



Destination Earth

Flagship initiative of the European Commission



A Highly Accurate Digital Model of the Earth

20th ECMWF workshop on high
performance computing in
meteorology

10 October 2023

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European Commission

DG CONNECT C.1 - Open Science and Digital Modelling

Implemented by  ECMWF  esa  EUMETSAT

Destination Earth

A Highly Accurate Digital Model of the Earth

To monitor, simulate and predict natural phenomena and the impact of human activity on Earth



To assist in designing accurate adaptation strategies and climate change related mitigation measures



To accelerate the EU's green and digital transition



To leverage existing and new data sources and EU's advanced digital and computing infrastructure



To create and test "what if" scenarios and to integrate impact sector applications for more sustainable development



To support near real-time decision-making at various levels (e.g. EU, national, regional, local)



To go beyond the current complex systems designed mainly for expert use



To scale up existing models and fuse simulation with observation



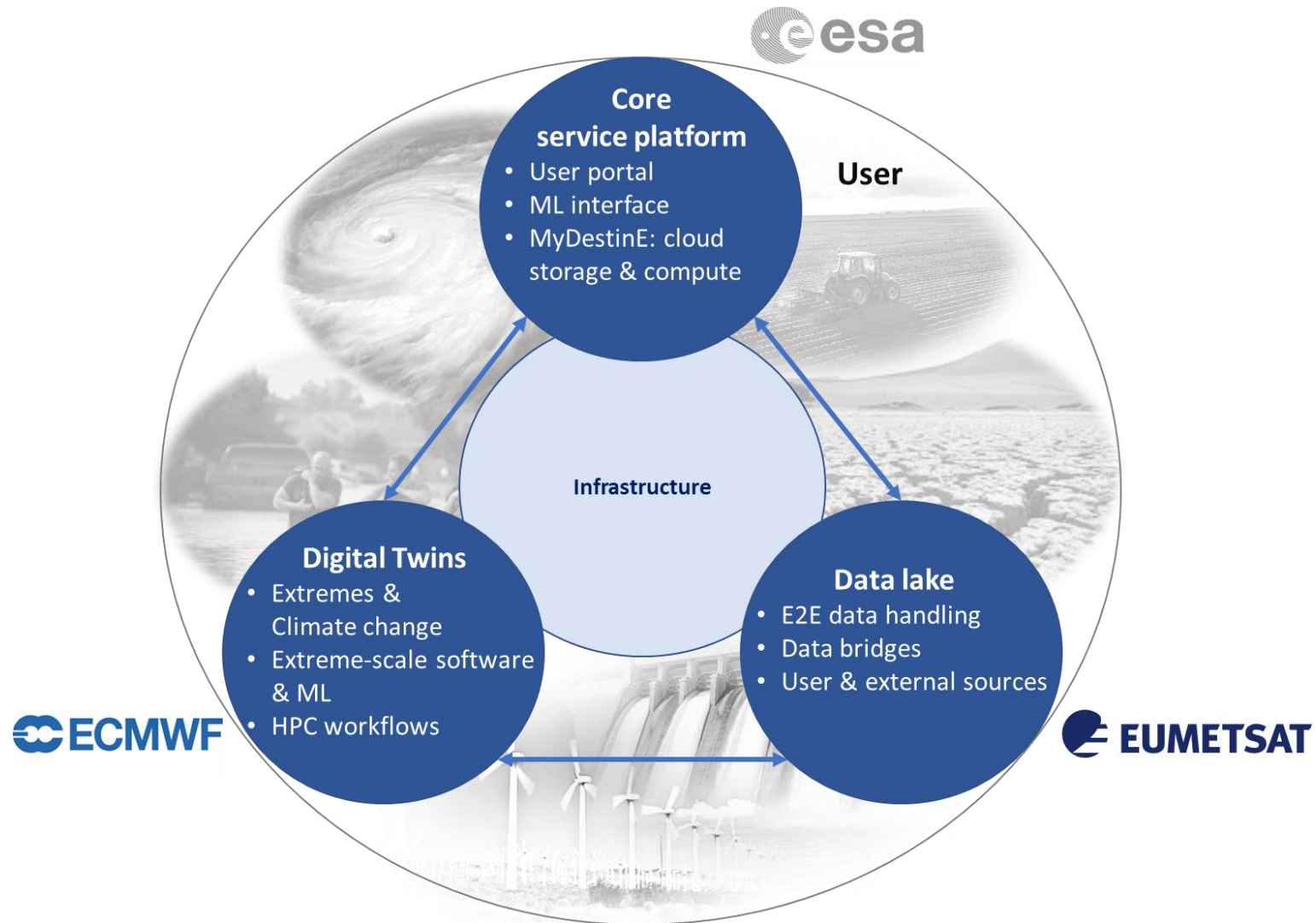
Evidence-based policy development and the user dimension

- **Go beyond the current highly complex systems designed mainly for expert use - significant breakthroughs in terms of simulation realism.**
- Variety of users, with **different expertise and function (e.g. decision-makers, experts and non-expert users)** will have access to high-quality information, services, trustworthy models, scenarios, forecasts and visualisations in relation to major environmental and societal challenges (trusted and verifiable information for evidence-based policy and decision-making, together with information on the fidelity and reliability of the predictions):



- **Policy makers** at EU, Member State, regional and local levels:
 - To **better understand the impact of climate change** e.g. on land use, food security or water resources,
 - To **evaluate the impact of proposed legislative measures**, test the effectiveness of proposed solutions **against alternatives**, **monitor the enforcement** of existing legislation, or to **focus on priority challenges** for specific regions.
- **Public and business sector users**, who can test their **own models, applications, and data**. They will be **able to access**, via the **cloud**, the DestinE models, algorithms, applications and a vast amount of natural and socio-economic data and use them **to develop new applications and services** to suit their own needs.
- **The general public** who will be able to get informed more accurately about the intensity of the environmental, social and economic challenges, assess the efficiency of the proposed solutions, and the reliability of the underlying predictions.

