

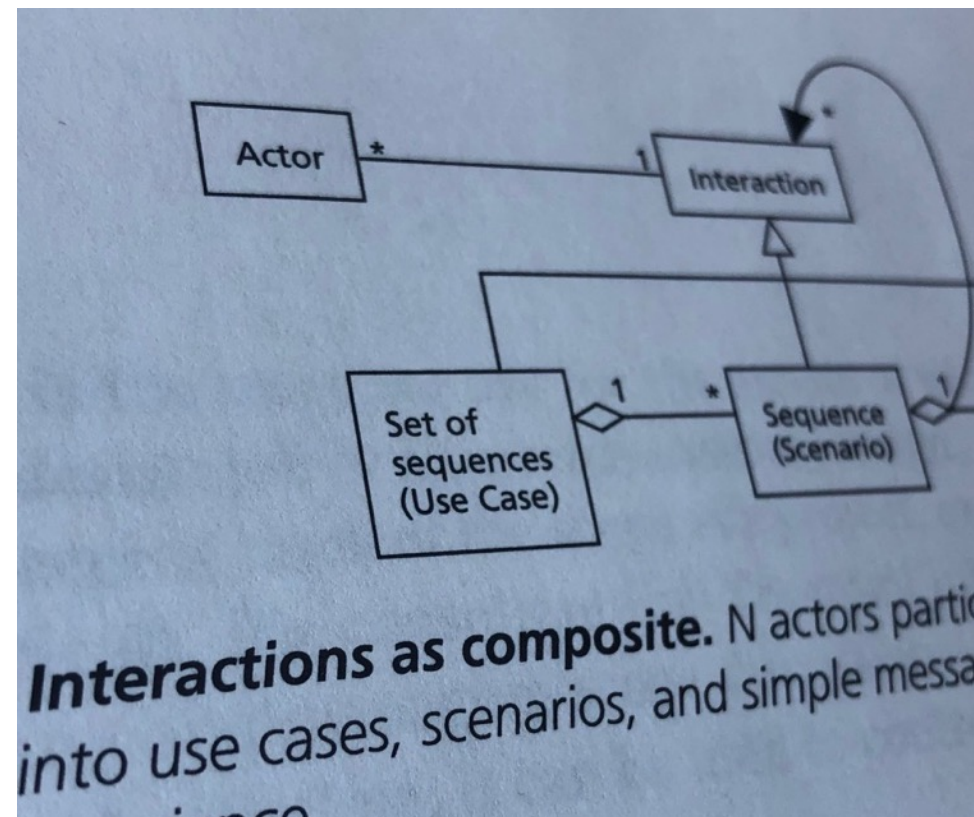
Data infrastructures and interoperable Services

**a EU to local perspective
for reliable and robust data**

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Outline

- Digital Agenda
- EU Data Strategy
- Digital Twins – Destination Earth
- EU actions regarding interoperability
- Initiatives on interoperability and federated systems
- Conclusion



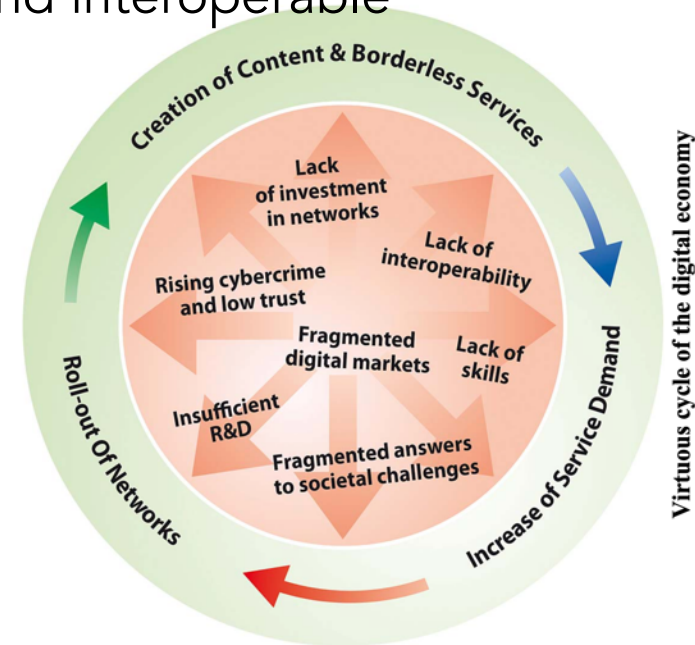
Data infrastructures and interoperable Services

Digital Agenda for Europe [COM(2010)245]

- overall aim, is to deliver sustainable (maximise) economic and social benefits from a digital single market based on fast and ultra fast internet and interoperable applications

