



## INSPIRE CONFERENCE 2021

# Modernising INSPIRE within the European Green Deal data space – a technological and organisational perspective

Marco Minghini & Alexander Kotsev – *European Commission, JRC*  
Friso Penninga – *Geonovum, NL*

# Session agenda



INSPIRE - The Public Sector Contribution to the European Green Deal Data Space: A vision for the technological evolution of Europe's Spatial Data Infrastructures for 2030

*Marco Minghini & Alexander Kotsev – European Commission, JRC*

The evolution of geospatial standards: An exciting journey

*Athina Trakas – Open Geospatial Consortium (OGC)*



The role of geospatial developer communities in the data sharing ecosystem

*Codrina Maria Ilie – Open Source Geospatial Foundation (OSGeo)*



A user-driven data space: is INSPIRE ready?

*Nikola Milojevic-Dupont – Technical University of Berlin*



Panel discussion: how to make the vision a reality?

with participation of *Friso Penninga – Geonovum*



# Join us!

- Ask questions to speakers – they will be answered in the panel session!
- Like questions asked by others!

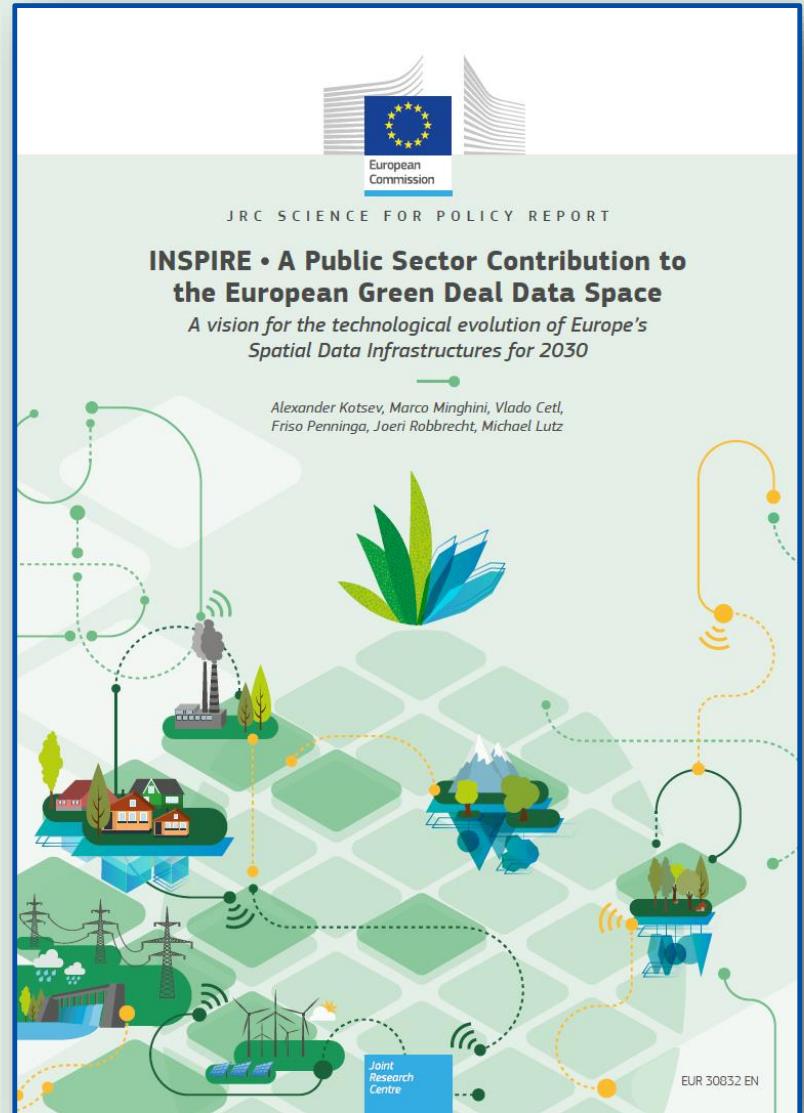


# Why are we here today?

- There are multiple reasons for analysing the future of INSPIRE:
  - end of the legally defined roadmap
  - new EU political context around Green Deal
  - disruptive technological trends around (geo)data sharing
  - ...
    - doing this earlier would be premature, doing it later would be late!
- We provide our own (JRC) outlook on how to modernise INSPIRE from the organisational and technological perspectives, by:
  - reflecting on lessons learnt from the first 10+ years of implementation
  - assessing the political and technological context
  - developing a vision for the future and actions to achieve it

# New JRC Science for Policy Report

- Title: INSPIRE – A Public Sector Contribution to the European Green Deal Data Space
- Authors from the European Commission (DG JRC and DG ENV) & Geonovum



<https://publications.jrc.ec.europa.eu/repository/handle/JRC126319>

# New JRC Science for Policy Report

- Title: INSPIRE – A Public Sector Contribution to the European Green Deal Data Space
- Authors from the European Commission (DG JRC and DG ENV) & Geonovum

- Content roughly divided in 2 parts:

