall cover the entire Member State when combined.						

(<sup>1</sup>) Directive 2007/2/EC of the European Parliament and of the Council of 14 March 2007 establishing an Infrastructure for Spatial Information in the European Community (INSPIRE) (OJ L 108, 25.4.2007, p. 1).

# Evaluation of new standards & technologies for the Green Deal data space

- **Standards** for data encoding & data sharing
- **Open source** technology as enabler for innovation
- Collaboration & **agreements**



The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, Volume XLVIII-4/W1-2022  
Free and Open Source Software for Geospatial (FOSS4G) 2022 – Academic Track, 22–28 August 2022, Florence, Italy

## GEOSPATIAL DATA EXCHANGE USING BINARY DATA SERIALIZATION APPROACHES

P. Mooney , M. Minghini

The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, Volume XLVI-4/W2-2021  
FOSS4G 2021 – Academic Track, 27 September–2 October 2021, Buenos Aires, Argentina

## TOWARDS THE INTEGRATION OF AUTHORITATIVE AND OPENSTREETMAP GEOSPATIAL DATASETS IN SUPPORT OF THE EUROPEAN STRATEGY FOR DATA

A. Sarretta<sup>a,\*</sup>, M. Minghini<sup>b</sup>

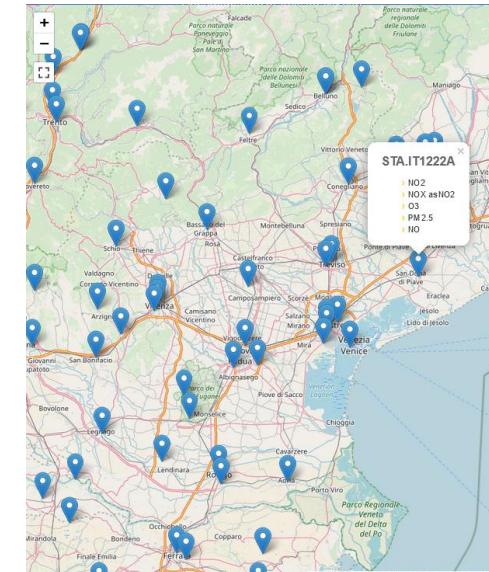
<sup>a</sup> National Research Council, Research Institute for Geo-hydrological Protection, Padua, Italy - alessandro.sarretta@irpi.cnr.it

<sup>b</sup> European Commission, Joint Research Centre (JRC), Ispra, Italy - marco.minghini@ec.europa.eu



## Good Practice documents

Candidate	Endorsed
	<a href="#">GeoJSON encoding of INSPIRE datasets</a>
	<a href="#">GeoDCAT-AP</a>
	<a href="#">SDMX for Human Health and Population Distribution</a>
	<a href="#">GeoPackage encoding of INSPIRE datasets</a>
	<a href="#">Data-Service Linking Simplification</a>
	<a href="#">OGC compliant INSPIRE coverage data and service implementation</a>
	<a href="#">Guidance for the integration of dispersed WMS sources</a>
	<a href="#">Guidelines for making spatial data downloadable via WMS services</a>
	<a href="#">Setting up an INSPIRE Download service based on the OGC API-Features standard</a>
	<a href="#">INSPIRE download services based on OGC SensorThings API</a>



# Thank you!

And if you are attending FOSS4G Europe, don't miss the European Track happening on Thursday!



© European Union 2024

Unless otherwise noted the reuse of this presentation is authorised under the [CC BY 4.0](#) license. For any use or reproduction of elements that are not owned by the EU, permission may need to be sought directly from the respective right holders.

Slide 1: ©Ico Maker/stock.adobe.com.