Digital Single Market Strategy EU [COM(2015)192]

- Building a data economy - - "Big Data and High Performance Computing are also changing the way research is performed and knowledge is shared, as part of a transition towards a more efficient and responsive 'Open Science'."
- Boosting competitiveness through interoperability and standardisation



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A European Strategy for Data [COM(2020)66]

- aims the digital transformation over the next five years will depend on establishing effective frameworks to ensure trustworthy technologies, and to give businesses the confidence and means to digitise - be successful in the data-agile economy
- EU & MS creates strong legal framework

- Issues & problems were identified

- Issues #Availability of data

value of data lies in its use and re-use (g2b, b2b, b2g mechanism – Data Governance)

- Issues #Imbalances in market power

market imbalances in relation to access to and use of data, for example when it comes to access to data by SMEs

Digital twins create a virtual replica of a physical product, process or system. The replica can for example predict when a machine will fail, based on data analysis, which allows to increase productivity through predictive maintenance.

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A European Strategy for Data [COM(2020)66]

- Issues #Data governance

There have been calls to further reinforce the governance of data use - Data Governance Act [25.11.2020]

- Issues #Empowering individuals to exercise their rights

Individuals value the high level of protection granted by the GDPR and ePrivacy legislation. However, they suffer from the absence of technical tools and standards that make the exercise of their rights simple and not overly burdensome

- Issues #Cybersecurity

SafeTY and widespread use of data-fuelled products and services will also depend on the highest cybersecurity standards

- Skills and data literacy

big data and analytics are top of the list of critical skills shortages

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A European Strategy for Data [COM(2020)66]

- Issues #Data interoperability and quality

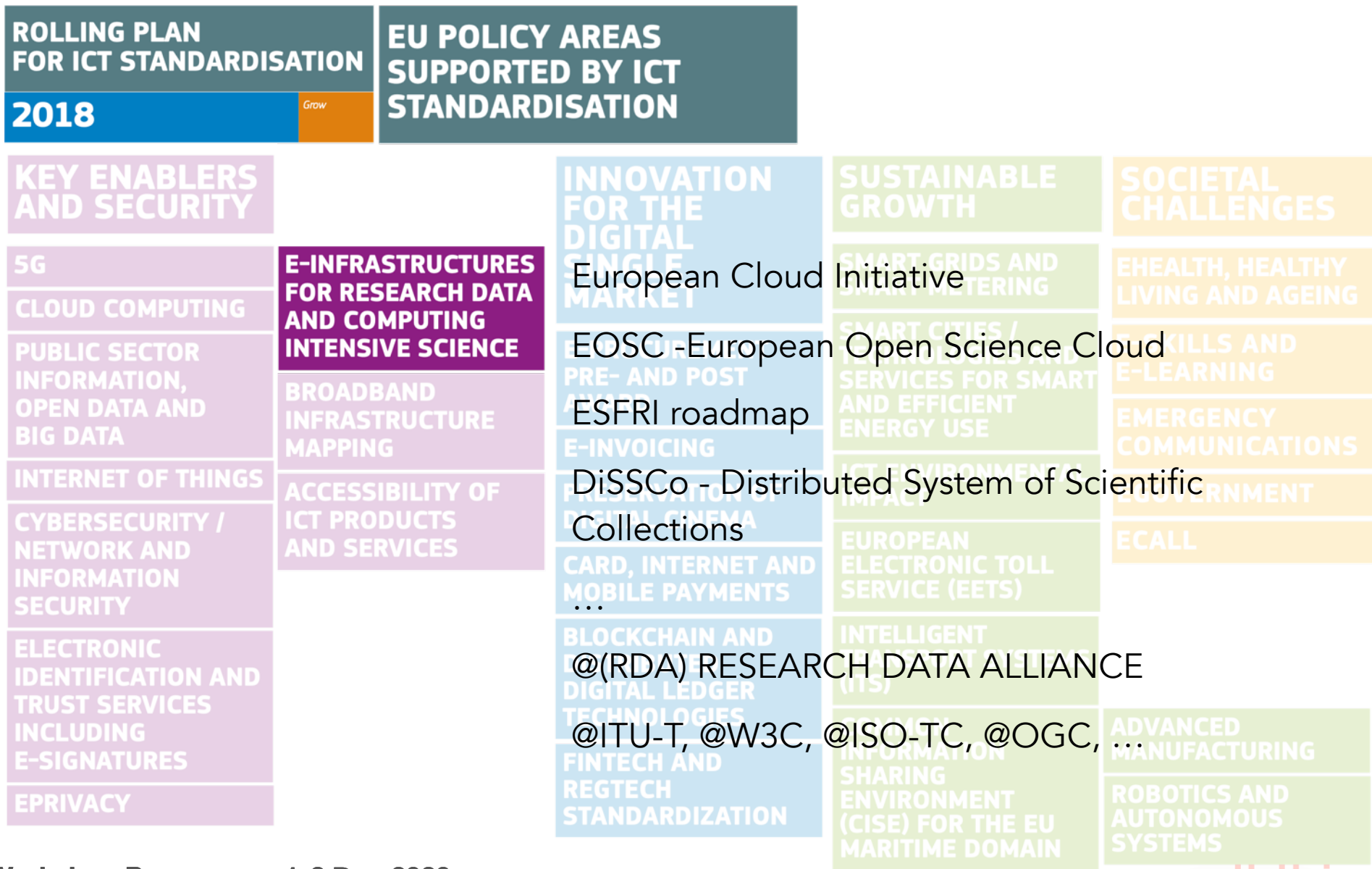
Data producers and users have identified significant interoperability issues which impede the combination of data from different sources within sectors, and even more so between sectors

