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Cloud-Edge-IoT Orchestration

Trend/Paradigm Shift: from Cloud to Edge
Bringing compute resources closer to the data

Far Edge / IoT	Edge	Cloud / HPC
Smart Device	Cloud	Infrastructure

Federating far edge resources ad hoc via wireless (5G, mesh)
to provide cloud resources close to the edge

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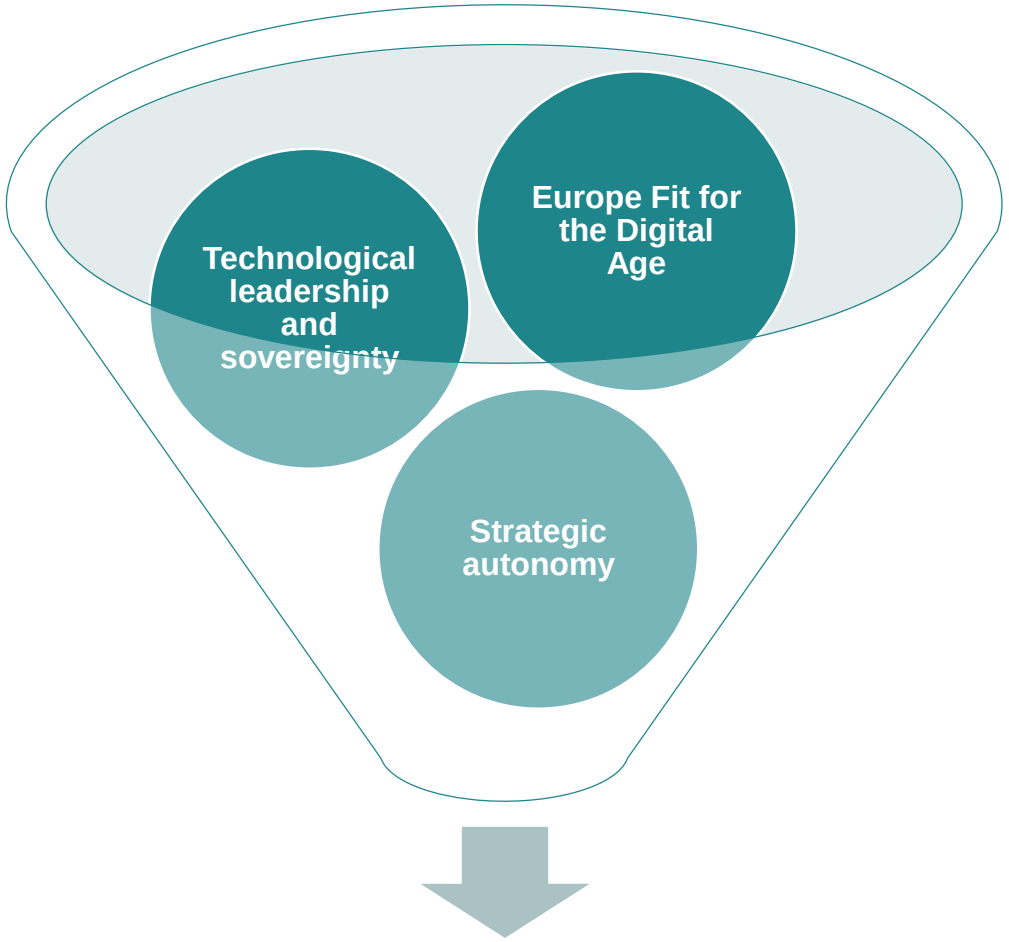
Some guiding principles



European Strategy for Data

A more strategic approach to enable stakeholders to gather, store, pool, share and analyse data securely