3E and the three main components



DestinE Governance

Decision making layer
Steering and guidance.

DEP Programme Committee

*European Commission & Member States
(business owner: DG CONNECT)*

DestinE Joint Steering Board (JSB)

EC & ESA, ECMWF, EUMETSAT

Intelligence gathering and advice

**DestinE
Member States
Coordination
Group (DCG)**

**DestinE
Strategic
Advisory Board
(SAB)**

Implementation layer

Programmatic Frameworks

**DIGITAL
(DEP)**

**Supporting
Horizon Europe
Projects**

DestinE Joint Technical Committee (JTC)

EC & ESA, ECMWF, EUMETSAT

**Continuous
Feedback**

Stakeholders and communities

**User and
Technology
partnerships**

**User
Engagement
Framework**

Inter-service Coordination

DG CNECT, DEFIS, RTD, JRC

**Technology & Data
Working group**

**Science Plan Working
Group**

Internal 3E Coordination

ESA, ECMWF, EUMETSAT

Technical Boards and horizontal teams

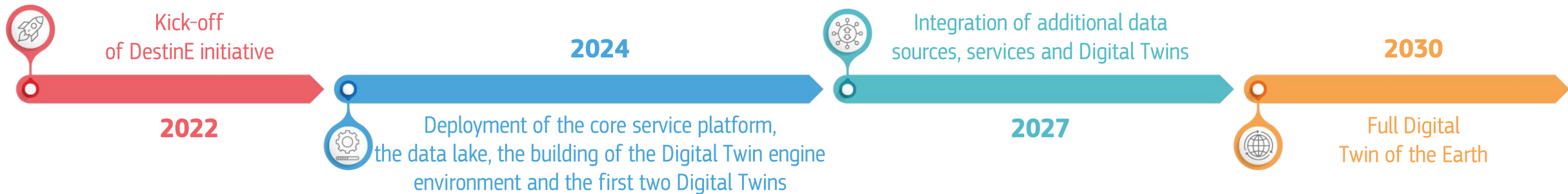
DestinE – Initial Services

- Destination Earth will deliver **initial digital services in Q3 2024 (go-live mid June 2024)**. At first it will serve professional public sector users, and will be later expanded to scientists, private sector, and the general public. These services will be increasingly scaled up and extended during the programme.
- The open core service platform, data lake, the digital twin engine, and the first two digital twins will be funded from the Digital Europe Programme, **with €150 million for the first 30 months implementation period in 2021-2024. Horizon Europe will also provide over €55 million** in additional investment in related research and innovation to reinforce DestinE technologies and prepare for new twins.
- Synergies are established with other EU programmes like Copernicus, the EuroHPC Joint Undertaking and will link with related national initiatives, while bringing together European scientific and industrial excellence to achieve these ambitious goals.



Destination Earth – implementation roadmap

Signature of the CAs (official start of Phase I): **15 December 2021**





DestinE in the broader
HPC,
common European Data Spaces and
European Cloud Federation
Ecosystem

The EuroHPC Joint Undertaking



A legal and funding agency located in Luxembourg

34 Participating States + EC + 3 Private Members (ETP4HPC & BDVA& QUICQ)

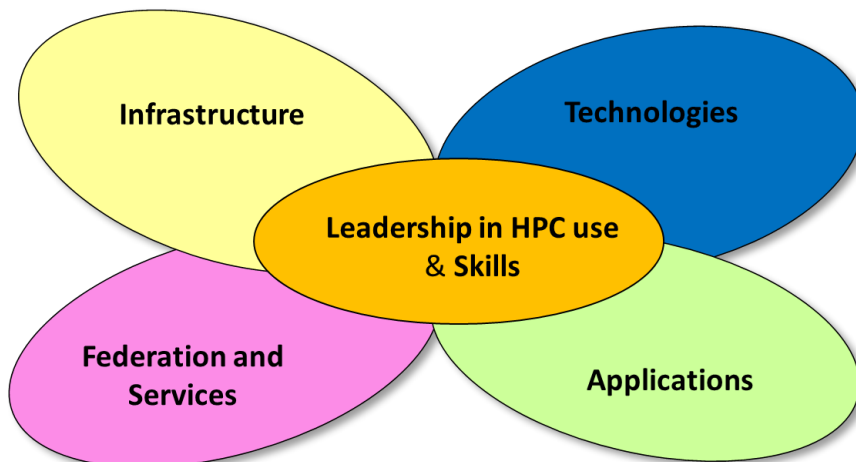
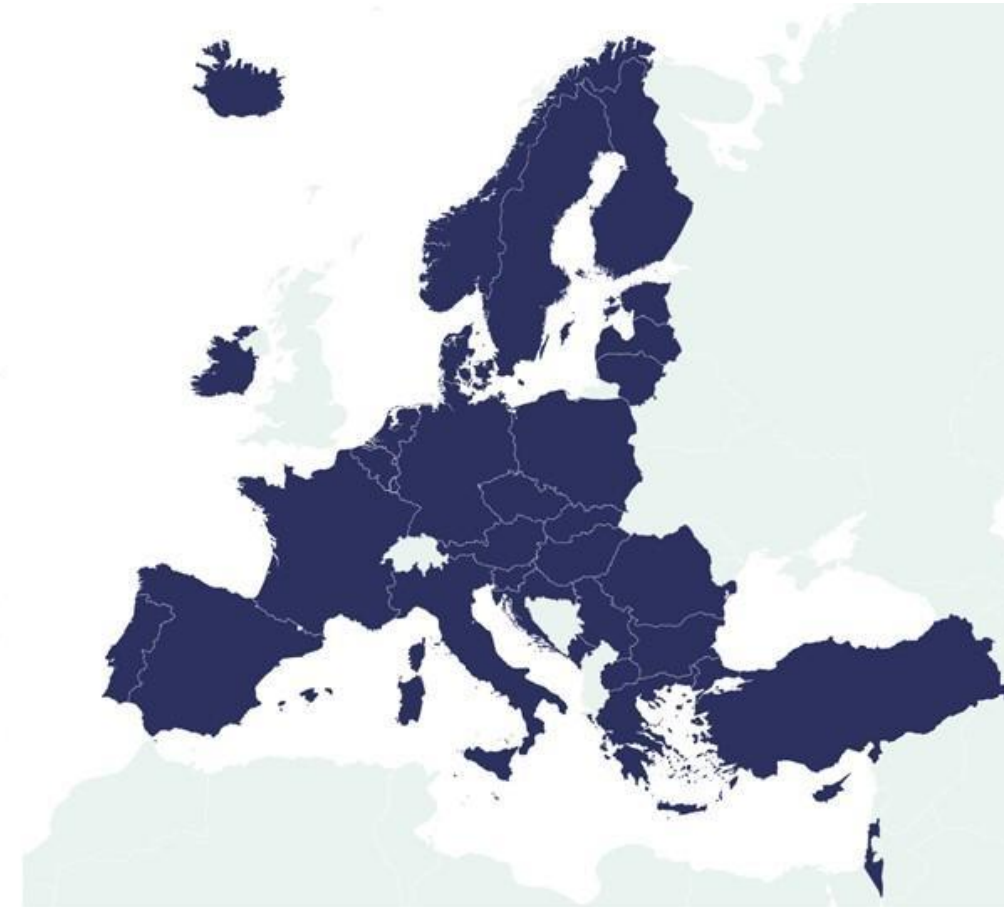
Launched in October 2018