- Issues # Data infrastructures and technologies

Availability and uptake of secure, energy-efficient, affordable and high-quality data processing capacities, such as those offered by cloud infrastructures and services, both in data centres and at the edge

- EU needs to reduce its technological dependencies in these strategic infrastructures, at the centre of the data economy

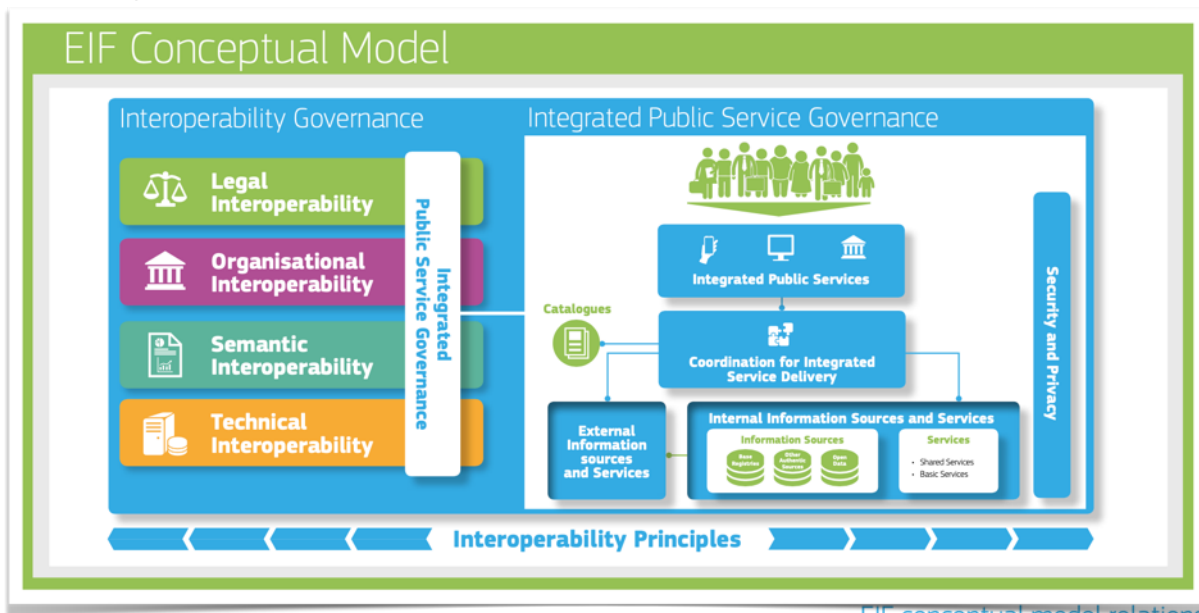
Data infrastructures and interoperable Services



Data infrastructures and interoperable Services

Interoperability

- the ability of organisations to interact towards mutually beneficial goals, involving the sharing of information and knowledge between these organisations, through the business processes they support, by means of the exchange of data between their ICT systems [2017, doi:10.2799/78681]



EIF conceptual model relations

European Interoperability Framework (EIF) is part of the Communication (COM(2017)134) from the European Commission adopted on 23 March 2017

