Horizon Europe 2021-2027

First look at the research opportunities in Horizon Europe WP 2021 - 2022

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Outline

- European Strategy on Data
  - European Data Governance – Data Governance Act – Data Altruism
- Horizon Europe 2021-2027 Overview: SDG, Mission Areas, Pillars, Clusters
- AI, Digitalisation and Data Governance and Management in Horizon Europe Programme
  - Based on WP 2021-2022 draft Annex 7. Digital, Industry and Space
  - Destination 3 – World Leading Data and Computing Technologies
  - Destination 6 – A Human-centered and Ethical Development of Digital and Industrial Technologies
- Related EU initiatives and documents
  - European Data Spaces and Data Sharing
  - European Policy on Cloud Computing: Migration to cloud and cloud compliance
  - European Strategy on Artificial Intelligence
- Summary and Discussion
- Additional information
  - Industrial Data Spaces
  - IDSA Reference Architecture Model and Data Sovereignty

A European strategy for data COM(2020) 66 final, 19.02.2020

https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0066

- The European data space will give businesses in the EU the possibility to build on the scale of the Single market. Common European rules and efficient enforcement mechanisms should ensure that:
  - Data can flow within the EU and across sectors;
  - European rules and values, in particular personal data protection, consumer protection legislation and competition law, are fully respected;
  - Rules for access to and use of data are fair, practical and clear, and there are clear and trustworthy data governance mechanisms in place;
    - there is an open, but assertive approach to international data flows, based on European values.

European Data Governance

https://ec.europa.eu/digital-single-market/en/european-data-governance

The economic value of data sharing

- Data access and reuse can generate **social and economic benefits of 1% to 2.5%** of GDP[1].
- The new measures could **increase the annual economic value** of data sharing by up to €7-11 billion by 2028[2].
- In addition, the new rules will have a **wider impact on the EU economy and society** as a whole:

€1.3 trillion

in increased productivity in **manufacturing** through **Internet-of-Things data** by 2027[3]

€120 billion

of savings per year in the **EU health sector**[4]

The EU will boost the development of **trustworthy data-sharing systems:**

- Empower **Europeans** to decide what happens to their data, and what data they would like to share with whom.
- Facilitate **data altruism** to make it easier and safer for companies and individuals to voluntarily make their data available for the benefit of society.
- Enhance the **reuse** of public sector data that cannot be made available as open data.
- Create **new EU rules on neutrality** to allow novel data intermediaries to function as trustworthy organisers of data sharing.
- Set up a **European Data Innovation Board** to steer data governance and prioritise standards.

- Data sharing as a goal

Regulation on European Data Governance (Data Governance Act), Nov 2020

- EU/Parliament Regulation on European data governance (Data Governance Act) SEC(2020) 405 final, Nov 2020, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020PC0767
  - ‘data’ means any digital representation of acts, facts or information and any compilation of such acts, facts or information, including in the form of sound, visual or audiovisual recording;
- The regulation will also support the set-up and development of common European data spaces in strategic domains, involving both private and public players: health, environment, energy, agriculture, mobility, finance, manufacturing, public administration and skills.
- Facilitate Sharing and Re-use of Data
  - new way of data governance will increase trust in data sharing, strengthen mechanisms to increase data availability and overcome technical obstacles to the reuse of data.

European Data Governance: Goal

- Making public sector data available for re-use, in situations where such data is subject to rights of others.
  - "Data the use of which is dependent on the rights of others" or "data subject to the rights of others" covers data that might be subject to data protection legislation, intellectual property, or contain trade secrets or other commercially sensitive information.
- Sharing of data among businesses, against remuneration in any form.
- Allowing personal data to be used with the help of a 'personal data-sharing intermediary', designed to help individuals exercise their rights under the General Data Protection Regulation (GDPR).
- Allowing data use on *altruistic* grounds.

European Data Governance – Covered Aspects

- General aspects
  - (a) conditions for the re-use, within the Union, of certain categories of data held by public sector bodies;
  - (b) a notification and supervisory framework for the provision of data sharing services;
  - (c) a framework for voluntary registration of entities which collect and process data made available for altruistic purposes.
- Re-use of certain categories of ***protected data*** held by public sector bodies which are protected on grounds of:
  - (a) commercial confidentiality ;
  - (b) statistical confidentiality;
  - (c) protection of intellectual property rights of third parties;
  - (d) protection of personal data.
- Requirements to data sharing services and providers
- Data Altruism and organisations

Data Governance Act: Data Altruism Defined

- ‘data altruism’ means the consent by data subjects to process personal data pertaining to them, or permissions of other data holders to allow the use of their non-personal data without seeking a reward, for purposes of general interest, such as scientific research purposes or improving public services;
  - data voluntarily made available by individuals or companies for the common good
- European data altruism consent form should be developed and used in the context of altruistic data sharing.
  - there should be a possibility for sectoral adjustments of the European data altruism consent form
- EC regulation establishes the possibility for organisations engaging in data altruism to register as a ‘Data Altruism Organisation recognised in the EU’ in order to increase trust in their operations.
- In addition, a common European data altruism consent form will be developed to lower the costs of collecting consent and to facilitate portability of the data (where the data to be made available is not held by the individual).
- Data Altruism Organisations recognised in the Union should be able to collect relevant data directly from natural and legal persons or to process data collected by others. Typically, data altruism would rely on consent of data subjects

Data Governance Act: Chapter IV Data Altruism

Article 15 Register of recognised data altruism organisations

- (2) The Commission shall maintain a Union register of recognised data altruism organisations.
- (3) An entity registered in the register in accordance with Article 16 may refer to itself as a 'data altruism organisation recognised in the Union' in its written and spoken communication.

Article 16 General requirements for registration

In order to qualify for registration, the data altruism organisation shall:

- (a) be a legal entity constituted to meet objectives of general interest;
- (b) operate on a not-for-profit basis and be independent from any entity that operates on a for-profit basis;
- (c) perform the activities related to data altruism take place through a legally independent structure, separate from other activities it has undertaken.

Article 22 European data altruism consent form

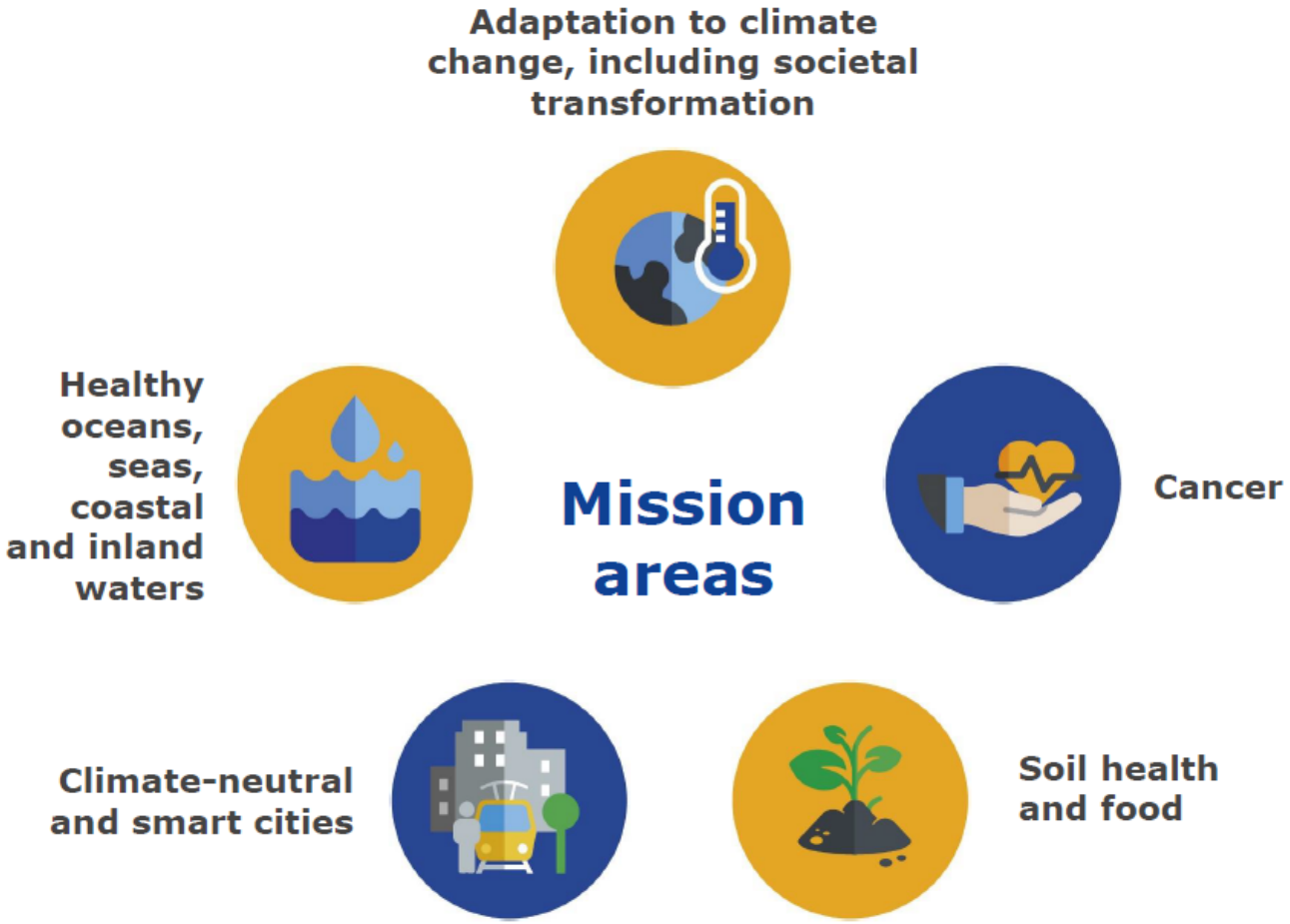
- Where personal data are provided, the European data altruism consent form shall ensure that data subjects are able to give consent to and withdraw consent from a specific data processing operation in compliance with the requirements of Regulation (EU) 2016/679.