- intro to INSPIRE
- implementation state of play
- lessons learnt

- policy context
- technology trends
- vision & actions

PAST

FUTURE



<https://publications.jrc.ec.europa.eu/repository/handle/JRC126319>

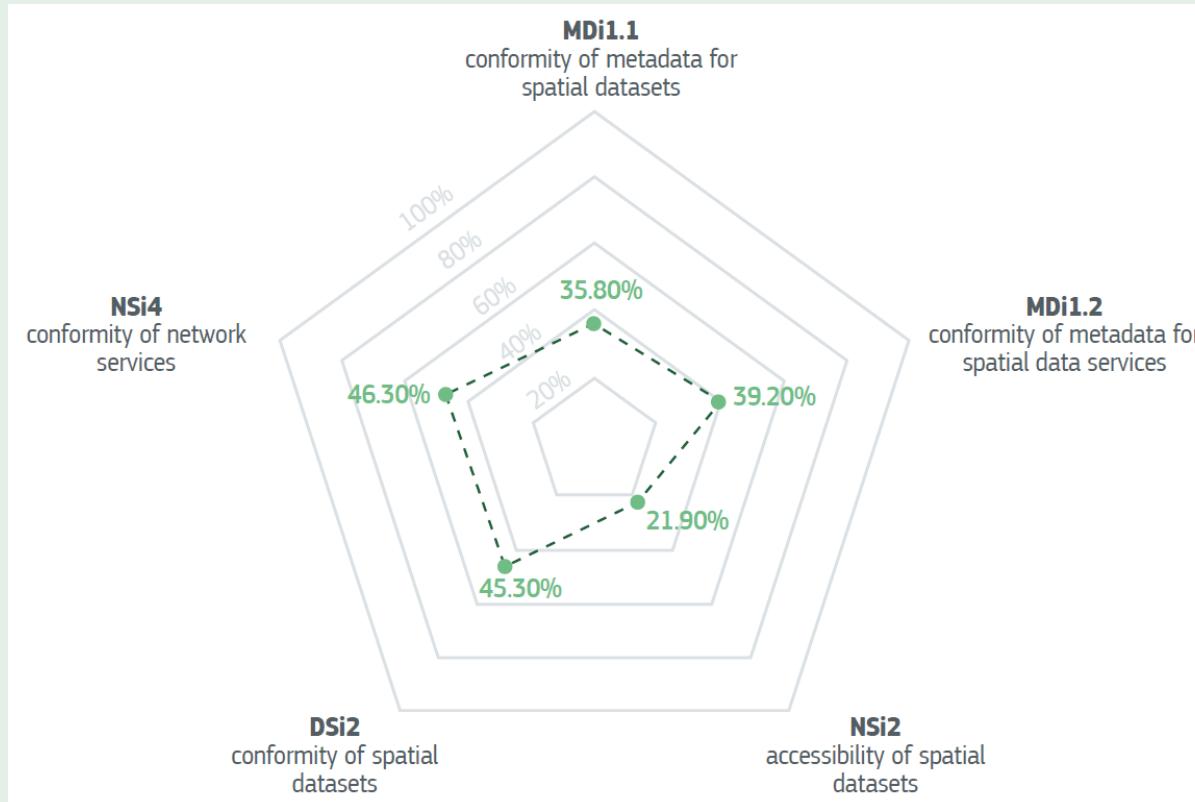


## INSPIRE CONFERENCE 2021

# *State of play*

# Data availability, accessibility & conformity

- INSPIRE implementation still heterogeneous across Member States
  - no single country has yet reached full implementation!



Mean values of indicators MDi1.1, MDi1.2, DSi2, NSi4 and NSi2 calculated in the 2019 INSPIRE Monitoring and Reporting.

# Governance

- Traditional governance (EC/EEA + MS):
  - INSPIRE Coordination Team (ENV, JRC, ESTAT, AGRI, EEA)
  - INSPIRE Committee, MIG & MIG-T
  - INSPIRE Work Programme

# Governance

- Traditional governance (EC/EEA + MS):
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  - INSPIRE Committee, MIG & MIG-T
  - INSPIRE Work Programme
- Modern governance (community-driven):
  - INSPIRE Good Practices
  - governance of INSPIRE artefacts

## Good Practice Library

### Good Practice documents

#### Candidate

[Building one access point to dispersed data sources](#)

[Making spatial data downloadable via WMS services](#)

#### Endorsed

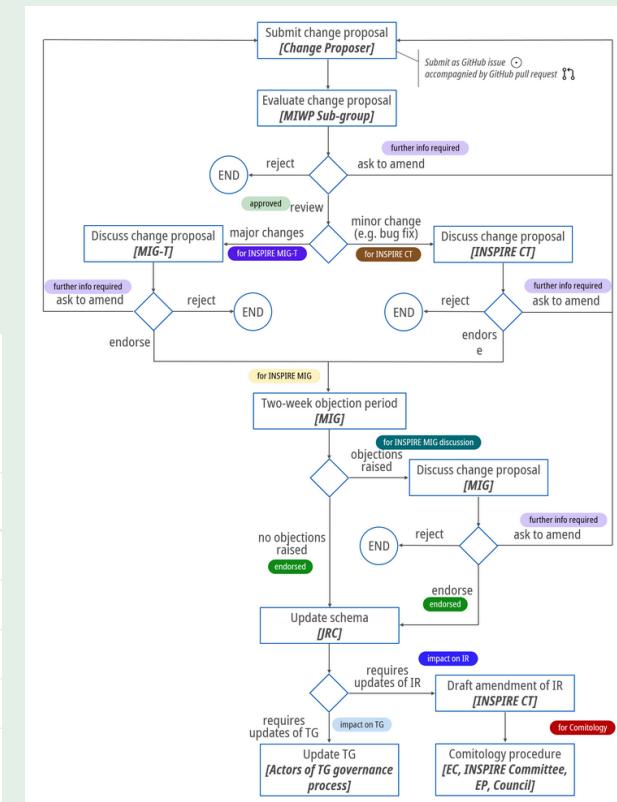
[GeoDCAT-AP](#)

[SDMX for Human Health and Population Distribution](#)

[OGC API – Features as an INSPIRE download service](#)

[OGC SensorThings API as an INSPIRE download service](#)

[OGC compliant INSPIRE Coverage data and service implementation](#)



# Technological stack

- INSPIRE central infrastructure components:
  - based on reusable, open source software solutions

The screenshot shows the INSPIRE Geoportal homepage. At the top, there's a navigation bar with the European Commission logo, a search bar, and language selection (English). Below this is a banner for "ENHANCING ACCESS TO EUROPEAN SPATIAL DATA". The main content area features a large map of Europe with countries highlighted in orange, labeled "INSPIRE Datasets - EU & EFTA Country overview". To the right of the map are three statistics boxes: "91533 Metadata records", "44778 Downloadable Datasets", and "46446 Viewable Datasets". Below these are sections for "Select a COUNTRY" (listing countries with their respective metadata counts) and "Select the whole EUROPE". A "Download stats" button is at the bottom right.

INSPIRE Geoportal, based on GeoNetwork opensource

The screenshot shows the "INSPIRE Validator - Test selection" page. It has a header with the European Commission logo and a search bar. Below the header is a navigation menu with "Test selection", "Test reports", "Get support", and "More on the INSPIRE Reference Validator". The main content area is titled "Configure your test" and contains several configuration options: "Select the INSPIRE resource you would like to test" (radio buttons for Metadata, View Service, Download Service, Discovery Service, or Data set), "Select the Technical Guidelines version" (radio buttons for Version 1.3 - DEPRECATED or Version 2.0), "Select the type of metadata record(s) to be tested" (radio buttons for Data sets and data set series, Network Service, or Spatial Data Service), and "Provide the resource to test" (a file upload input field with a maximum size of 50 MB). At the bottom is a "Start test >" button.