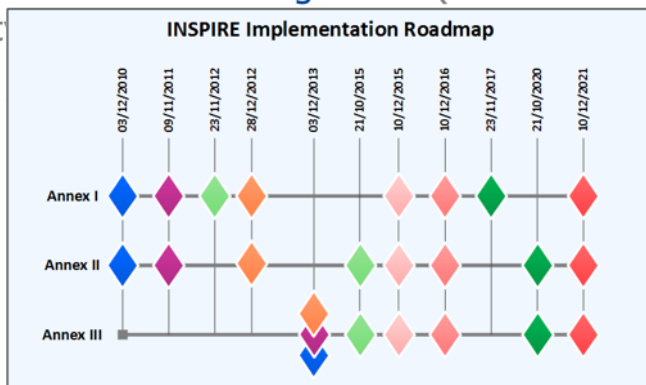
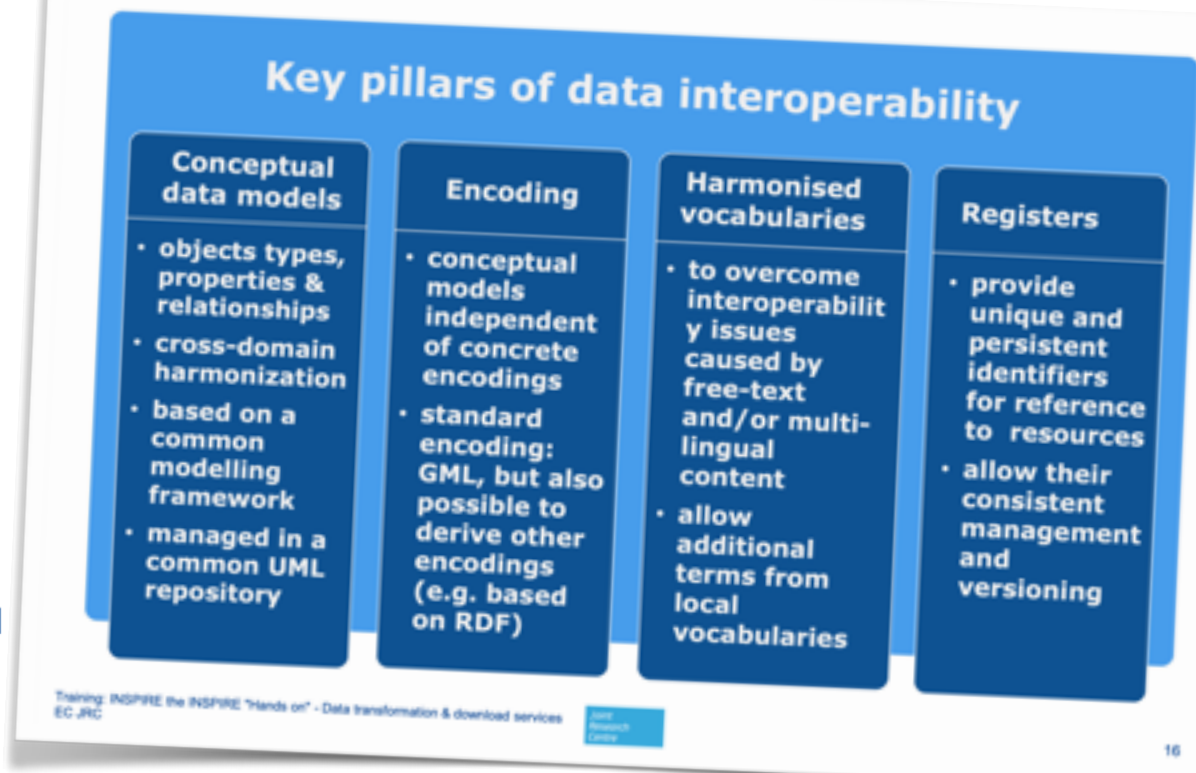
Data infrastructures and interoperable Services

INSPIRE



Infrastructure for Spatial Information in the European Community [Directive 2007/2/EC]

- Comprehensive **data inventory** (Monitoring & Reporting IR)
- **Facilitate data discovery** through standardised discovery services & metadata (IR on Network Services & Metadata)
- **Data sharing** (IR on Data and Service Sharing; Article 17)
- **Facilitate data access** by allowing standardised view, download and transformation (IR on Network Services)
- **Facilitate data use and interoperability** by adopting common cross-domain models to exchange data (IR on Data Interoperability)



<p>Discovery metadata shall be available for spatial data sets and services</p>	<p>Spatial data sets shall be available for discovery and view from the INSPIRE geo-portal (data does not yet need to be conformant to IR-ISDSS)</p>	<p>Spatial data sets shall be available for download and transformation (whenever applicable¹) from the INSPIRE geo-portal (data does not yet need to be conformant to IR-ISDSS²)</p>
<p>Newly collected and extensively restructured spatial data sets shall be conformant to IR-ISDSS (incl. metadata for interoperability) and available through network services</p>	<p>All spatial data sets shall be conformant to IR-ISDSS (incl. metadata for interoperability) and available through network services</p>	
<p>All invocable spatial data services shall be conformant to Annex V of IR-ISDSS (incl. metadata)</p>	<p>Invocable spatial data services related to newly collected and extensively restructured spatial data sets shall be conformant to Annexes VI and (where practicable) VII of IR-ISDSS (incl. metadata)</p>	<p>All invocable spatial data services shall be conformant to Annexes VI and (where practicable) VII of IR-ISDSS (incl. metadata)</p>