Horizon Europe Preparation and Concepts

- Mission-oriented research and innovation in the European Union
- Focus on UN 17 SDG discussed during preparation stage

5 Mission areas in HE

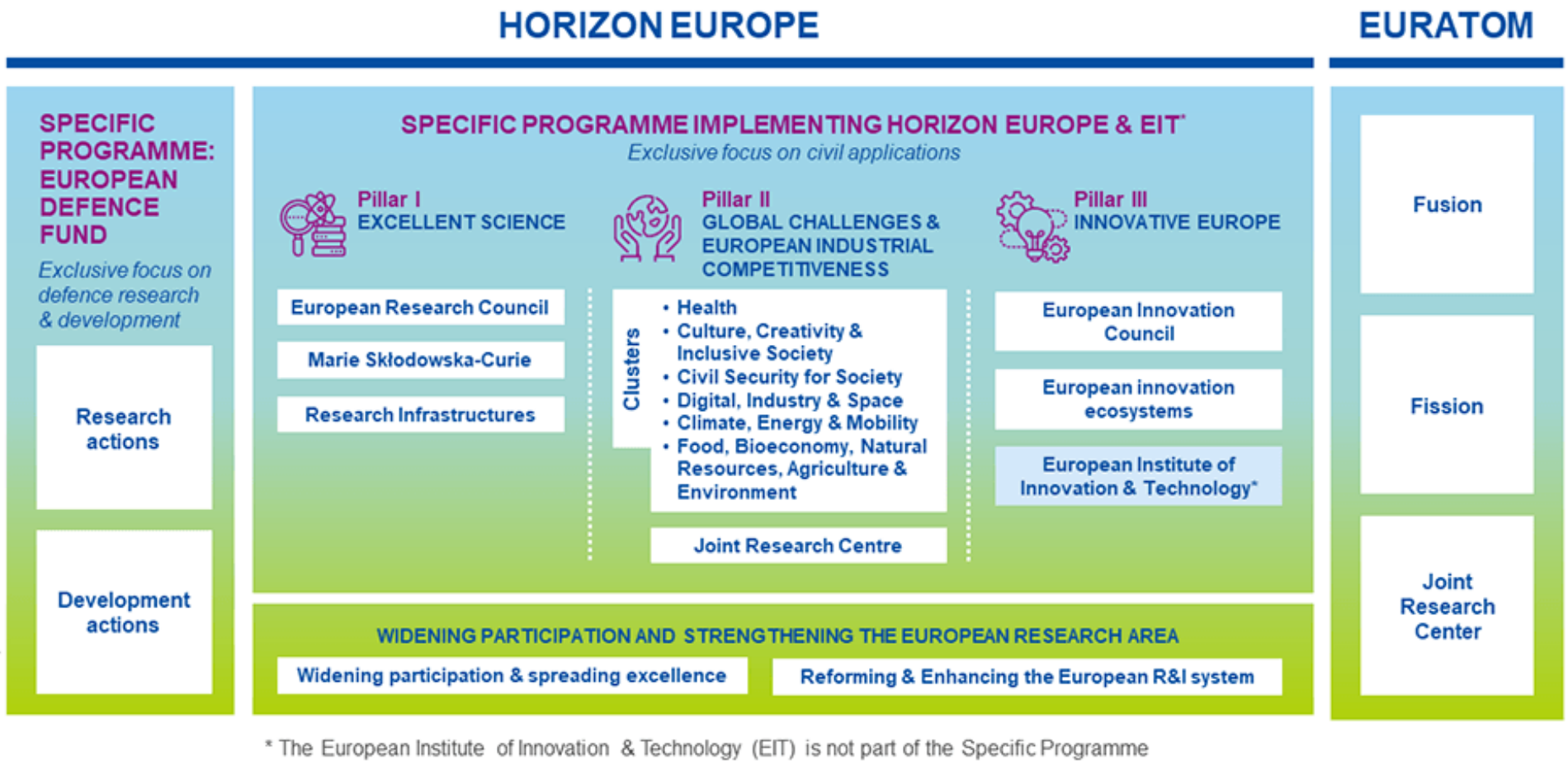
- Adaptation to climate change including societal transformation
- Cancer
- Climate-neutral and smart cities
- Healthy oceans, seas, coastal and inland waters
- Soil health and food



Horizon 2020 vs Horizon Europe

Recommendations interim evaluation	
Support breakthrough innovations	Launch of the European Innovation Council
Create more impact through mission-orientation and citizen's involvement	5 missions in the research and innovation area
Strengthen international cooperation	Extended association possibilities
Increase openness	Adoption of Open Science policies
Rationalise funding possibilities	3 types of partnerships for more efficiency

Horizon Europe Programme Structure



* The European Institute of Innovation & Technology (EIT) is not part of the Specific Programme

- Health
- Culture, Creativity & Inclusive Society
- Civil Security for Society
- **Digital, Industry & Space**
- Climate, Energy & Mobility
- Food, Bioeconomy, Natural Resources, Agriculture & Environment

Pillar 1: Excellent Science: Reinforcing and extending the excellence of the Union's science base

European Research Council

- Frontier research by the best researchers and their teams

Commission proposal:
€ 16.6 billion

Marie Skłodowska-Curie Actions

- Equipping researches with new knowledge and skills through mobility and training

Commission proposal:
€ 6.8 billion

Research Infrastructures

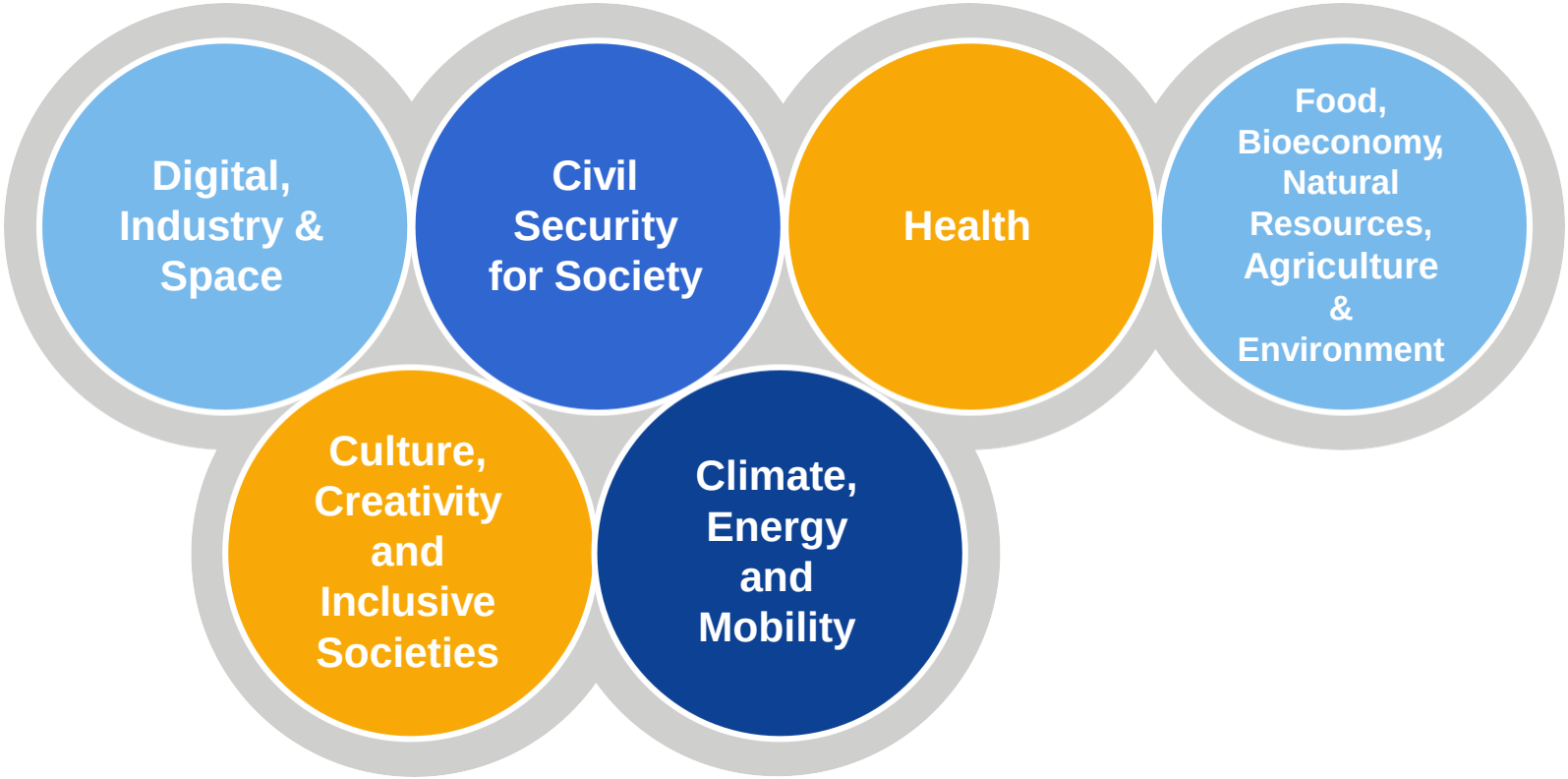
- Integrated and inter-connected world-class research infrastructures