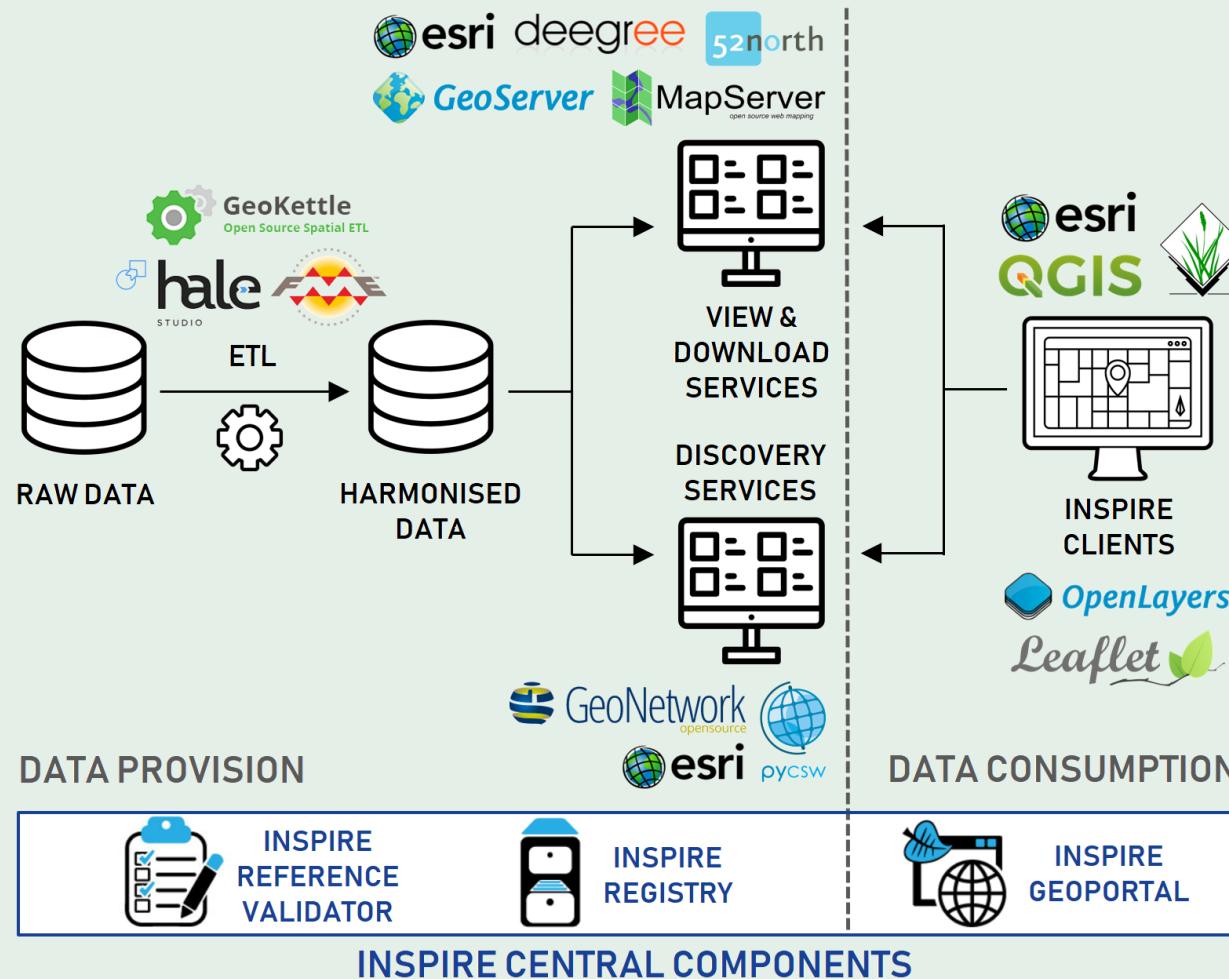
INSPIRE Reference Validator, based on the ETF Testing Framework

The screenshot shows the "INSPIRE Registry" page. It has a header with the European Commission logo and a search bar. The main content area is titled "INSPIRE registry" and includes a message about helping improve the Re3gistry software. It lists various registers: INSPIRE application schema register, INSPIRE code list register, INSPIRE enumeration register, INSPIRE feature concept dictionary, INSPIRE glossary, INSPIRE layer register, INSPIRE media-types register, INSPIRE metadata code list register, INSPIRE reference document register, and INSPIRE theme register. It also shows download links for XML files (Re3gistry and ISO 19133).

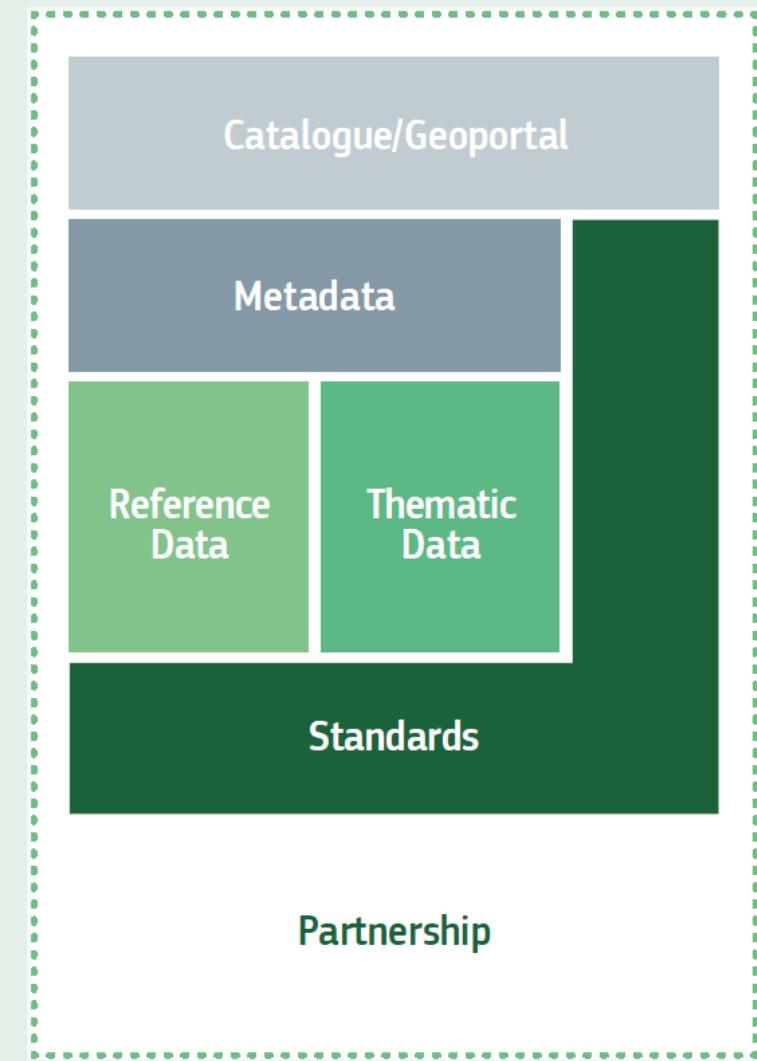
INSPIRE Registry, based on the Re3gistry