IR-ISDSS = Implementing Rules on Interoperability of spatial data sets and services (Commission Regulation (EU) No. 1089/2010), including its amendments Regulations (EU) No. 102/2011, 1253/2013 and 1312/2014

¹ Transformation Services only need to be provided if data sets are not made conformant with the IR-ISDSS by some other means (see Art. 7(3) of the INSPIRE Directive)

² With the exception of newly collected and extensively restructured Annex I data sets, which already have to be compliant with the IR-ISDSS by 23/11/2012

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INSPIRE WP 2020- 2024 (evolution)

Towards a digital ecosystem

Need-driven data prioritisation

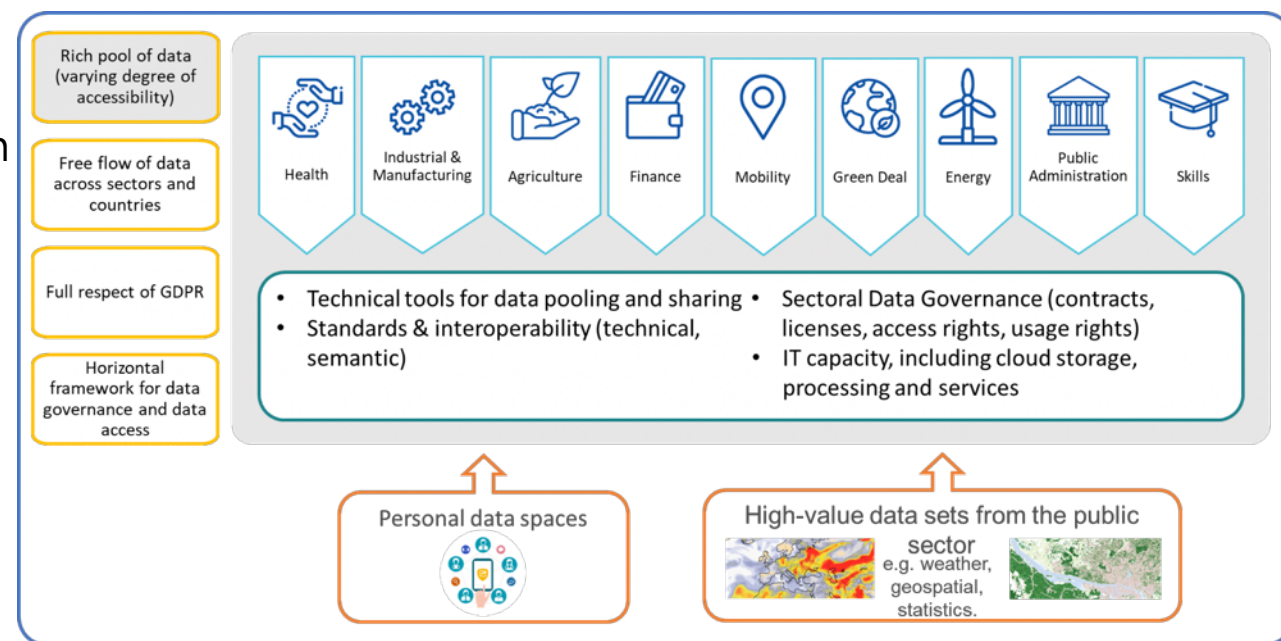
Roadmap for priority-driven implementation

Simplification of INSPIRE implementation

Central infrastructure components

GreenData4all initiative

...



Green Deal dataspace 27/11/2020

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Initiatives on interoperability and federated systems

a Common European Green Deal data space, to use the major potential of data in support of priority actions on climate change, circular economy, zero- pollution, biodiversity, deforestation and compliance assurance

“GreenData4All” and ‘Destination Earth’ (digital twin of the Earth) initiatives will cover concrete actions

just potential examples ...