Commission proposal:
€ 2.4 billion

Pillar 2 – Clusters: Global Challenges & European Industrial Competitiveness Performed under Joint Research Centre by European Research Council

Boosting key technologies and solutions underpinning EU policies & Sustainable Development Goals

Commission proposal for budget: € 52.7 billion



- Cluster 1 - Health
- Cluster 2 – Culture and Creativity
- Cluster 3 – Civil Security for Society
- Cluster 4 – Digital, Industry, Space
- Cluster 5 – Climate. Energy, Mobility
- Cluster 6 – Food and Natural Resources

Pillar 3: Innovative Europe

- Bringing deep tech innovation to Europe
- European Innovation Council
  - Yearly work programmes
  - Programme managers
  - Rebuttal
  - AI tool Transparency
  - Fast Track
  - Business Acceleration Services

Annex 7. Horizon Europe. Digital, Industry and Space. Work Programme 2021-2022

Annex 7. Horizon Europe. Work Programme 2021-2022 - Digital, Industry and Space

- DESTINATION 1 – CLIMATE NEUTRAL, CIRCULAR AND DIGITISED PRODUCTION
  Call - TWIN GREEN AND DIGITAL TRANSITION 2021
- DESTINATION 2 – INCREASED AUTONOMY IN KEY STRATEGIC VALUE CHAINS FOR RESILIENT INDUSTRY
  Call - A DIGITISED, RESOURCE-EFFICIENT AND RESILIENT INDUSTRY 2021
- DESTINATION 3 – WORLD LEADING DATA AND COMPUTING TECHNOLOGIES 169
- DESTINATION 4 – DIGITAL AND EMERGING TECHNOLOGIES FOR COMPETITIVENESS AND FIT FOR THE GREEN DEAL 187
- DESTINATION 5 – OPEN STRATEGIC AUTONOMY IN DEVELOPING, DEPLOYING AND USING GLOBAL SPACE-BASED INFRASTRUCTURES, SERVICES, APPLICATIONS AND DATA
- DESTINATION 6 – A HUMAN-CENTRED AND ETHICAL DEVELOPMENT OF DIGITAL AND INDUSTRIAL TECHNOLOGIES

DESTINATION 3 – WORLD LEADING DATA AND COMPUTING TECHNOLOGIES – Publication 15 April 2021, Deadline 31 August 2021

DESTINATION 3 – WORLD LEADING DATA AND COMPUTING TECHNOLOGIES

- Call - WORLD LEADING DATA AND COMPUTING TECHNOLOGIES 2021
- Data sharing in the common European data spaces
  - Technologies and solutions for compliance, privacy preservation, green and responsible data operations (RIA)
  - **Technologies for data management (IA)**
- Strengthening Europe's data analytics capacity
  - Extreme data mining, aggregation and analytics technologies and solutions (RIA)
- From Cloud to Edge to IoT for European Data
  - Future European platforms for the Edge: Meta Operating Systems (RIA)

DESTINATION 3 – WORLD LEADING DATA AND COMPUTING TECHNOLOGIES – 172 Mln

DESTINATION 3 – WORLD LEADING DATA AND COMPUTING TECHNOLOGIES

- Call - WORLD LEADING DATA AND COMPUTING TECHNOLOGIES 2021
- Data sharing in the common European data spaces
  - HORIZON-CL4-2021-DATA-01-01: Technologies and solutions for **compliance, privacy preservation, green and responsible data operations** (RIA) – total 52Mln / 10Mln prj
  - HORIZON-CL4-2021-DATA-01-03: **Technologies for data management (IA)** – total 31Mln / 5Mln
- Strengthening Europe's data analytics capacity
  - HORIZON-CL4-2021-DATA-01-04: Extreme data mining, aggregation and analytics technologies and solutions (RIA) – total 30Mln / 5Mln
- From Cloud to Edge to IoT for European Data
  - HORIZON-CL4-2021-DATA-01-05 Future European platforms for the Edge: Meta Operating Systems (RIA)
  - HORIZON-CL4-2021-DATA-01-07: Coordination and Support of the 'Cloud-Edge-IoT' domain (CSA)
  - HORIZON-CL4-2021-DATA-01-08: Roadmap for next generation computing and systems technologies (CSA)

HORIZON-CL4-2021-DATA-01-01: Technologies and solutions for **compliance, privacy preservation, green and responsible data operations** (RIA) – total 52Mln / 10Mln prj

- Activities are expected to start at TRL 2-3 and achieve TRL 4-5 by the end of the project

Expected Outcome: Project results are expected to contribute to the following expected outcomes:

- **improve the efficiency and the use of trustworthy digital technologies** to address the requirements of citizens, companies and administrations/public organisations on **privacy and commercial and administrative confidentiality** as well as responsible, fair and environmentally friendly (e.g. in terms of energy/carbon/material footprint) data operations in data spaces, across the data life cycle.

Scope: Digital technologies, methods, architectures and processes for user-friendly, safe, trustworthy, compliant, fair, transparent, accountable and environmentally sustainable collection, storage, processing, querying, analytics and delivery of data.

- The technologies shall **facilitate sharing and manipulation of data** in compliance with prevailing and emerging legislation (e.g. GDPR) for data processors and data subjects/rightholders and other stakeholders.
- The technologies and solutions shall **enable safe and secure data handling, sharing and re-use** in the context of common **European data spaces** in various situations and application areas.
- The scope also includes the combination of technological and social innovation, technologies and solutions that **enable environmentally sustainable data operations** (e.g. by optimising/minimising/de-centralising processing, transfer and storage of data and avoiding unnecessary data manipulations, using energy-harvesting sensors/devices etc.),
- Technologies and solutions for **ensuring human, fair and ethically sound collection, processing and manipulation of data**, in line with the principles of responsible/trustworthy AI.

Liaisons

- The actions under this topic shall **liaise** with relevant cyber-security actions under **Cluster 3 (Civil Security for Society)**. The actions shall build on Horizon 2020 actions on privacy-preserving technologies and **liaise** with appropriate actions from Horizon 2020 topic **ICT-13-2018-2019 (Data Markets)**, as well as with data-centric H2020 **European Research Infrastructures**.
- They shall also **liaise** with the **Data Spaces Support Centre** (to be set up under the Digital Europe programme), in order to provide methods and solutions for the emerging common European data spaces (to be deployed under the Digital Europe programme).
- Likewise, they shall **liaise** with other relevant **national, regional and trans-national initiatives such as Gaia-X and EOSC**, especially to ensure interoperability and reasonable re-use of common reference models, processes and building blocks for a **pan-European data infrastructure**.

(1) HORIZON-CL4-2021-DATA-01-01: Technologies and solutions for **compliance, privacy preservation, green and responsible data operations** (RIA) – total 52Mln / 10Mln prj

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Liaising and coordinating

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- Likewise, they shall **liaise** with other relevant **national, regional and trans-national initiatives such as Gaia-X and EOSC**, especially to ensure interoperability and reasonable re-use of common reference models, processes and building blocks for a **pan-European data infrastructure**.

Bootstrapping the Proposal: How to address the Call requirements in the Proposal

- Start from mapping the project Objectives and expected outcome to the call requirements and messages
  - What are conditional and what are desirable?
  - Define 3-4 Objectives, not more
  - Provide information where the Objectives are addressed
- Use this exercise to structure WPs and invite partners

Objective	Call Requirements	Expected Result and where it is addressed in WP# or Task #.#
Objective 1 Description		R1.1 Text R1.2 Text
Objective 2 Description		
Objective 3		

HORIZON-CL4-2021-DATA-01-03: **Technologies for data management (IA)** – total 31Mln / 5Mln

- Activities are expected to start at TRL 5 and achieve TRL 8 by the end of the project

Expected Outcome: Project results are expected to contribute to the following expected outcomes:

- provide new secure and energy-efficient data management tools improving the usability and discoverability of data in different contexts, covering data provenance, synthetic data generation, data quality management (such as data cleaning, validation, enrichment, co-creation, identification of bias and correlations), improving data interoperability, metadata management (automated ways of labelling and describing data, data linkage), and ensuring data security, privacy and integrity, especially in the context of data spaces.

Scope: The actions under this topic are expected to provide practical, robust and scalable tools to improve the interoperability, quality, and integrity of data and metadata, in the context of other topics of the heading “Data sharing in the common European data space”.

- The data management tools and systems shall support a holistic approach of the data life cycle and comply with accountability, fairness and confidentiality as well as the FAIR principles (Findable, Accessible, Interoperable, Reusable) for data and metadata management.
- Building on results of relevant past and current initiatives, data management tools, systems and processes **shall enable**, support and/or automate the creation and maintenance of common ontologies, vocabularies and data models and/or structured, standardised and automated authoring, co-creation, curation, annotation and labelling of data, in view of different later uses (especially AI) made of the data.
- The actions are expected to **create links** with relevant initiatives collecting/using heterogeneous/linguistic data, including AI initiatives (such as AI4EU, European Language Grid, or the projects from the H2020 topic ICT-48 – AI on-demand platform), and **liaise** with standardization bodies.
- Actions are expected to **deal with gaps** and needs identified in real-world data space management and real-world data heterogeneity challenges (encoding formats, multiple languages, collection mechanisms, access methods, etc.), supporting, where necessary, hybrid/adaptive approaches and models, leading to robust, reliable and automated annotation of unstructured data sources.
- The tools shall contribute to **minimization of the energy footprint**, be adaptable to different user needs and support and encourage new business models and (where appropriate) citizen involvement and social innovation.
- The tools shall be demonstrated by **diverse use cases**. Provision of open source tools is encouraged to contribute to outreach and impact.