Budget for 2021-2027: ~7B€

#EuroHPC Joint Undertaking

The European High Performance Computing Joint Undertaking (EuroHPC JU) will pool European resources to develop top-of-the range exascale supercomputers for processing big data, based on competitive European technology.

Member countries are Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Latvia, Lithuania, Luxembourg, Malta, Montenegro, the Netherlands, North Macedonia, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden and Turkey.

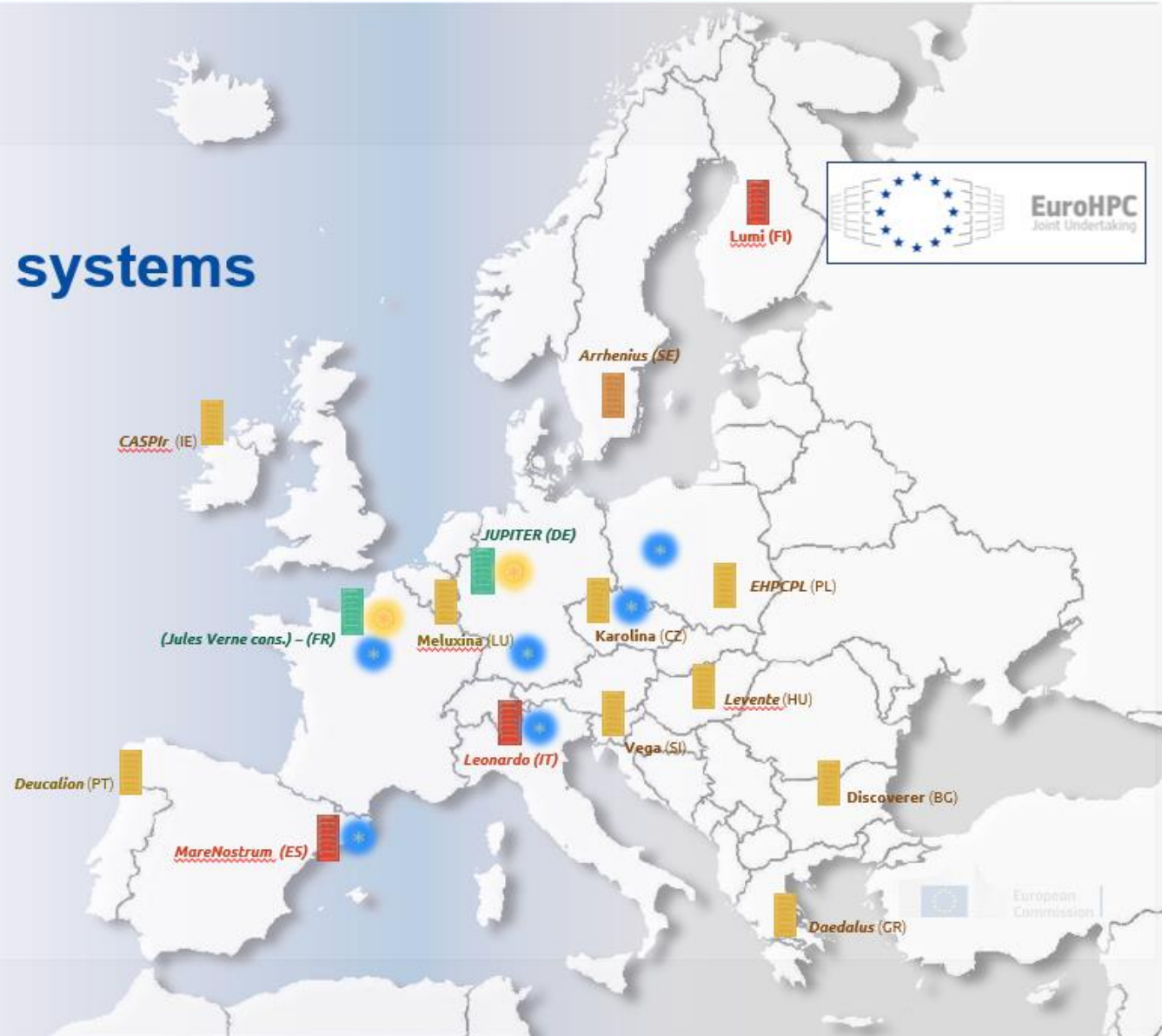


<https://eurohpc-ju.europa.eu/>

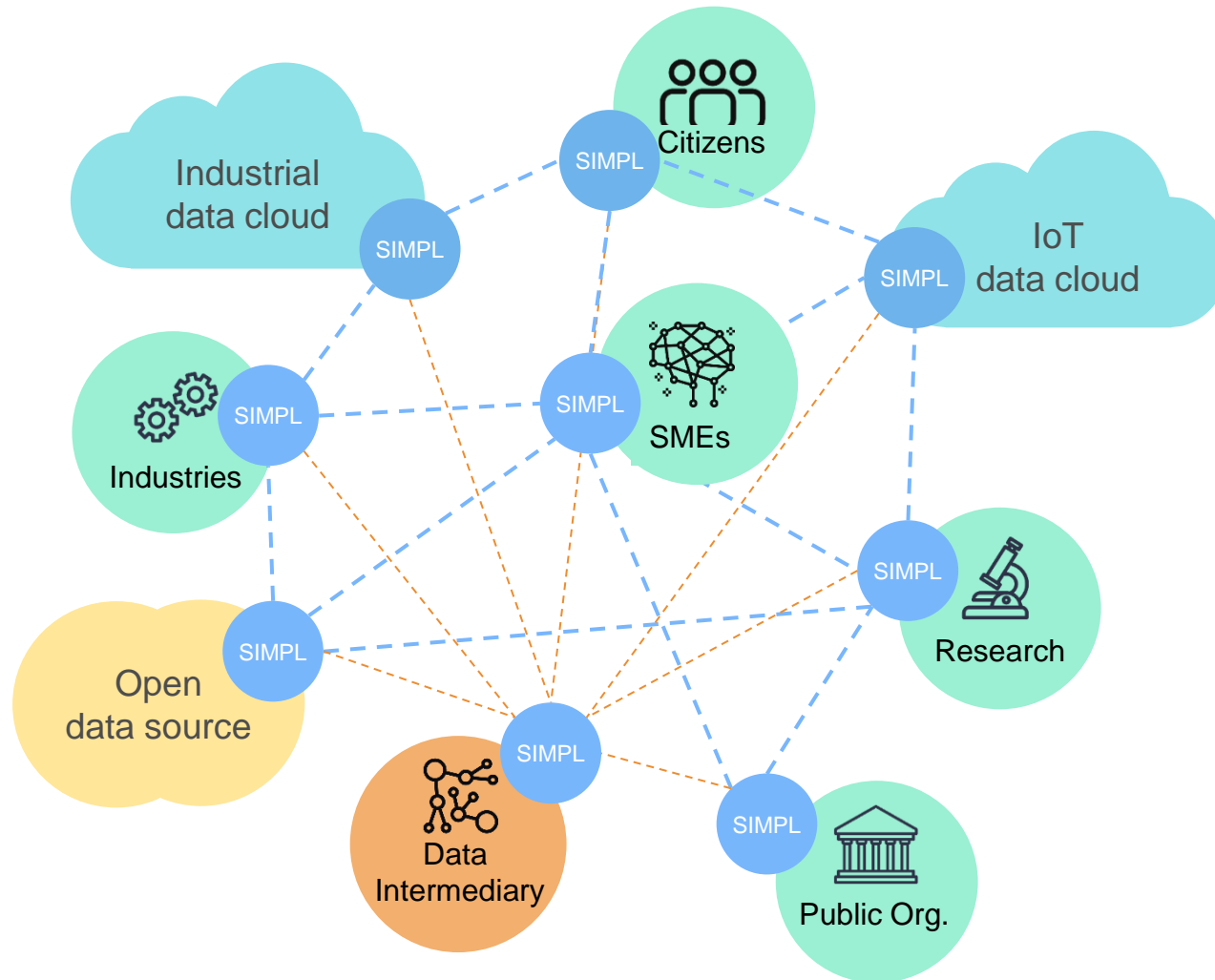
DestinE & EuroHPC Joint Undertaking

- ✓ The EuroHPC JU can grant special access to strategic European Union initiatives considered to be essential for the public good, or in emergency and crisis management situations
- ✓ DestinE has been granted Special Access to EuroHPC supercomputers
- LUMI, Leonardo, MareNostrum5 and MeluXina