Show Case
Urban resilience to
extreme weather
H2020 no. 820852



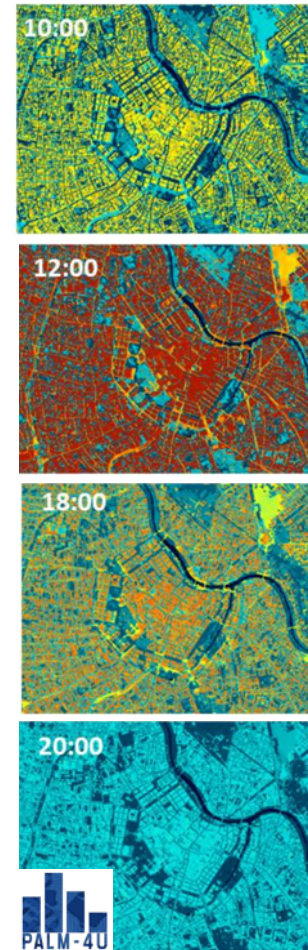
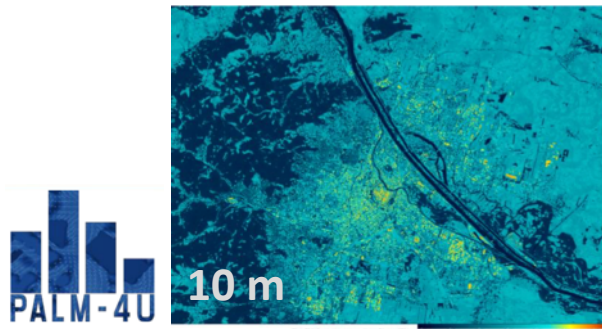
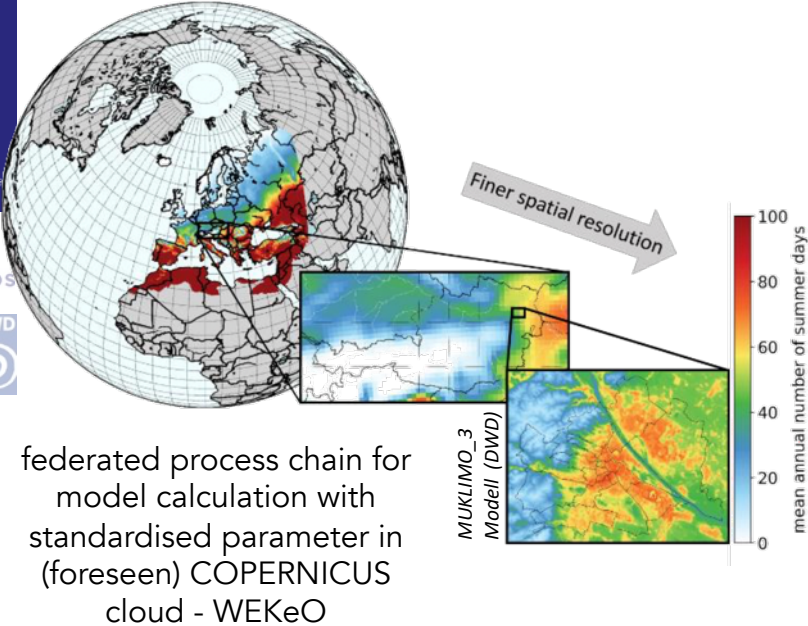
Interface between EO Data
Infrastructures and Front-End
Applications
H2020 no. 776242



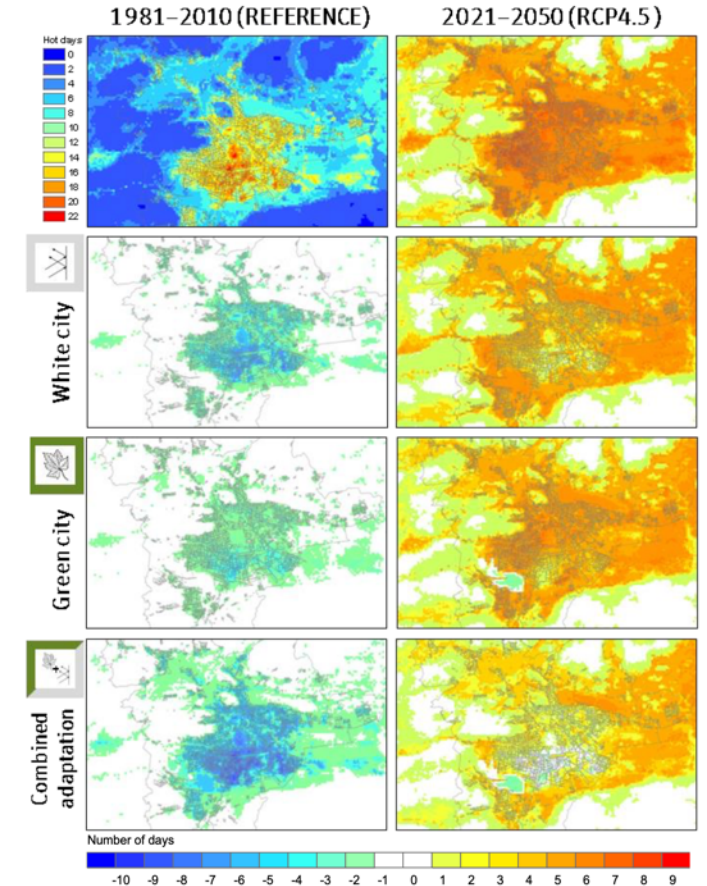
Open Source Geospatial Data
Management
& Analysis Platform