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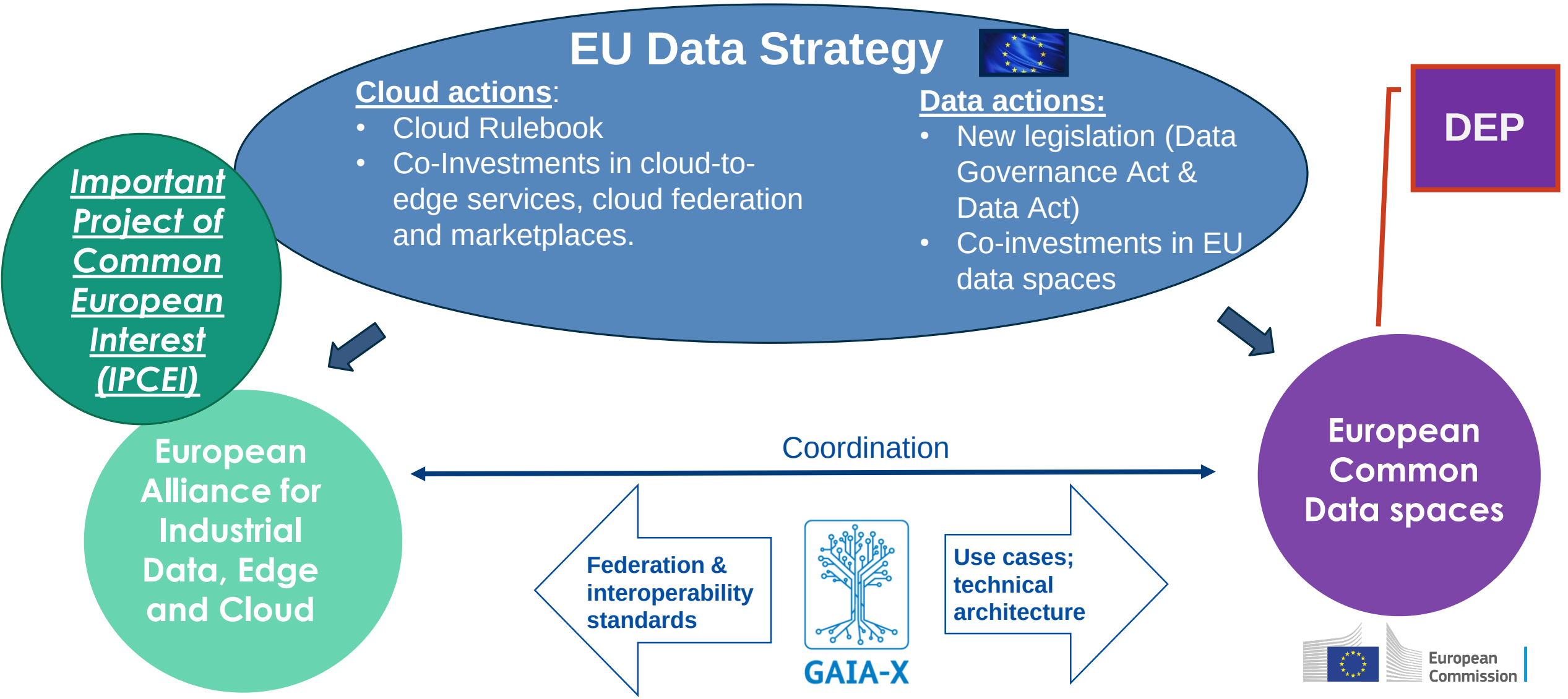
A European Data Strategy



A Strategic Approach for Cloud-Edge-IoT

US/CN Large Cloud Service Providers

Cloud

Computing Continuum

Edge

Far Edge/Device

EU HW/SW Companies, Service Providers and System Integrators

Horizontal Research

Vertical Research and Innovation

Open Source for Cloud Based services
(2022, TRL 2-5, 4-8M€)

- Virtual environments, methods and tools for deployment of full Open Source stacks compiled for new processing architectures
- OS distribution coordination (new target architectures)
- Open hardware interfaces for new processing architectures
- Basic initialization software up to the OS boot

Environments and tools for Decentralised Intelligence at the edge
(2022, TRL 2-5, 4-8M€)

- Programming environments for groups of devices
- Swarm intelligence
- Tactile Internet
- Reduce complexity
- AI-based tools
- Interoperability: no vendor lock-in
- Reusability
- Agility

Future European Platforms for the Edge: Meta Operating Systems
(2021, TRL 4-5, 8-12 M€)

- "Meta" operating Systems: to orchestrate edge & devices
- Strong computing capacity @ edge and far edge
- Intelligence at egde/device
- Modularity/Containerisation
- Refactoring/Encapsulasation of legacy
- Separate data/cloud/app
- Virtualisation of HW
- Resource efficiency
- AI inference/real-time support
- App aggregators
- Trusted Computing Base

Cognitive Cloud Framework: AI-enabled Computing Continuum from Cloud to Edge
(2022, TRL 2-6, 4-6M€)

- Continuum management
- Multi-Cloud approach
- AI-based techniques
- Optimisation data/compute
- Dynamic load balancing
- Seamless integration from cloud to far edge
- Security and data privacy
- Energy efficiency

CSAs: Co-ordination and roadmapping

Emerging Smart Industrial IoT and Edge Computing Systems (**2023 - planned**):

- Gradual up-take of emerging concepts
- Instantiation
- Customisation
- Scalability
- Exploring the limits
- Integration in open sectoral platforms
- Ecosystems
- Use cases and pilots
- Energy, Home, Industry 4.0, Mobility, Agriculture, Health, Smart Communities