Call - WORLD LEADING DATA AND COMPUTING TECHNOLOGIES 2022 – 23 Nov 2021 / 5 April 2022 – 176.5 Mln

- Data sharing in the common European data spaces
  - **HORIZON-CL4-2022-DATA-01-04: Technologies and solutions for data trading, monetizing, exchange and interoperability (IA)**
- Strengthening Europe's data analytics capacity
  - HORIZON-CL4-2022-DATA-01-01: Methods for exploiting data and knowledge for extremely precise outcomes (analysis, prediction, decision support), reducing complexity and presenting insights in understandable way (RIA)
- From Cloud to Edge to IoT for European Data
  - HORIZON-CL4-2022-DATA-01-02: Cognitive Cloud: AI-enabled computing continuum from Cloud to Edge (RIA)
  - HORIZON-CL4-2022-DATA-01-03: Programming tools for decentralised intelligence and swarms (RIA)

HORIZON-CL4-2022-DATA-01-04: Technologies and solutions for data trading, monetizing, exchange and interoperability (RIA) – 30 mln/5 mln

- Activities are expected to start at TRL 3 and achieve TRL 5 by the end

Expected Outcome: Project results are expected to contribute to the following expected outcomes:

- provide better **technologies, tools and solutions for** data mining (searching and processing) of large, constantly growing amounts and varieties of data, and/or extremely sparse/dispersed/heterogeneous/multilingual data (stored centrally or in distributed/decentralized systems), in particular IoT, industrial, business, administrative, environmental, scientific or societal data.

Scope: The actions under this topic are expected to provide ground-breaking advances in the performance (speed and/or, accuracy) and usefulness of data discovery, collection, mining, filtering and processing in view of coping with “extreme data”: (defined as data that exhibits one or more of the following characteristics, to an extent that makes current technologies fail: increasing volume, speed, variety; complexity/diversity/multilinguality of data; the dispersed data sources; sparse/missing/insufficient data/extreme variations in values).

The technologies and solutions shall be able to discover and distil meaningful, reliable and useful data from heterogeneous and dispersed/scarce sources and deliver it to the requesting application/user with minimal delay and in the appropriate format. In particular, the advances shall enable the development of **trustworthy, accurate, green and fair AI systems** where quality of data is as important as quantity and/or support industrial distributed decision-making tasks at appropriate level in the computing continuum (edge/fog/cloud).

The results are intended for human use, take into account the relevant human aspects and interactions with users.

The actions should address the **integration of relevant technologies** (e.g. big data, AI, IoT, HPC, edge/fog/cloud computing, language technologies, cybersecurity, telecommunications, autonomous systems…) as a means towards achieving the goals, and foster links to the respective research, industrial and user/innovator communities (e.g. AI4EU, digital innovation hubs).

DESTINATION 6 – A HUMAN-CENTRED AND ETHICAL DEVELOPMENT OF DIGITAL AND INDUSTRIAL TECHNOLOGIES

- Leadership in AI based on trust
  - HORIZON-CL4-2021-HUMAN-01-01: Verifiable robustness, energy efficiency and transparency for Trustworthy AI: Scientific excellence boosting industrial competitiveness (RIA)
  - AI to fight disinformation (RIA)
- **An Internet of Trust**
  - **HORIZON-CL4-2021-HUMAN-01-04: Trust & data sovereignty on the Internet (RIA) – 10 Mln (only 1 project)**
  - HORIZON-CL4-2021-Trustworthy open search and discovery (RIA)
  - NGI International Collaboration - Transatlantic fellowship programme (CSA)
  - eXtended Reality Modelling (RIA)
  - Piloting a new industry-academy knowledge exchange focusing on companies' needs (CSA)
  - **HORIZON-CL4-2021-HUMAN-01-26: Workforce skills for industry 5.0 (RIA)**

HORIZON-CL4-2021-HUMAN-01-04: Trust & data sovereignty on the Internet (RIA)

Project results are expected to contribute to the following expected outcomes:

- Increased trust, privacy and user control when exchanging and accessing personal data on the Internet.
- A trusted electronic identity ecosystem, fostering a universal, interoperable, accessible, and user-centric digital identity as a passport to the digital society.
- A European ecosystem of top internet innovators, with the capacity to set the course of the Internet evolution according to a human-centric approach.
- New business and sustainability models based on decentralised technologies and open source.

HORIZON-CL4-2021-HUMAN-01-26: Workforce skills for **Industry 5.0** (RIA) – 5 Mln

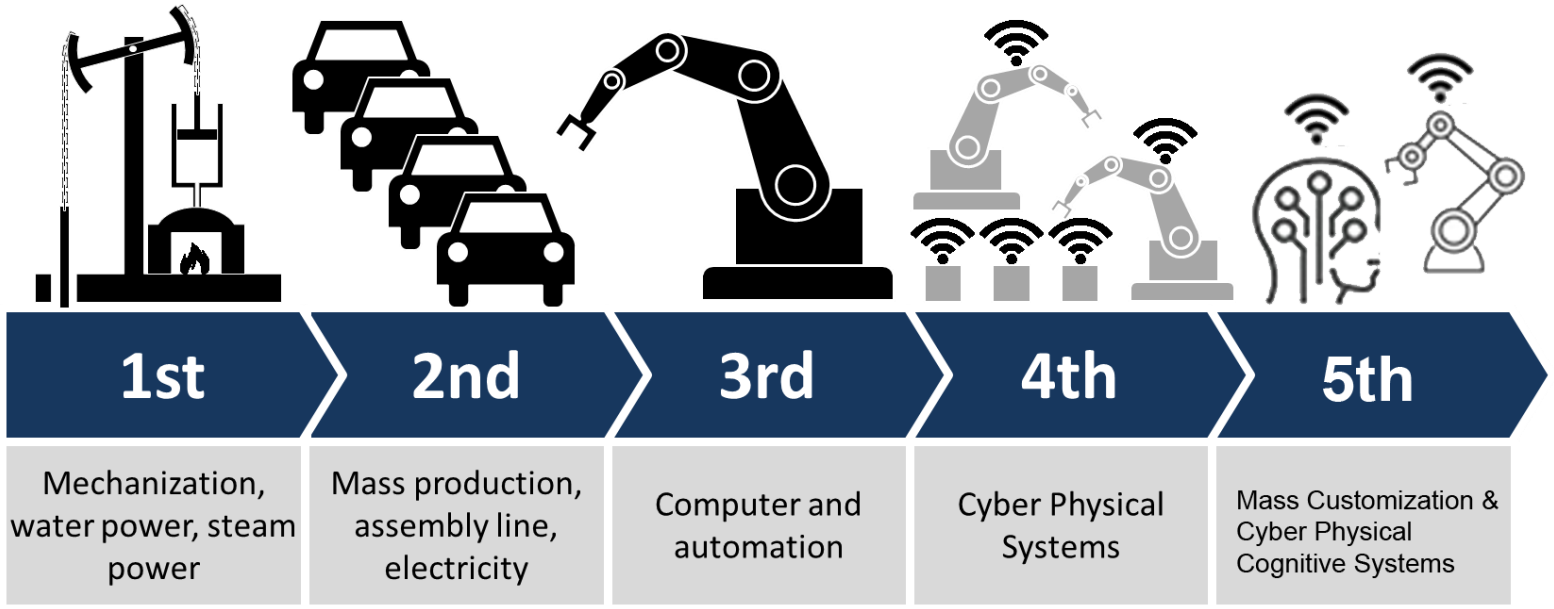
Projects are expected to contribute to the following outcomes:

- A quantitative and qualitative assessment of the nature of job transformations in the context of the 4th industrial revolution, estimating and mapping the emerging occupations. Establishment of an “Industry 5.0 platform” for future skill requirements improving the critical understanding of the ‘black box’ of new jobs creation;
- Guidance and recommendations, including avenues for new learning and training systems, for policy-makers, businesses, individuals, to reduce the skills’ gaps, to cope with possible unemployment effects, to foster industrial competitiveness while enhancing inclusiveness.

Scope:

- The 4th industrial revolution, has been associated with production efficiencies, cost reductions, streamlined labour requirements and business model adaptations.
- However, this is accompanied with social, economic and organizational challenges such income inequalities, public perception for job quality and scarcity, legal issues and data security.

Reference: Industry 5.0 | European Commission (europa.eu)



- Industry 5.0 is characterised by going beyond producing goods and services for profit. It shifts the focus from the shareholder value to stakeholder value and reinforces the role and the contribution of industry to society.
- It places the wellbeing of the worker at the centre of the production process and uses new technologies to provide prosperity beyond jobs and growth while respecting the production limits of the planet.
- It complements the existing "Industry 4.0" approach by specifically putting research and innovation at the service of the transition to a sustainable, human-centric and resilient European industry.

Related: Society 5.0 (according to Japan)
https://www8.cao.go.jp/cstp/english/society5_0/index.html

- Society 5.0 was proposed in **the 5th Science and Technology Basic Plan** as a future society that Japan should aspire to.
  - It follows the hunting society (Society 1.0), agricultural society (Society 2.0), industrial society (Society 3.0), and information society (Society 4.0).
- Definition: "A **human-centered society** that balances economic advancement with the resolution of social problems by a system that highly integrates cyberspace and physical space."