EuroHPC systems



The common European Data Spaces



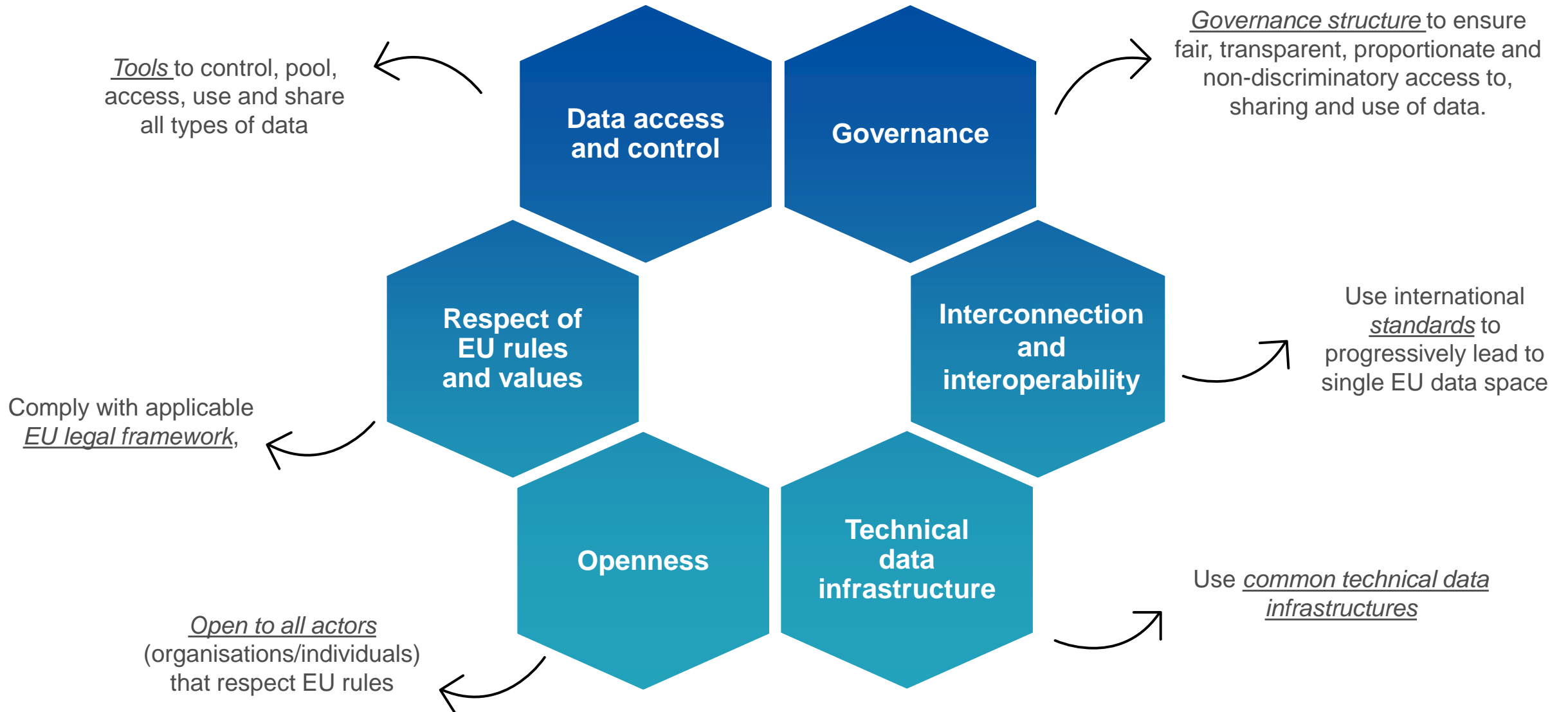
--- Data exchange
--- Metadata exchange

Common European Data Spaces are a **federated data ecosystem based on shared policies and rules**. The participants of data spaces are enabled to access data in a secure, transparent, trusted, easy and unified fashion.

Data holders remain in control of who can access and use their data, for which purpose and under which conditions.

From a technical perspective, a data space is a data integration concept which does not require common database schemas and physical data integration. A data space is rather based on distributed data stores and integration on an “as needed” basis.