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strengthen urban resilience and preparedness to extreme weather using time-scales from sub-seasonal, seasonal to centuries, e.g. climate projections of summer heat load (ZAMG)



Surface temperature - daily variation, Vienna

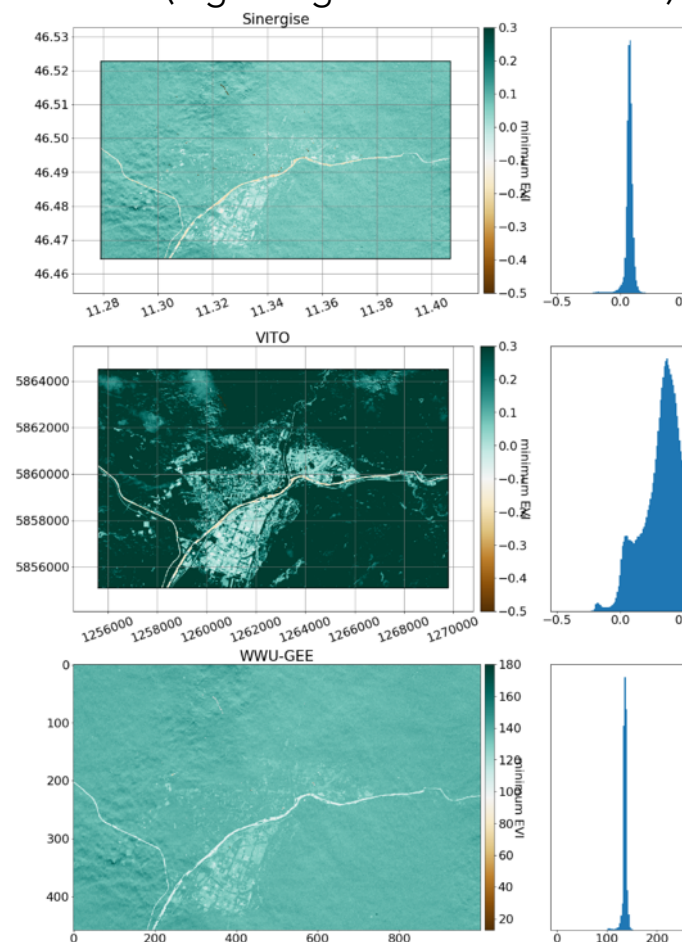
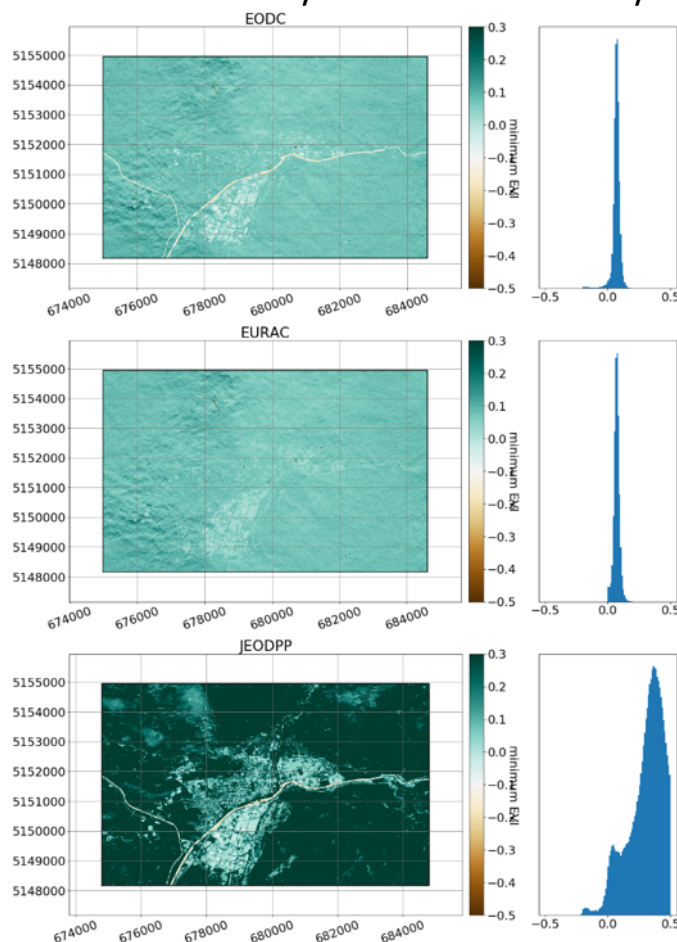


ADAPT-UHI Climate adaptations, Vienna

Data infrastructures and interoperable Services



comparison experiment for the minimum EVI, same area, same Scenes (S2L1), same time frame (2018-06-04 to 2018-06-22), same model algorithmic, different processing infrastructure, archive format, input data (e.g. integer vs. float – file size).