European Data Spaces as core concept in EC Data Policy

- European Data Spaces
- Prio - European Cloud Initiative

European Data Space

The European data space will give businesses in the EU the possibility to build on the scale of the Single market. Common European rules and efficient enforcement mechanisms should ensure that:

- data can flow within the EU and across sectors;
- European rules and values, in particular personal data protection, consumer protection legislation and competition law, are fully respected;
- the rules for access to and use of data are fair, practical and clear, and there are clear and trustworthy data governance mechanisms in place; there is an open, but assertive approach to international data flows, based on European values.

Key actions

- Propose a legislative framework for the governance of common European data spaces, Q4 2020
- Adopt an implementing act on high-value data-sets, Q1 2021
- Propose, as appropriate, a Data Act, 2021
- Analysis of the importance of data in the digital economy (e.g. through the Observatory of the Online Platform Economy), and review of the existing policy framework in the context of the Digital Services Act package (Q4 2020).

Industrial Data Spaces and Industry 4.0

- **Data monetization and data exchanges** today are hot topics on many levels, among others in the Internet of Things. Vendors are looking for IoT data monetization models.
- Data needs to be gathered, combined and shared for particular purposes, among others leveraging advanced analytics and in data-intensive circumstances also leveraging artificial intelligence.
  - Finally, all this data needs to be turned into actionable intelligence, (semi-)automated actions and ideally, *the essence of digital transformation*, into new services, platforms and revenue streams
- Industrial data exchanges for innovation
  - The exchange and sharing of data *(or access to it)* is key for innovation and transformation at scale and in the more mature stages of digital transformation.
- IoT data ecosystem for ecosystem-driven IoT data monetization for IoT device manufacturers and service providers and tackled how IoT data exchanges are the next IoT revolution.
- Probable data sovereignty, control and data security

European Data Space – Key Infrastructure Actions for Cloud

- Invest **in a High Impact project on European data spaces**, encompassing data sharing architectures (including standards for data sharing, best practices, tools) and governance mechanisms, as well as the European federation of energy-efficient and trustworthy cloud infrastructures and related services, with a view to facilitating combined investments of €4-6 billion, of which the Commission could aim at investing €2 billion.
  - First implementation phase foreseen for 2022;
- Sign Memoranda of Understanding with Member States on cloud federation, Q3 2020;
- Launch a European cloud services marketplace, integrating the full stack of cloud service offering, Q4 2022;
- Create an EU (self-)regulatory cloud rulebook, Q2 2022.

- International Data Spaces Association (IDSA) and Industrial Data Spaces Initiative

Industrial Data Spaces: Sharing Data

- Sharing and Sovereignty are key to make value of data
- Data Sovereignty achieved by attaching policy and usage conditions to data
- Enabling regulated environment for data processing
  - Enclave computing in modern cloud technology

European Policy on Cloud Computing

https://digital-strategy.ec.europa.eu/en/policies/cloud-computing

- The availability of both edge and cloud computing is essential in a computing continuum to ensure that data is processed in the most efficient manner.
  - Energy-efficient and trustworthy edge and cloud infrastructures will be fundamental for the sustainable use of edge and cloud computing technologies.
  - Whereas cloud computing happens mostly in large data-centres today, by 2025 this trend will reverse: 80% of all data is expected to be processed in smart devices closer to the user, known as edge computing.
  - Edge and Far Edge technologies and infra
- European Alliance on Industrial Data, Edge and Cloud to be established to facilitate development
  - Joint Investment in cross-border cloud infrastructures and services to build the next generation cloud supply
  - European marketplaces for cloud services, where users will have a single portal to cloud offerings meeting key EU standards and rules
  - EU Cloud Rulebook for cloud services, which will provide a single European framework of rules, transparency on their compliance and best practices for cloud use in Europe

European Policy on Cloud Computing: Related Initiaitves

- The **Regulation on the free flow of non-personal data**, together with the General Data Protection Regulation, raises legal certainty for cloud users by ensuring the free movement of all data in the EU.
- **Data portability:** the free flow of non-personal data Regulation also builds trust through facilitating a self-regulatory work on cloud switching and cloud security.
  - SWIPO data portability Codes of Conduct and the CSPCERT Recommendations for a candidate European cloud security certification scheme.
- **Cybersecurity:** at the request of the Commission, the European cybersecurity agency ENISA is working on a single European cybersecurity certification scheme for cloud services. The scheme will provide increased assurance to businesses, public administrations and citizens that their data is secure wherever they are stored or processed.
- **Data protection in the cloud:** the Commission has facilitated a platform for industry to develop Codes of Conduct for data protection in the cloud that are currently reviewed by the European Data Protection Board.
  - Processing of personal and non-personal data in the cloud - Guidance on mixed datasets**.** https://digital-strategy.ec.europa.eu/en/library/practical-guidance-businesses-how-process-mixed-datasets
- **Standardised Cloud Service Level Agreements (SLA)** that guarantee the quality of cloud services in the European market.
- **Cloud use by the financial sector:** Financial service providers increasingly use cloud services to remain competitive. There must be clear requirements in place for outsourcing agreements between financial entities and cloud service providers (as part of the Fintech Action Plan**)**
- **A European mapping of data flows** that will allow to assess the value of data flows to the European digital economy.

European Strategy for artificial intelligence

https://digital-strategy.ec.europa.eu/en/policies/strategy-artificial-intelligence

- WHITE PAPER On Artificial Intelligence - A European approach to excellence and trust, COM/2020/65 final
  https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020DC0065&from=EN
- Proposal for a Regulation laying down harmonised rules on artificial intelligence (Artificial Intelligence Act) – 21 April 2021 (108 pp + annex 17 pp)
  https://digital-strategy.ec.europa.eu/en/library/proposal-regulation-laying-down-harmonised-rules-artificial-intelligence-artificial-intelligence
- Trustworthy AI Self-assessment
  https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=68342
  1. Human Agency and Oversight;
  2. Technical Robustness and Safety;
  3. Privacy and Data Governance;
  4. Transparency;
  5. Diversity, Non-discrimination and Fairness;
  6. Societal and Environmental Well-being;
  7. Accountability

Additional Information

- Global trends on data sharing
- Industrial Data Spaces Association (IDSA)

Mixed, Personal and non-Personal data

https://europa.eu/youreurope/business/running-business/developing-business/using-storing-transferring-data/index_en.htm

- **What is non-personal data?**
  Non-personal data is information that **cannot** be linked to **an identified or identifiable person**, such as data:
  - generated as part of business processes (for example, business to business invoices)
  - generated by connected industrial devices (sensors communicating recorded data, such as for weather apps)
  - recorded for maintenance requirements (for example, industrial robots, streets, bridges etc.)
- **Personal data and mixed data sets**
  - The rules for dealing with personal data differ from those for non-personal data.
  - Personal and non-personal data are often collected and stored together; this is known as mixed data. If you handle mixed datasets, the same level of protection as personal data applies.

- **What is personal data?**
  Personal data is any information about an identified or identifiable person, also known as the **data subject**. Personal data includes information such as their:
  - name
  - address
  - ID card/passport number
  - income
  - cultural profile
  - Internet Protocol (IP) address
  - data held by a hospital or doctor (which uniquely identifies a person for health purposes).

Special categories of data

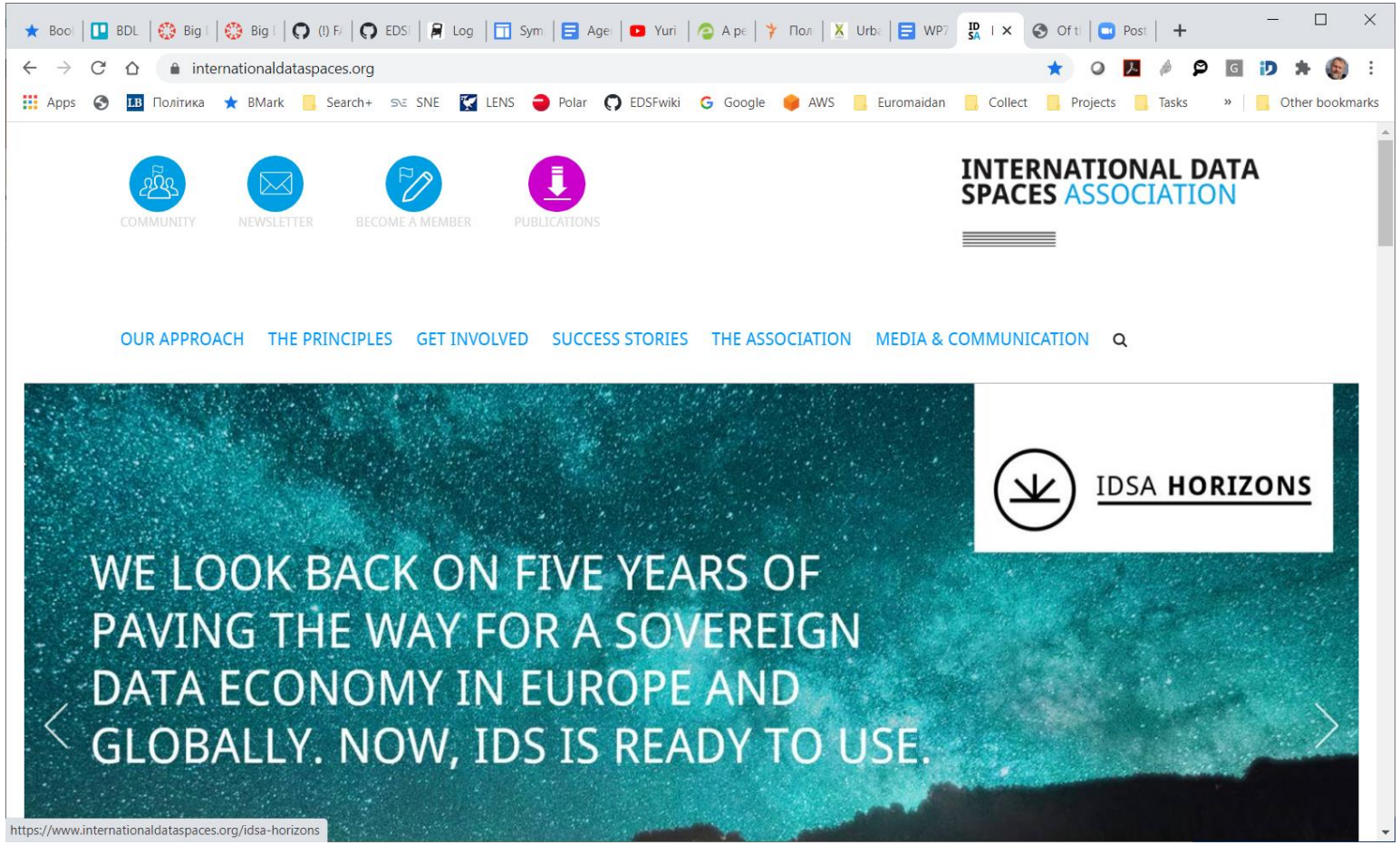
You may not process personal data about someone's:

- racial or ethnic origin
- sexual orientation
- political opinions
- religious or philosophical beliefs
- trade-union membership
- genetic, biometric or health data except in specific cases (e.g. when you've been given explicit consent or when processing is needed for reasons of substantial public interest, on the basis of EU or national law)
- personal data related to criminal convictions and offences unless this is authorised by EU or national law

Trends and Predictions for 2021+

- By 2022 companies will start formally/monetary assessing the value of their information assets
- By 2023 data literacy will be formally included into all strategies
- CDO role will strengthen, CDO will guide decision makers on effective use of data
-

International Data Spaces Association (IDSA)
https://www.internationaldataspaces.org/



- Industry focused
- IDSA Reference Architecture Model (RAM3.0)

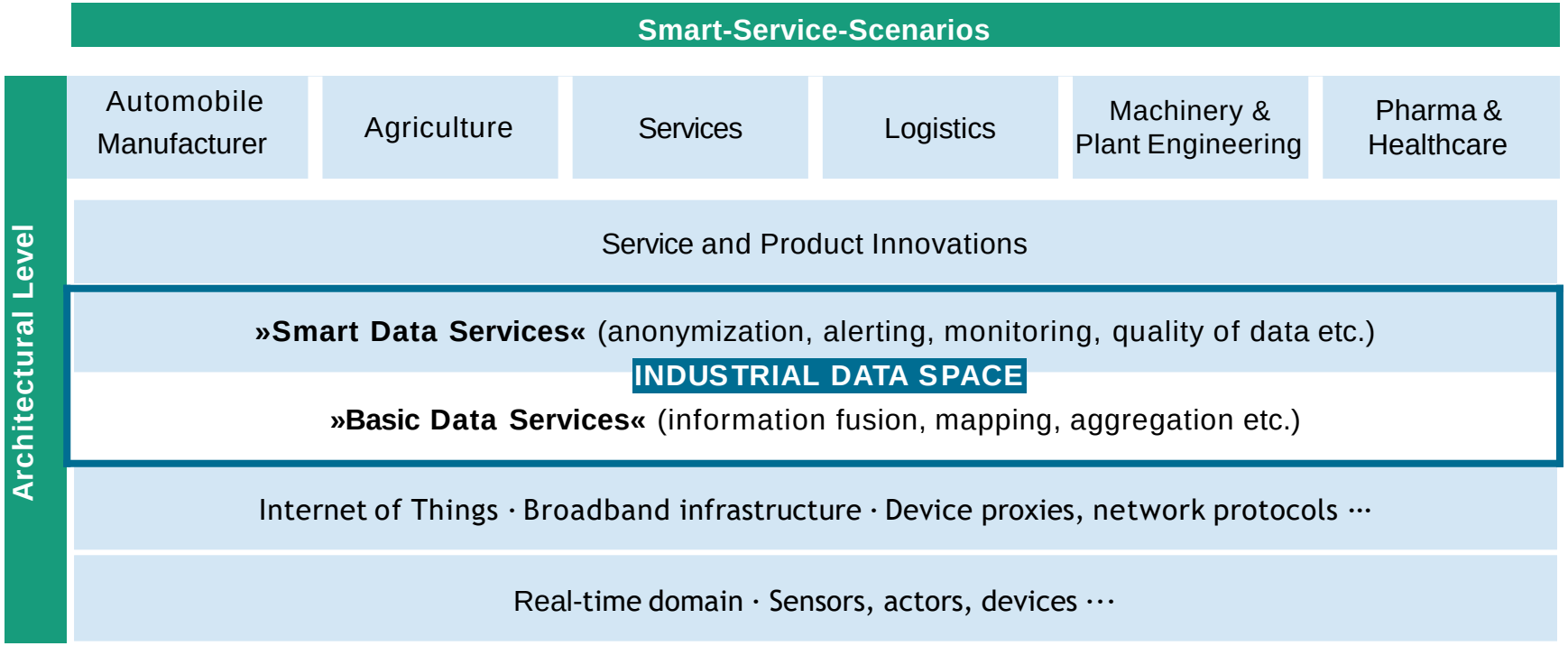
- Key Issue is Data **Sovereignty**

- More than 120 members

International Data Space Association

- Started 2016 as Industrial Data Space initiative (supported by German project)
- Re-defined as International Data Space Association (IDSA)
  - Published International Data Space Architecture Version 2.0 (2018)
  - Whitepaper and use cases
- Associated H2020 projects
  - MIDIH – Manufacturing Industry Digital Innovation Hub (22 partners, 12 countries)
    - Services: technological, business, skills building
    - Open calls
  - Boost4.0 – Big Data for Factories in Automotive Industry (20 Mln (100 Mln private), 3yrs, 50 partners, 16 countries)
  - Close cooperation with FIWARE Foundation (cloud like infrastructure resulted from Future Internet program)
    - Positions itself against IoT and Open-Data solutions in the areas of smart cities, Industry 4.0 and agriculture
- Ongoing active outreach campaign
  - Appearance at FIWARE Global Summit 8-9 May 2018 in Porto
  - Serial of webinars in Sept – Oct 2018

Industrial Data Space: Linking Data and Smart Services



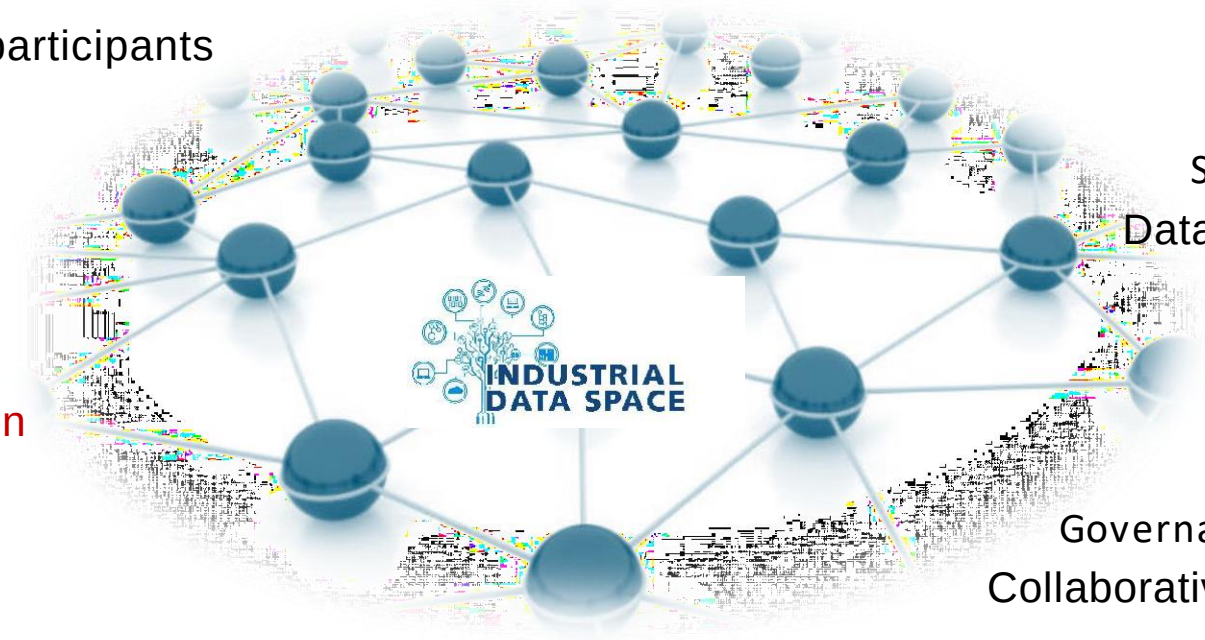
- IDS/IDSA slides courtesy Prof. Dr.-Ing. Boris Otto, Fraunhofer ISST, Industrial Data Space Association, and Prof. Dr. Jan Jürjens Fraunhofer, ISST, University Koblenz-Landau