# Technological stack

- INSPIRE-related software for data provision and consumption

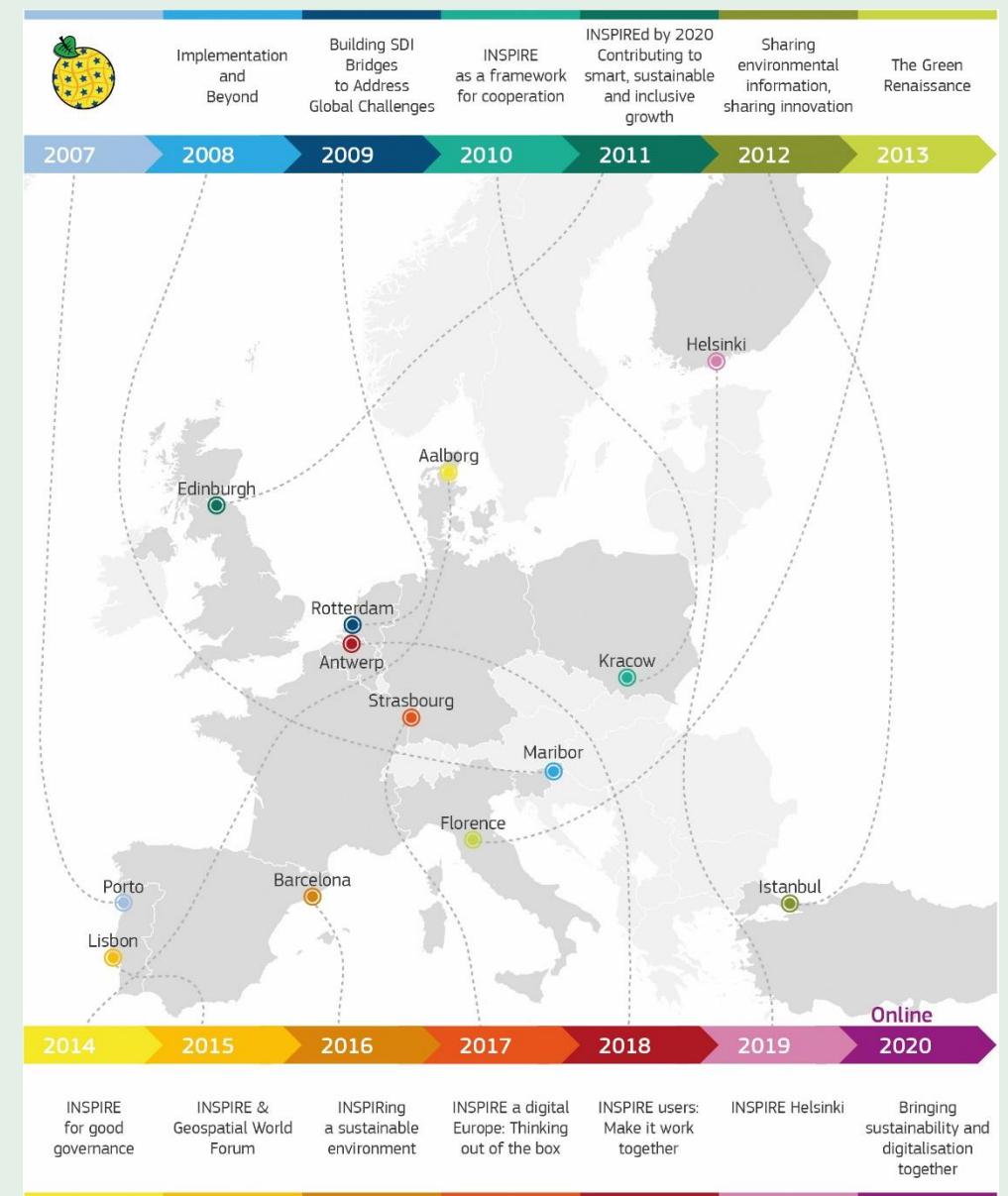


- INSPIRE is by nature based on **open standards**:
  - mutual benefits for INSPIRE & SDOs
- Examples (also thanks to Good Practices):
  - **metadata**: ISO 19115/19119, ISO 19139, GeoDCAT-AP
  - **data specifications**: ISO 19103, ISO 19131
  - **data encoding**: GML, GeoJSON, ISO 19156
  - **discovery service**: CSW
  - **view service**: WMS, WMTS
  - **download service**: Atom Syndication Format, WFS, WCS, OGC API - Features, OGC SensorThings API



# Community

*“A technical infrastructure is only as good as the social infrastructure underpinning it”*