Design principles for common European data spaces

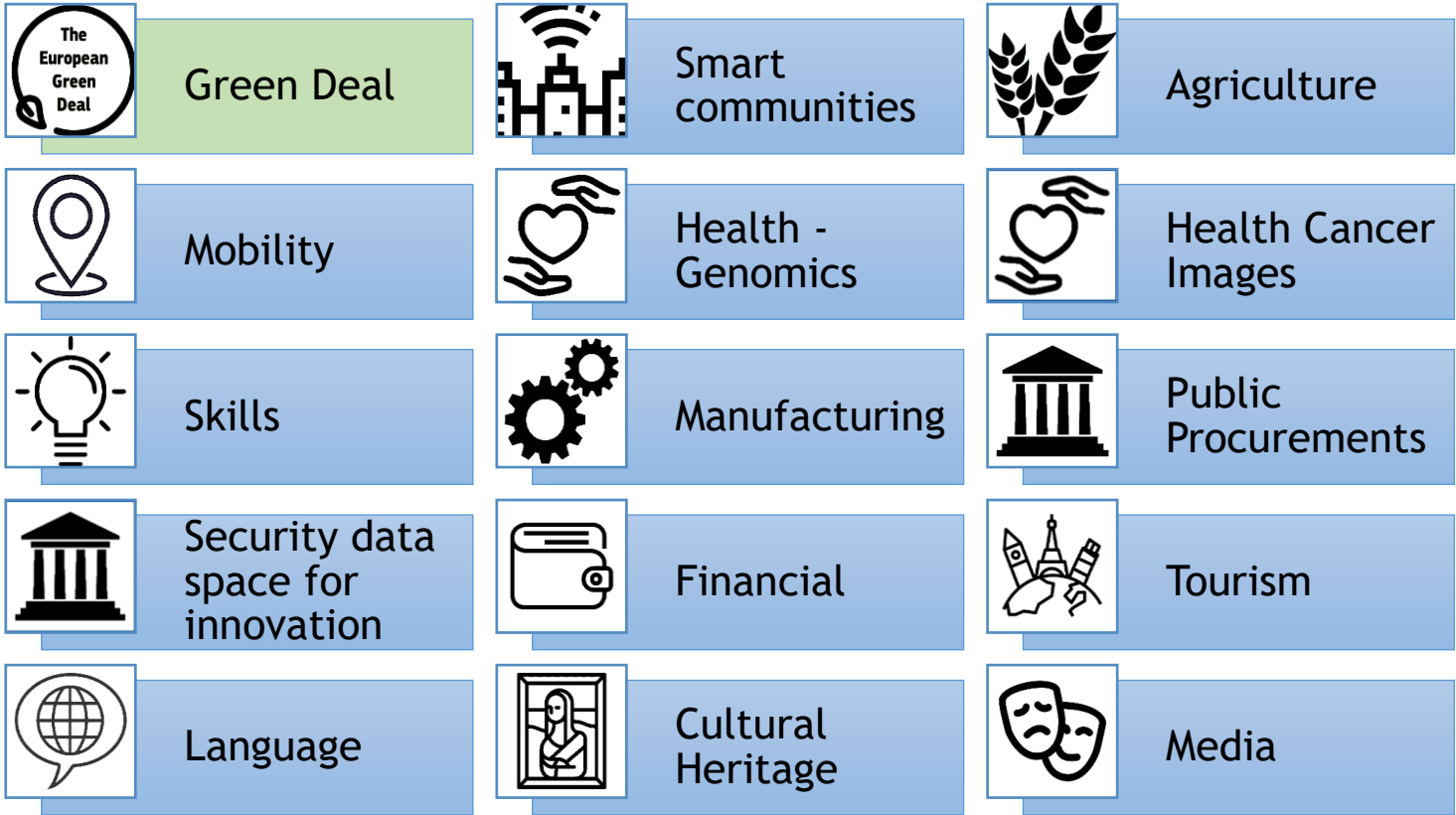


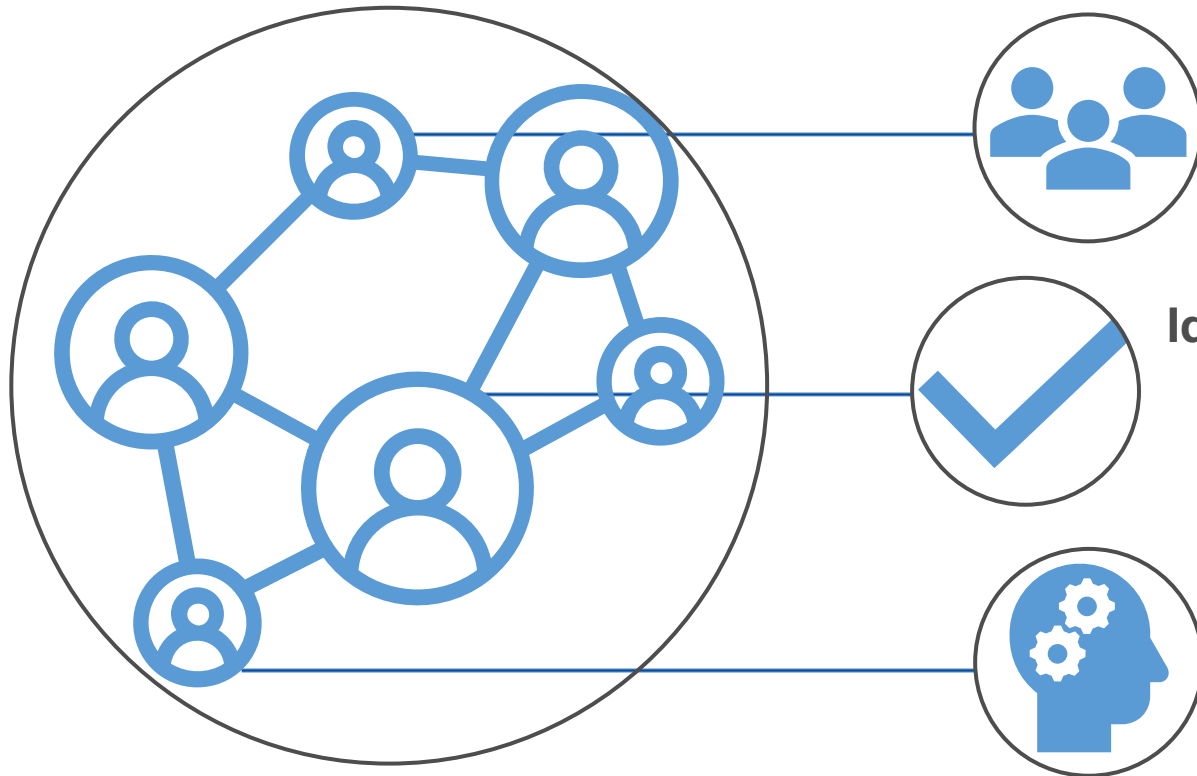
DestinE and the common European Data Spaces

In strategic sectors, the Commission is funding and facilitating the development of **EU-wide common data spaces**:

- Contributing to the definition of their objectives through sectoral policies.
- Offering a technical solution (a **Smart Middleware - SIMPL**) that will pool existing data infrastructures (cloud federation)

DestinE Earth





Create a network of stakeholders