Industrial Data Space: Core Principles

Decentralised
Federated architecture

Sovereignty
of data and services

Protection of Confidence
Certificated participants



Security
Data exchange

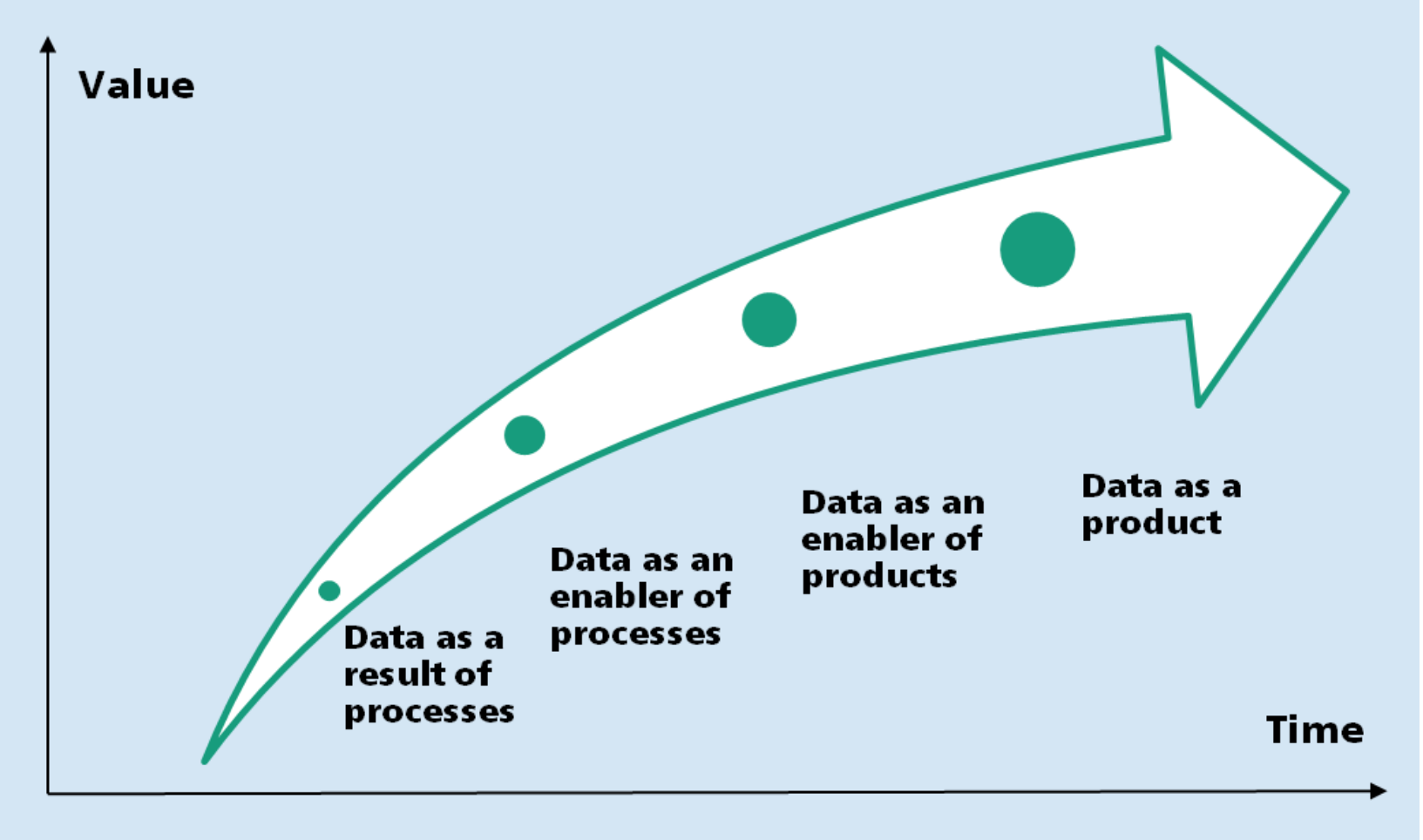
Openness
Neutral and user driven

Governance
Collaborative rules

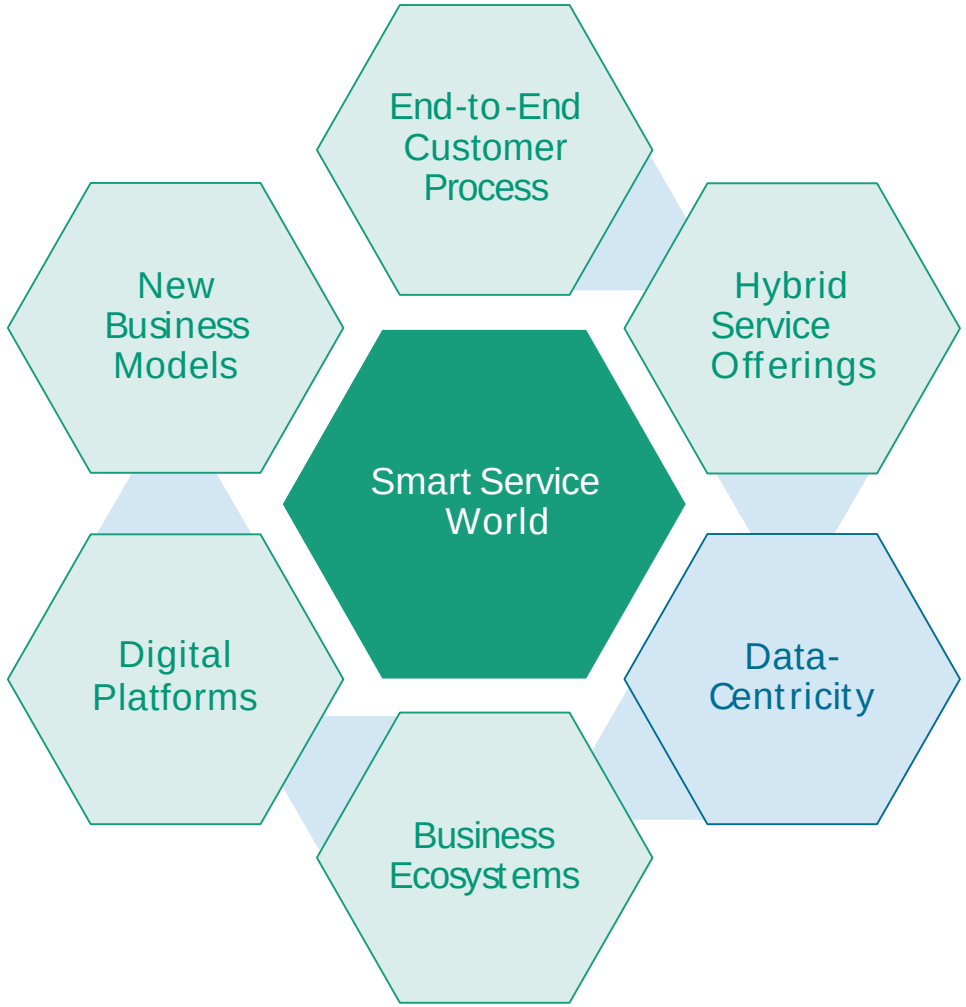
Scaling
effects on networks

Network
Platforms and services

Central: Role of Data is Changing

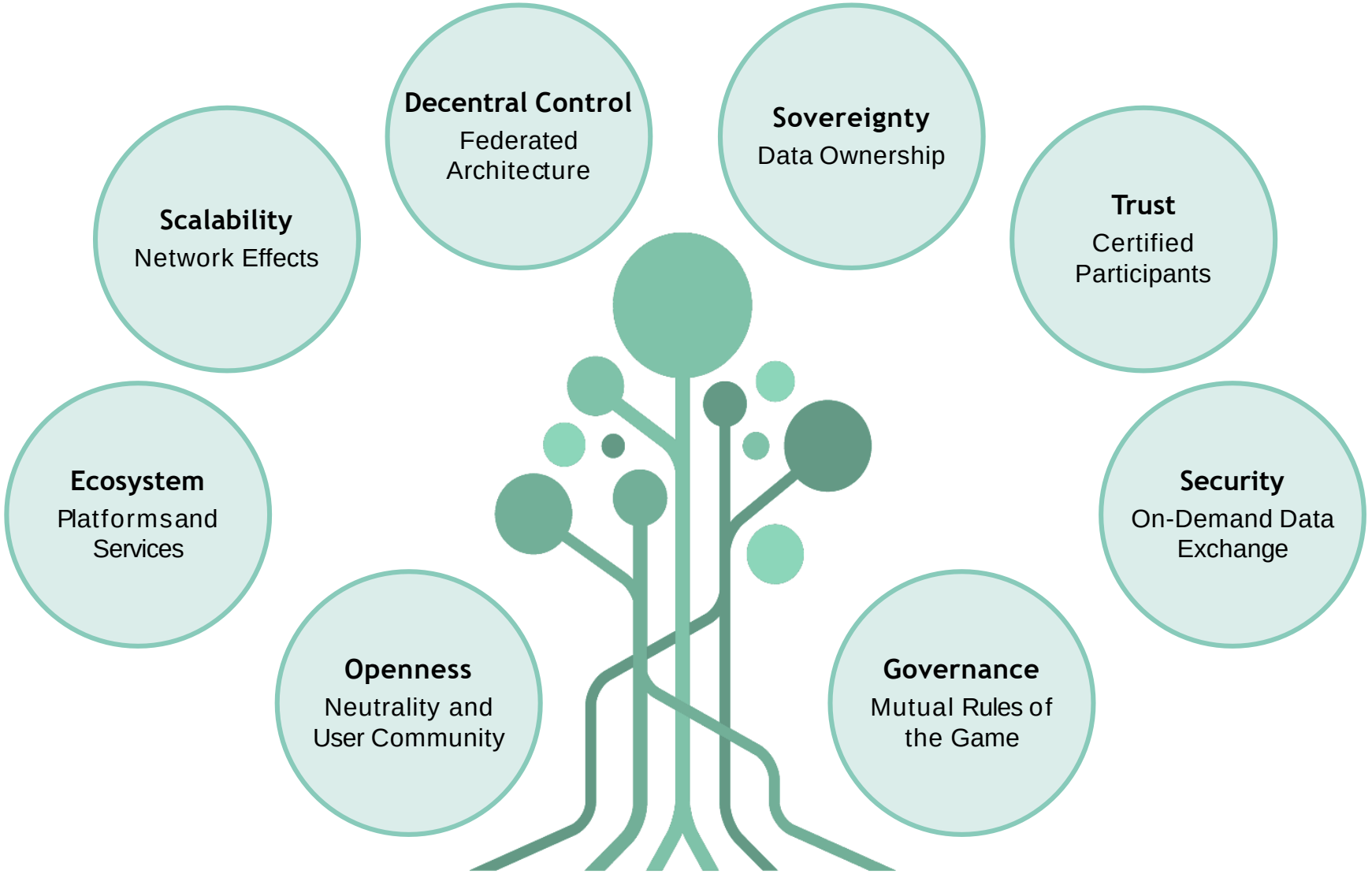


In the “Smart Service Welt” data is a key resource for business model innovation

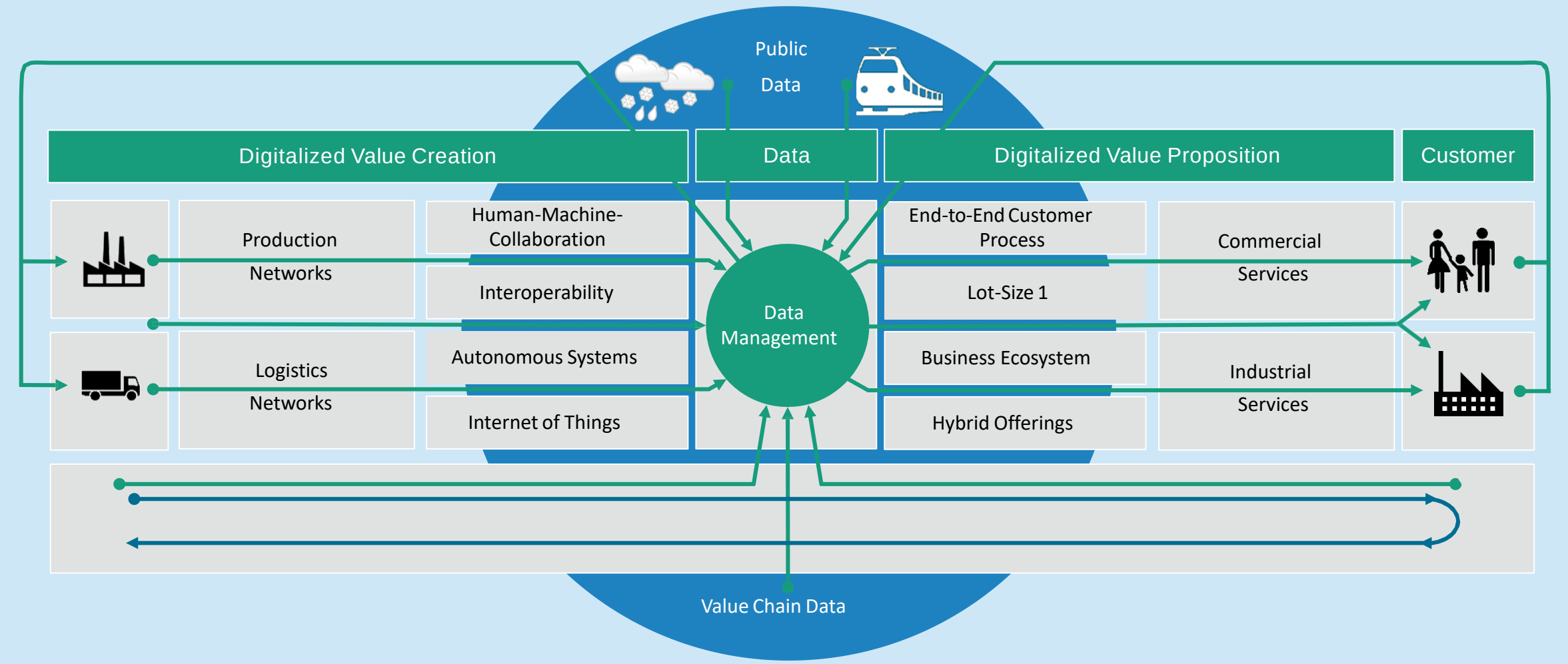


- End-to-End Customer Process
- Hybrid Services Offerings
- Data Centricity
- Business ecosystem
- Digital Platform
- New Business Model

Industry articulated requirements for a network of trusted data, the Industrial Data Space



In the extended enterprise, data must be managed in a consistent way

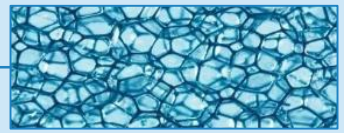


Legend: Information flow; Material flow.

Slides courtesy Jan Jurjens