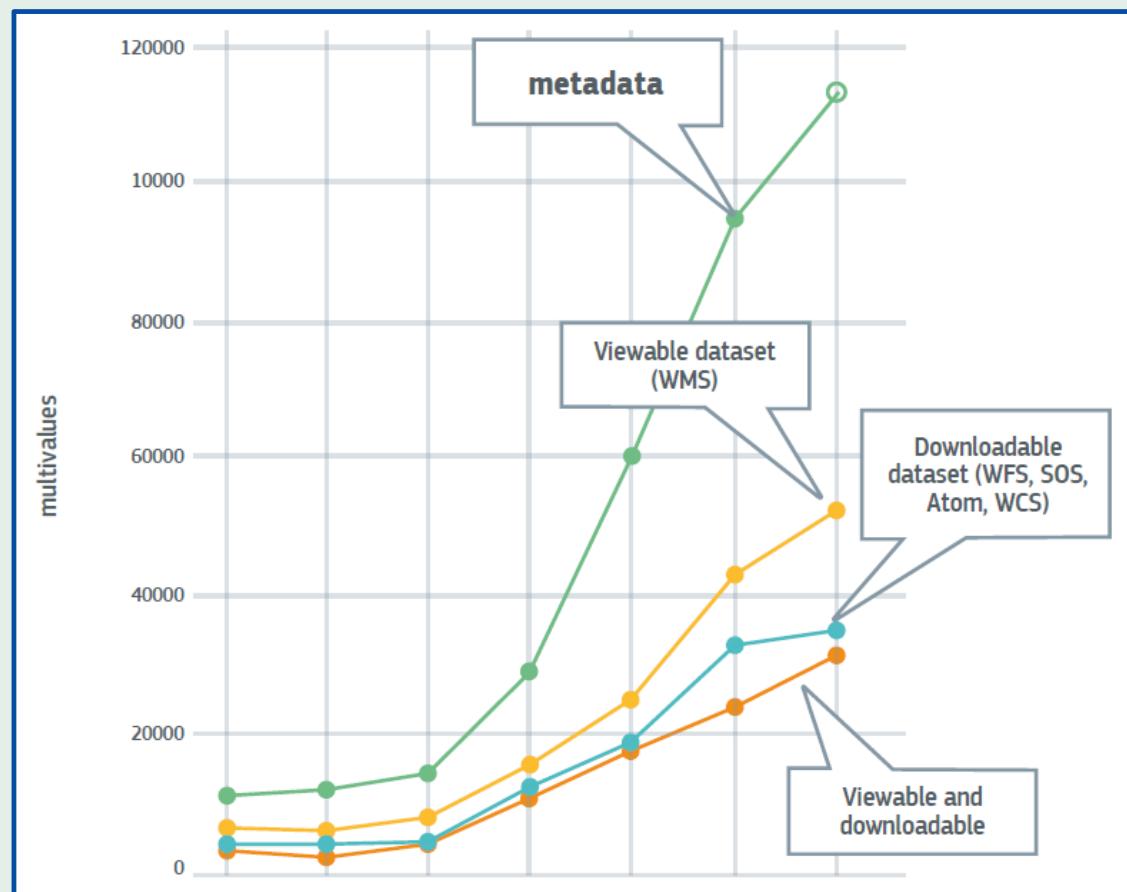


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# Lessons learnt

# Improved data discoverability & availability

- The amount of datasets made available through INSPIRE has overall grown:

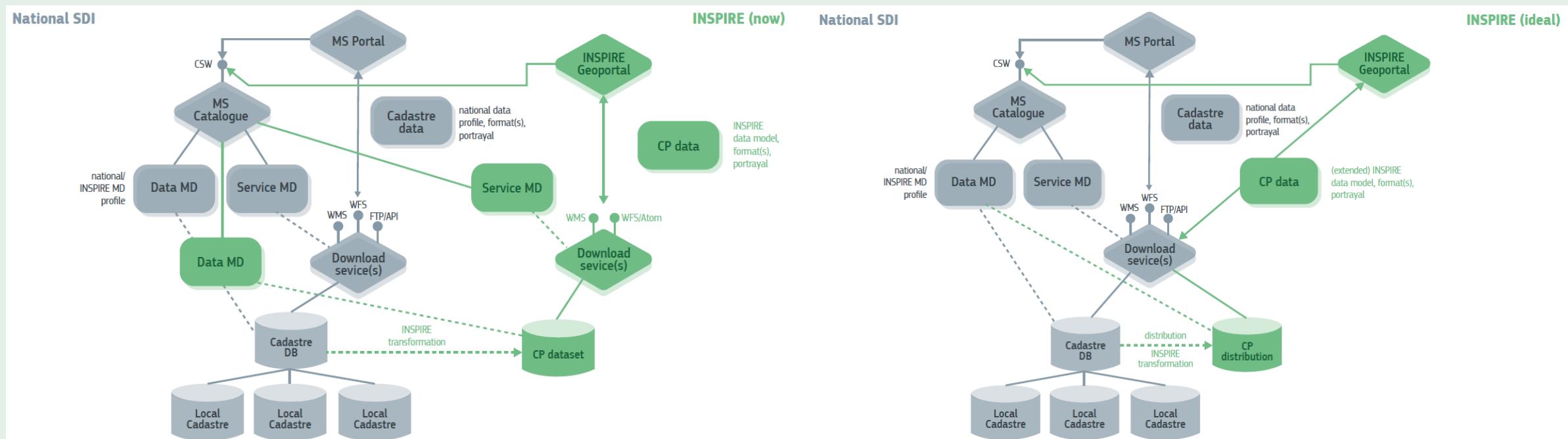


Improved data availability and in the INSPIRE infrastructure  
between 2007 and 2018.

- clarity on what data was actually available
- light on inefficiencies, gaps & overlaps in the production of datasets
  - improvement of national structures
- opportunity for reusing geospatial catalogues in different open data portals

# Parallel implementations

- Many Member States share only a limited number of datasets within INSPIRE:
  - INSPIRE only marginally linked – instead of being built on top of national SDIs
  - reasons: INSPIRE requirements are different than national ones
  - result: available data (themes, spatial object types, scale, quality) is heterogeneous across Europe, usability is limited



# Technological innovation

- INSPIRE (legal framework) as a **catalyst** for technological innovation:
  - support to the development/evolution of several **open source tools**
  - reuse of INSPIRE open source components (Re3gistry and ETF)

The figure consists of three vertically stacked screenshots of web interfaces:

- AUSTRIAN INSPIRE Registry:** A screenshot of the Austrian INSPIRE Registry interface. It shows a sidebar with navigation links like "Registers", "Registers", and "Registers". The main content area displays a table of registry entries.
- NLS INSPIRE Registry:** A screenshot of the National Land Survey of Finland (NLS) INSPIRE Registry. It shows a similar table structure with columns for "URI", "label", and "status".
- INSPIRE register Nederland:** A screenshot of the Dutch INSPIRE Registry. It shows a table with columns for "label", "definition", and "status".

All three interfaces include the "Geonovum" logo at the bottom.

Workshop website beta Editor GeoNode default management tests Language Services like European Inspiredata need Documentation Aim GIS directive application fields tools Previous Service ISO OSGeo MapServer World order Lists name OSGeoLive INSPIRE opensource level Style Mailing bug WFS info compliant WMS r QGIS om de Wiki degree SRS Portugal SVN GML Trac Open data fix | add en SDI les die GDAL SPatial GeoNetwork list metadata XML Web use see su new Search MapServer Inspire support FOSS SOS Free PDT capabilities Geospatial s View profile OGC Europe CSW standards GRASS Source Developer response GSOC related also Download based pycsw INfrastructure User version Discovery Release message Information Results basic take specifications first pour english

# Custom extensions are problematic!

- Wrong assumption that INSPIRE requirements would automatically lead to the evolution of software tools, such as:
  - support for **GML encoding** of INSPIRE data in mainstream GIS software
  - support for **extended capabilities** in INSPIRE network services
- Complex requirements only covering specific ‘niches’ created an **implementation overhead** with little value added.