- Closely work with CSAs and projects funded under the Digital Europe Programme

Identify common requirements:

- Support the work of the European Data Innovation Board (DGA)

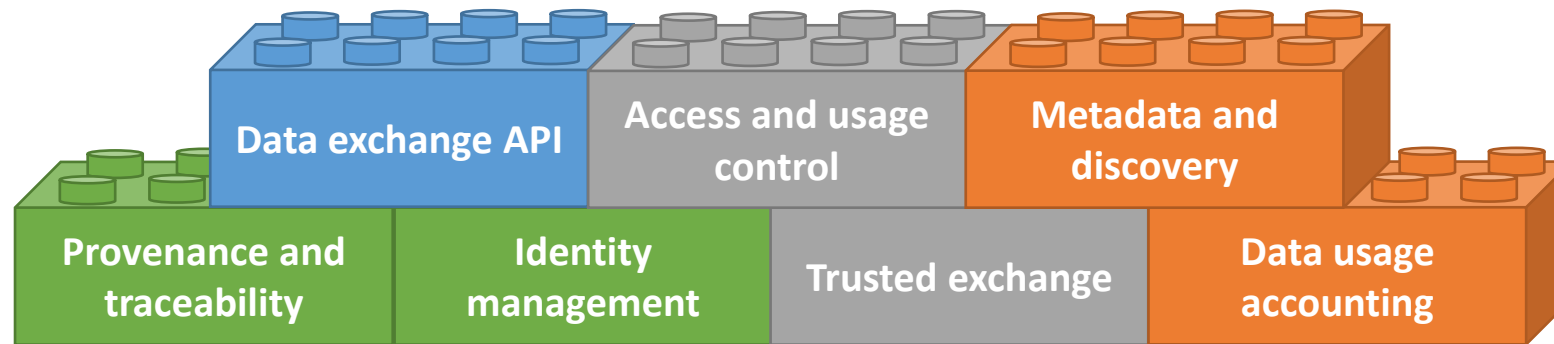
Create a platform for knowledge exchange:

- Support the deployment of data spaces

SIMPL (Smart Middleware Platform)

SIMPL is the smart middleware that will enable cloud-to-edge federations and **support all major data initiatives** funded by the European Commission, such as the **common European data spaces and DestinE**.