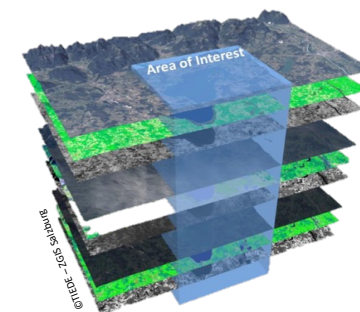
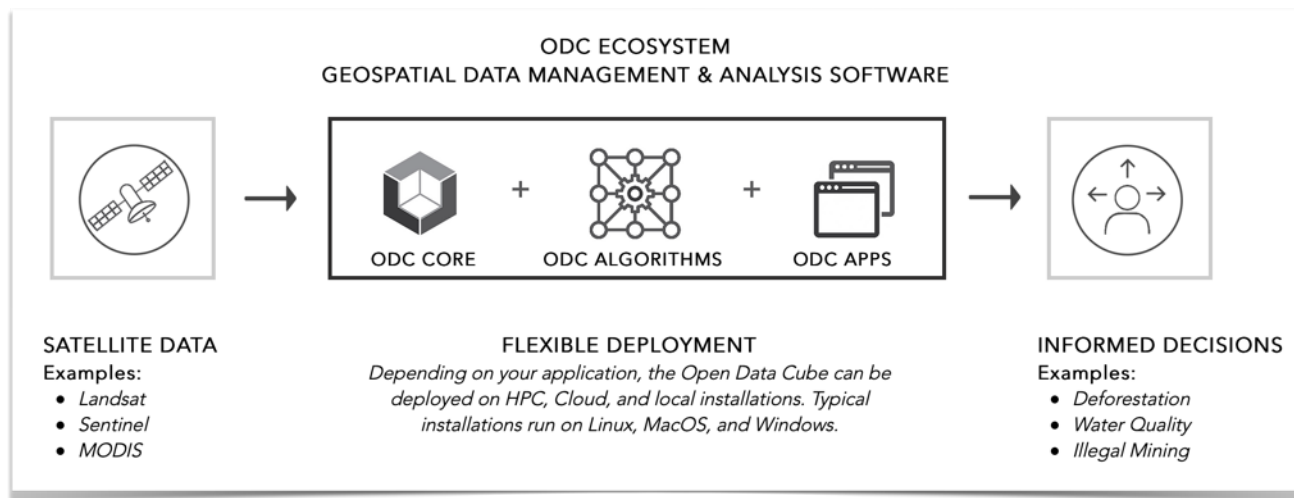
enhanced vegetation index (EVI) vegetation signal for high biomass regions and vegetation monitoring, Bolzano / IT

openEO API does not make back-ends interchangeable but easier comparable

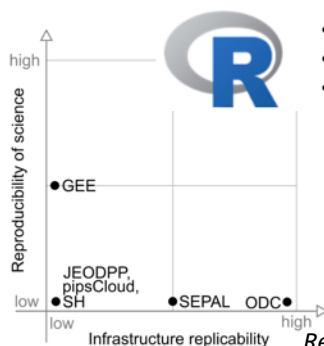
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is an Open Source Geospatial Data Management and Analysis Software that helps to harness the power of Satellite data providing an open and freely accessible exploitation tool



sen2cube.at



- Local R
- 8 cpu, 64 gb ram
- >30 min



- openEO (Open Data Cube)
- 8 cpu, 32 gb ram
- 2 min



Infrastructure replicability vs. Reproducibility of science.

Remote Sens. 2020, 12, 1253

Assessment of Platforms

e.g. „An Overview of Platforms for Big Earth Observation Data Management and Analysis“

doi.org/10.3390/rs12081253

Conclusion

- EU & MS take up a comprehensive efforts towards the digital paths
- There is a need of such legal frame work (in science & economy)
- H2020 & HORIZON EUROPE & MS by strong and strategic recommendations, get an impact of knowledge transfer & investments on the ICT landscape
- Interoperability needs multidisciplinary approaches on complex systems
- EU standardisation and interoperability initiatives support a data ecosystems but have to include local intelligence
- Overburdening complex legislation, overregulation,
- Solve the gap on available ICT skills

Thanks for your attention !

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