# Flexible governance approaches

- Inclusive and open governance approach since the beginning:
  - broad spectrum of users & implementers
  - INSPIRE MIG/MIG-T for organisational, legal and technical matters – but:
    - exclusively represented by data providers
    - not always flexible and fast in accommodating novelties
- More agile governance approaches would help:
  - community-driven
    - see e.g. INSPIRE Good Practices and artefacts
  - based on online collaborative platforms

# Impact of standardisation

- Probably the largest uptake of OGC standards worldwide!
  - **benefits** for all players: data providers, users & SDOs
  - **problems** of slowing down the implementation process
- Only mature and **well-supported** standards should be considered for INSPIRE technical provisions:
  - selected standards should not only satisfy the legal requirements, but also simplify the lives of providers/users!

# Heterogeneity in licensing

- Heterogeneous licensing approaches are a **barrier to data usage**:
  - licensing information not available at all
  - use of custom licenses (often in country-specific languages)
- Need for a **common European approach** for the licensing of the data:
  - Open Data Directive & high-value datasets
  - reuse of existing licensing frameworks, e.g. Creative Commons

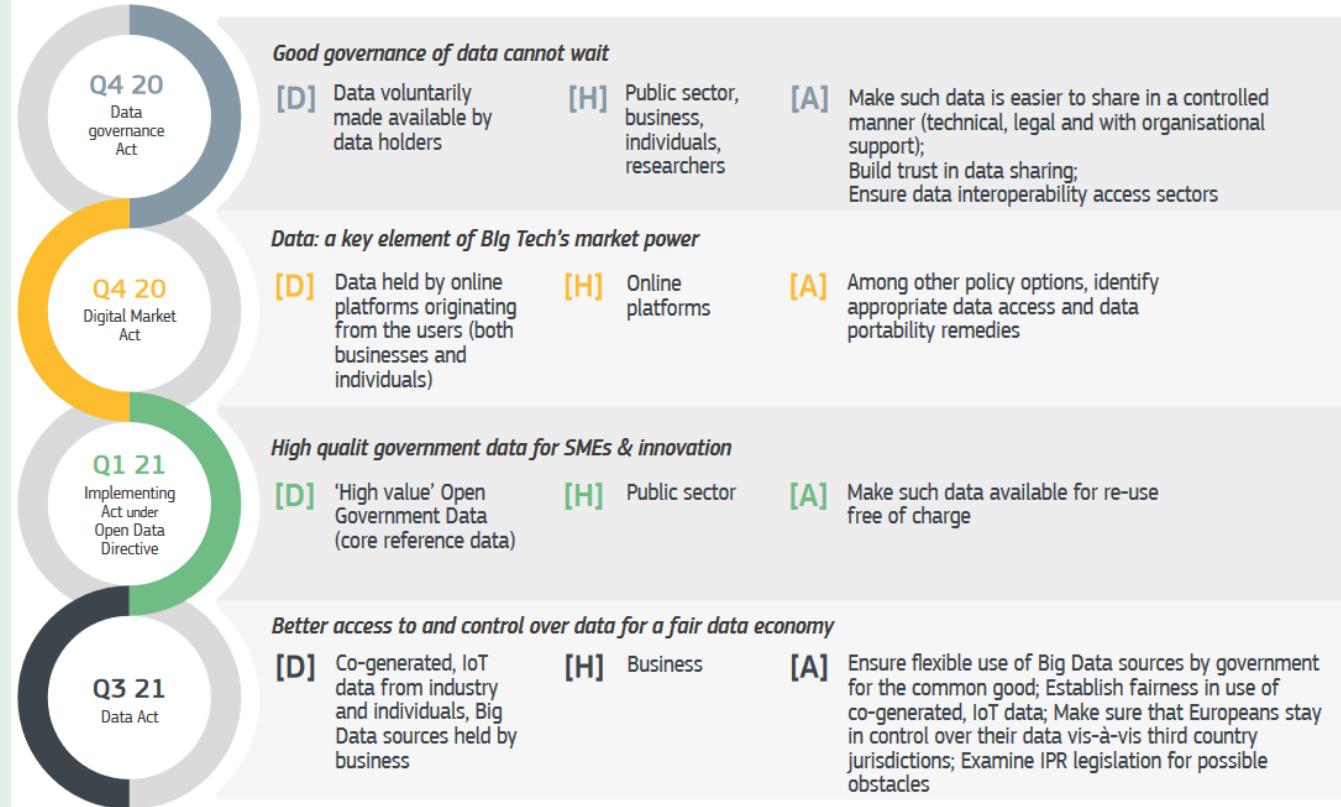


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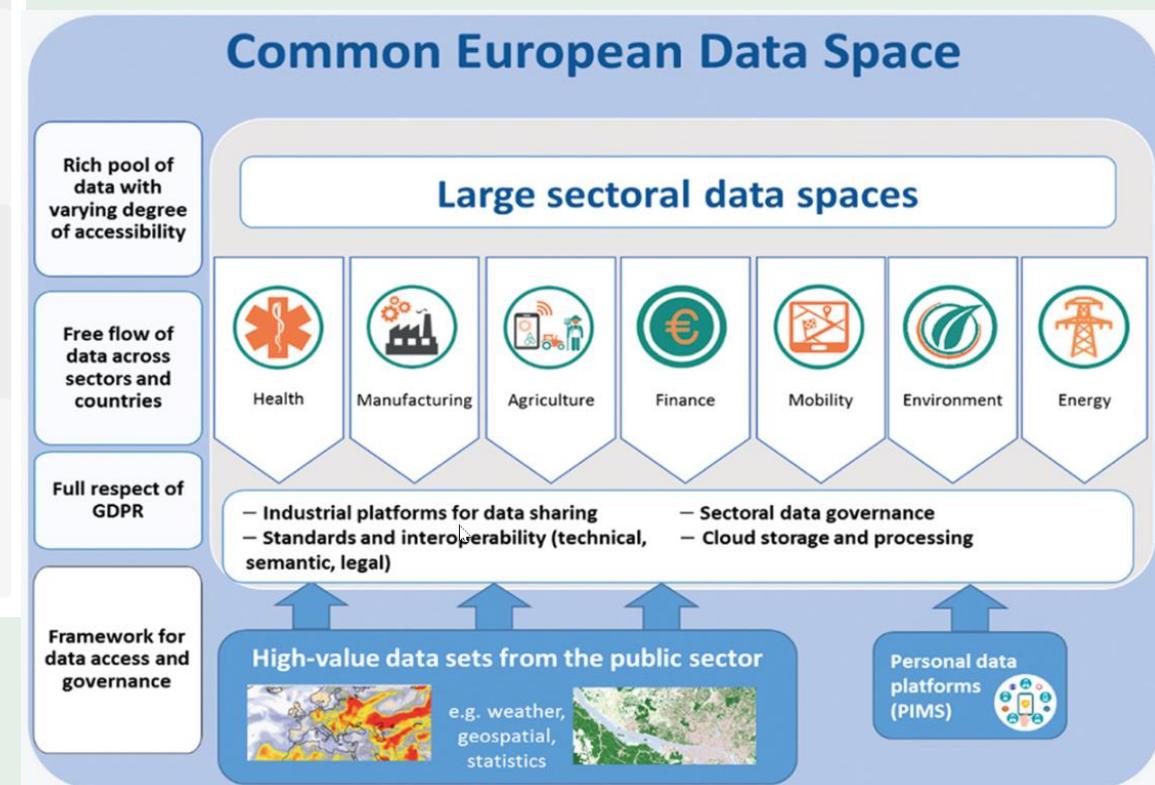
# Context