Data sharing is a key prerequisite for successful business ecosystems

Data Sharing



Material Sciences

Sharing of material information along the entire product life cycle

Energy

Shared use of process data for predictive asset maintenance

Manufacturing and Logistics

Sharing of master and event data along the entire supply chain

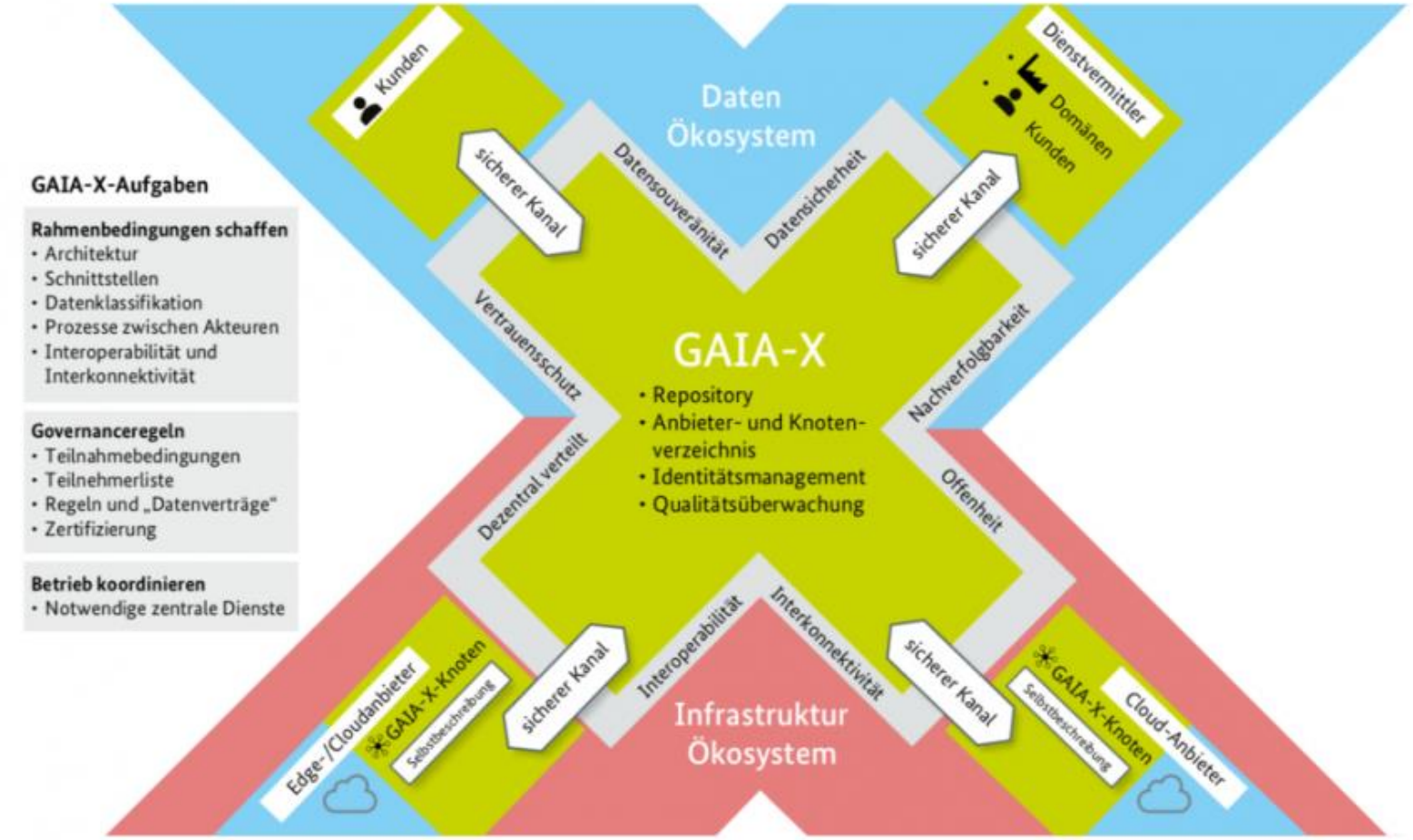
Healthcare

Anonymized, shared data pool for better drug development

»Smart Cities«

Shared use of data for end-to-end consumer services

GAIA-X – A Federated Data Infrastructure for Europe



Quelle: BMWi

- GAIA-X – A Federated Data Infrastructure for Europe
- Currently cooperative initiative by Germany, France, Netherlands and 22 companies
- Accepts IDSA Data Sovereignty Model
- Very interested in EOSC and BDVA experience

Discussion and Questions

- Importance of Data Governance at policy level and organisational level
- Industrial Data Spaces Initiative - Strong Industry support and on way to standardisation
- GAIA-X Initiative: A Federated Data Infrastructure for Europe