Next generation embedded microprocessors

Smart Edge / Devices

Connectivity: 5G, ZIGBEE, BT, WLAN, LPWA

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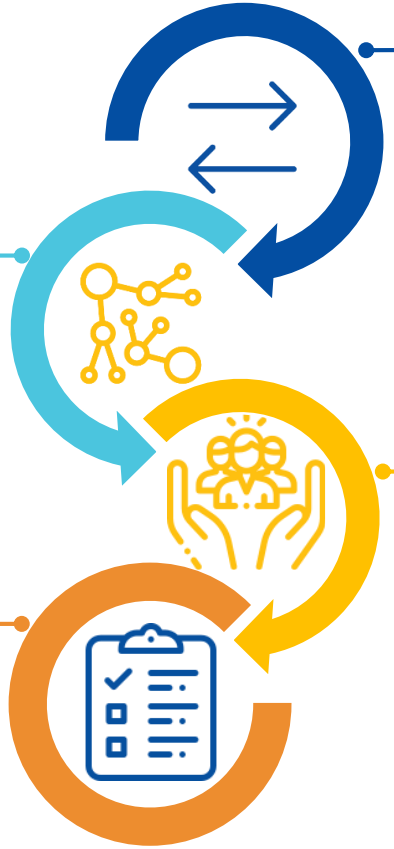
A European Strategy for Data
- Towards a single European data space -

Encouraging the creation of common European data spaces in nine crucial sectors: health, environment, energy, agriculture, mobility, finance, manufacturing, public administration, and skills.



Data can flow within the EU and across sectors

Free Flow of non-Personal Data Regulation

Availability of high quality data to create and innovate

European rules and values are fully respected

GDPR

Rules for access and use of data are fair, practical and clear & clear data governance mechanisms are in place

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Common European data spaces

Health

Industrial & Manufacturing

Agriculture

Finance

Mobility

Green Deal

Energy

Public Administration

Skills

High Value Datasets from public sector

- Driven by stakeholders
- Rich pool of data of varying degree of openness
- Sectoral data governance (contracts, licenses, access rights, usage rights)
- Technical tools for data pooling and sharing

Data Spaces Support Centre

- Coordinating the development of data spaces
- Assuring common standards and interoperability

Technical infrastructure for data spaces

Edge & cloud Services

Smart Middleware solutions

Marketplace

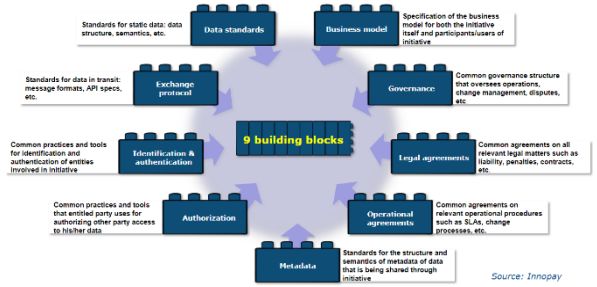
High-Performance Computing

AI on demand platform

AI Testing and Experimentation Facilities

OpenDEI: Design Principles for Data Spaces

- High-level architecture of data space
- Four Design Principles
- Nine building blocks - technical/technological, business, and organisational/operational
- Sector-specific data spaces - manufacturing, health, energy, and agriculture
- Governance and business models
- Roadmap for co-creating the soft infrastructure underlying European data spaces,
- Data Spaces supported by an Ecosystem



Courtesy: IDSA, InnoPay, **OPEN DEI CSA**
https://www.opendei.eu/

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Minimum Interoperability

- **Minimal Interoperability Mechanisms** (MIMs) or **Minimum Viable Product** principles are the minimal but sufficient capabilities needed to achieve (“good enough”) interoperability of data, systems, and services.
- Case in point - SynchroniCity - Scaling up with the power of MIMs AI-and IoT-enabled market-ready services: 50 services in 21 cities (synchronicity-iot.eu)
- Focusing on cross-domain interoperability - cross connecting silos
- Easy, simple, quick and cheap to implement and easy to test for compliance
- No new standards where standards exist - NGSI LD, SAREF(4Cities), etc.
- Pivotal Points of interoperability
- Development of a viable market – cutting costs, minimising risk and preventing vendor lock-in

CEF Digital Operational Digital Platforms (ODPs)

CEF-DIG-2021-TA-PLATFORMS

ODPs are physical and virtual information communication technology resources, operating via the communication infrastructure, which support the flow, storage, processing and analysis of transport or energy infrastructure data, or both.

Objectives/Expected outcomes

- Support the **EU environmental, energy and digitalization** targets
- **"Retro-fitting"** existing **energy and/or transport infrastructures** with cross-border **digital** infrastructure.
- Build on **European data, cloud and edge computing and connectivity infrastructures**

Scope/Activities

- Two-phases: a preparatory **Coordination and Support Action** (to identify the **most appropriate cases** and deliver the **building blocks)** and a follow-up **works project(s)** for **immediate** deployment
- **Four stages** to be implemented within 27 months' period, as follows:
  1. **Exploratory study** to prepare the baseline and identify and shortlist lead use cases
  2. **Feasibility study** for six shortlisted cases
  3. **Detailed preparations** for three shortlisted cases
  4. **Assistance to projects** coming from the first call for works

Maximum Co-Funding Rate:

100%

Consortium should be well **balanced** and cover the three CEF sectors i.e. **digital, transport and energy**

Indicative **budget**: **EUR 4 Million**

Deadline for submission: 22 March 2022 – 17:00:00 CET (Brussels)

Web link: call-fiche_cef-dig-2021-ta_en.pdf (europa.eu)

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Thank you

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