# Policy context

## Overview of data actions



## Common European Data Space

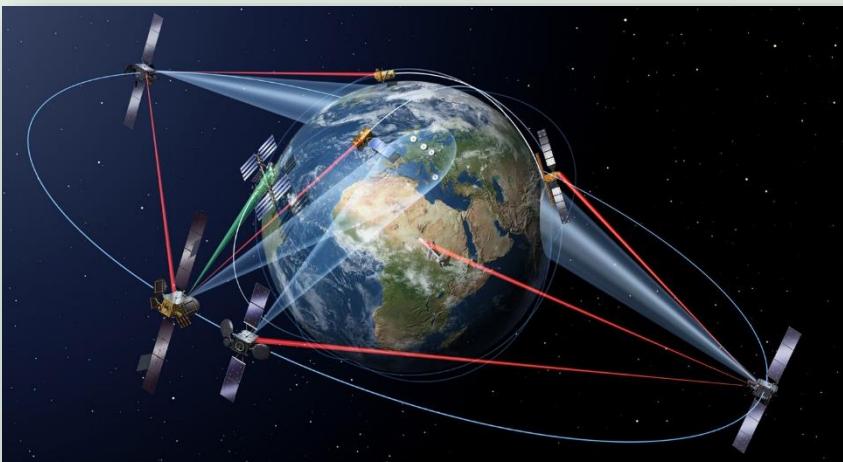


# Technology trends – new data sources

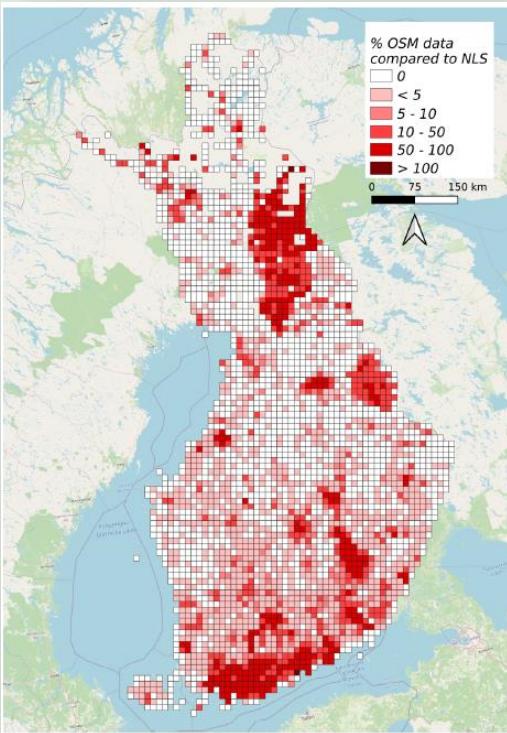
## 1. Internet of Things



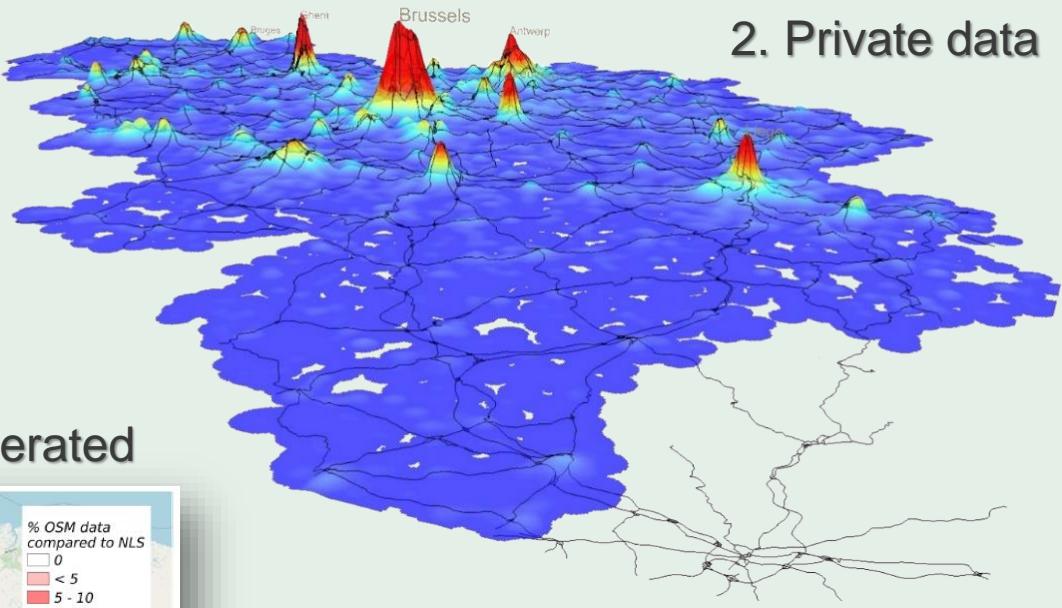
## 3. Copernicus



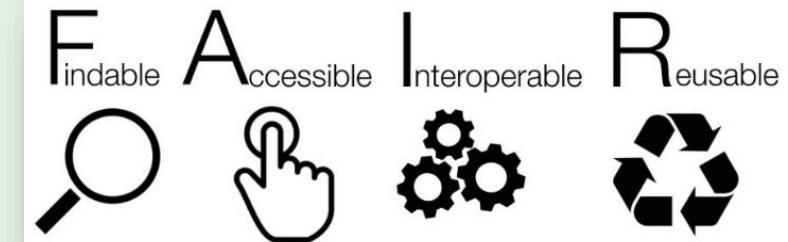
## 4. Citizen-generated



## 2. Private data



## 5. FAIR research data



# Technology trends

- From data collection to **data connection**:
  - APIs, APIs, APIs
- Agile standards
- Mature tools
  - multiple approaches for using and serving data
  - powerful **ETL** instruments
- Novel architectures
  - edge/fog
  - federated cloud
  - S.O.L.I.D.