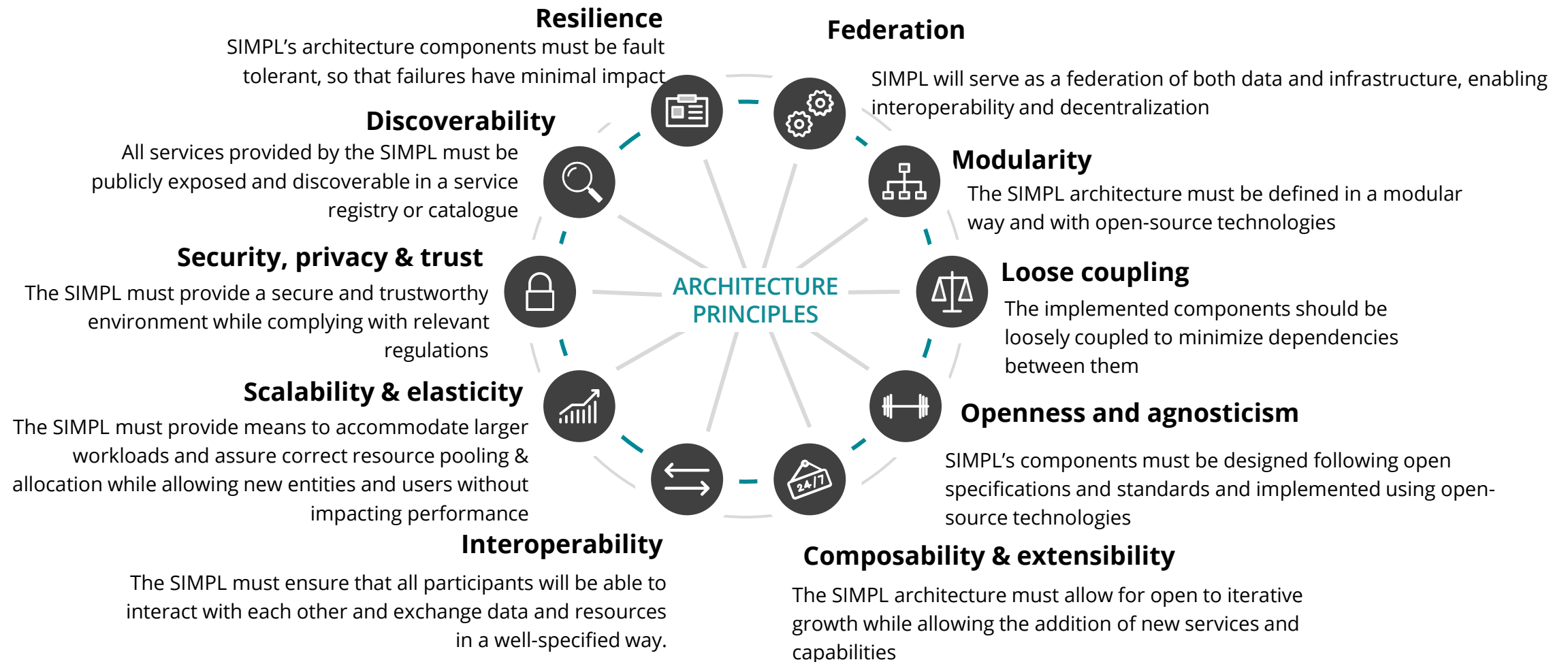
- Providing an open-source framework that makes it easier and more efficient to build, customize, and deploy data spaces
- Covering a broad range of cases **from sectoral data spaces** (e.g. Agriculture, Genomics, Energy, Mobility) to **Destination Earth**, and from **AI-on-demand** to the **European Open Science Cloud (EOSC)**.
- **SIMPL** will ensure that data sources and their infrastructures can be seamlessly interconnected and made interoperable.



More info and preparatory work available at: [Simpl: cloud-to-edge federations and data spaces made simple](#)