## INSPIRE CONFERENCE 2021

# *Vision*



# The possible future of INSPIRE

- Data sharing is **not a goal in itself**. To remain fit for purpose, INSPIRE should support data-driven decision-making and innovation.
- To be sustainable, INSPIRE should '**blend in**' with the broader **ecosystem** of spatial and non-spatial data, infrastructures, technologies and policies.
- This will mean **opening up to a broader community** of implementers and users and to a wider range of applications and use cases.
- Making the INSPIRE framework more **flexible and agile** will significantly lower the entry level to the sharing and utilisation of data.
- Technical **approaches need to be simplified** by reusing well-adopted standards and technologies.

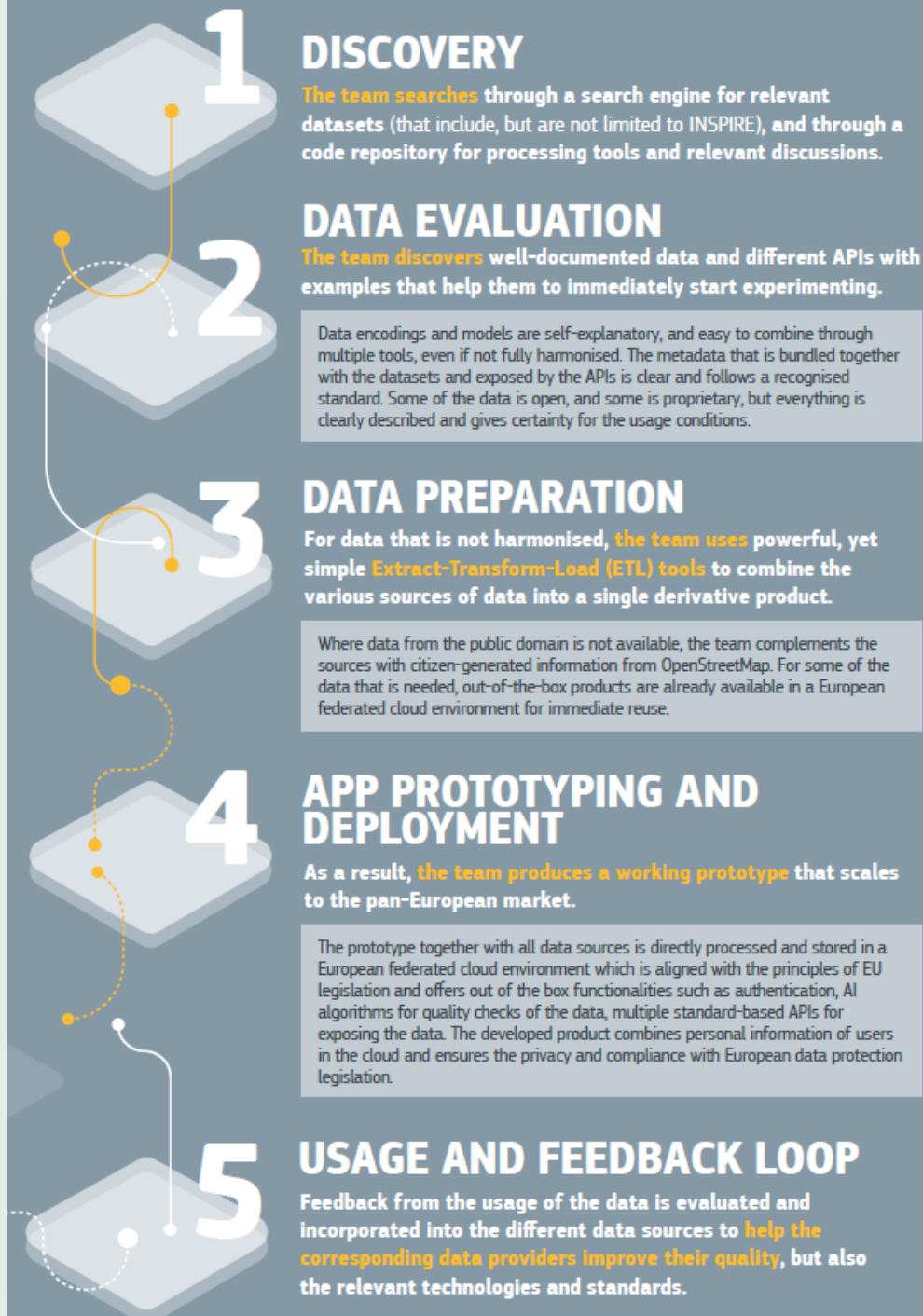
# A hypothetical use case



In 2025, a European SME is working on an analytical service for supporting citizens and real estate agencies in finding the areas of cities that are most suitable for renting housing. In accordance with their business plan, such an approach is only economically feasible if the service can be scaled to a pan-European level.

The team of developers engaged with this task has thorough experience in data science but little or no prior knowledge of geospatial technologies and standards.

They approach the problem in the following manner:





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# Actions

# Organisational and legal

1. Avoid overspecification
2. Use a simple licensing framework
3. Embrace co-design by default
4. Rethink the existing governance structures
5. Adopt an ecosystem approach

# Technological

1. Continue to improve the **discoverability** and **accessibility** of data
2. Ensure **neutrality** and embrace well-adopted standards and technologies
3. Avoid **custom extensions**
4. Embrace well-documented, **standard-based APIs**
5. Optimise data for **search engines**
6. Leverage on the developments of **federated European cloud infrastructure**
7. Deprecate **obsolete technologies** and standards

Join at  
[slido.com](https://slido.com/#INSPIRE2021)  
**#INSPIRE2021**



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# Thank you!

[marco.minghini@ec.europa.eu](mailto:marco.minghini@ec.europa.eu)  
[alexander.kotsev@ec.europa.eu](mailto:alexander.kotsev@ec.europa.eu)  
[F.Penninga@geonovum.nl](mailto:F.Penninga@geonovum.nl)