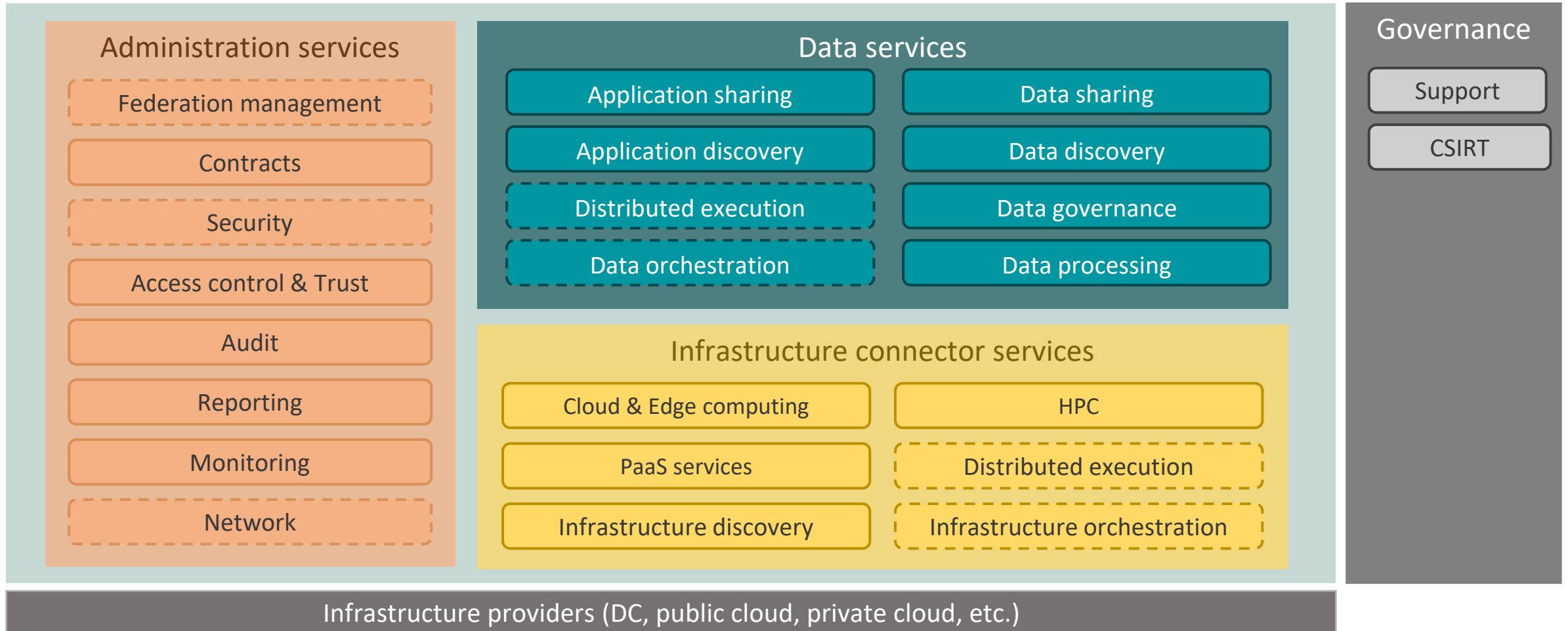
SIMPL Architecture Principles

Ten guiding principles for designing the architecture of the open-source smart middleware platform



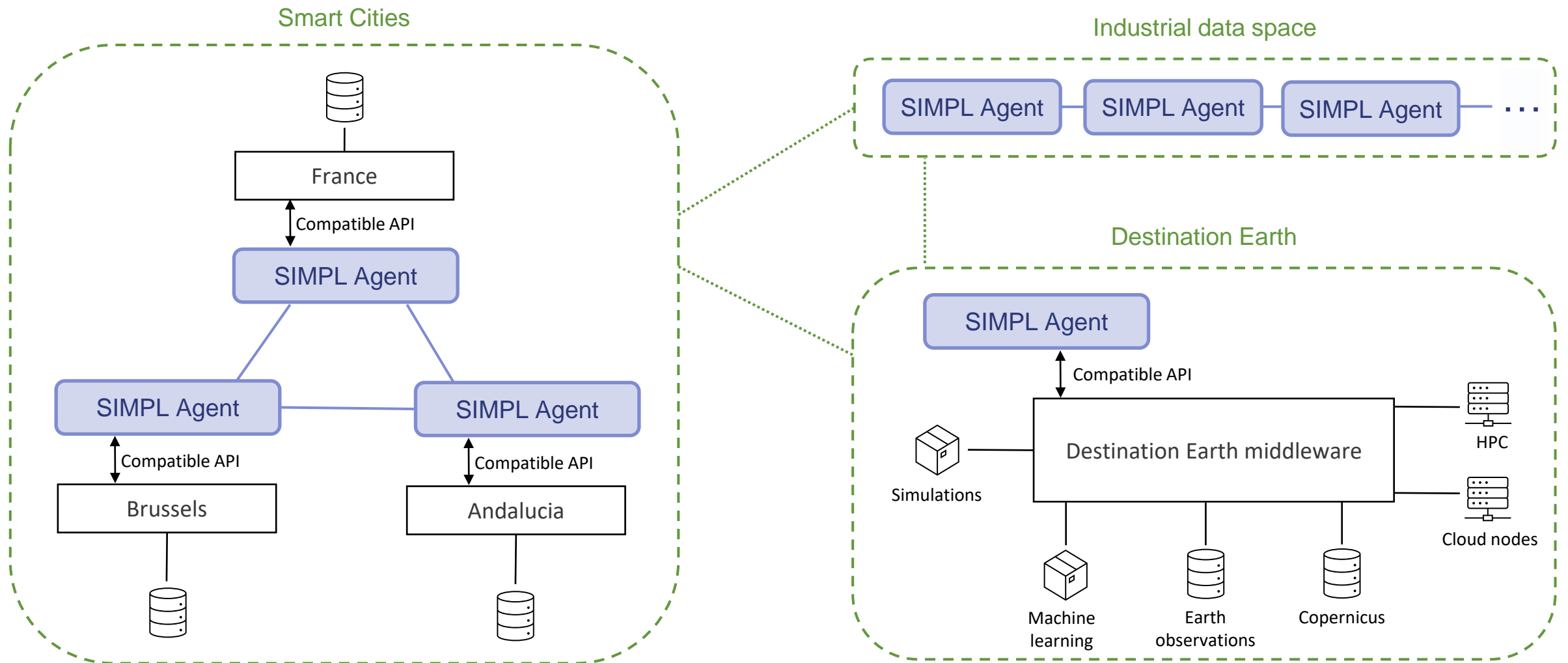
SIMPL Conceptual Architecture

Four architectural layers describe the capabilities of the Smart Middleware Platform



DestinE and SIMPL

An **example** deployment of different initiatives and data spaces using SIMPL - Smart Middleware **among** and **within** data spaces



Destination Earth – implementation roadmap



More information on:

- <https://destination-earth.eu/>
- <https://digital-strategy.ec.europa.eu/en/policies/destination-earth>
- <https://digital-strategy.ec.europa.eu/en/library/destination-earth>
- <https://digital-strategy.ec.europa.eu/en/library/destination-earth-factsheet>
- DestinE video: <https://www.youtube.com/watch?v=FKVHZIGqEyw>

#DigitalEU #DestinE #DigitalDecade #DigitalEUProgramme #EUGreenDeal



Thank you!