Destination 3: World-leading Data and Computing Technologies

This destination will directly support the following Key Strategic Orientations (KSOs), as outlined in the Strategic Plan:

- KSO A, '**Promoting an open strategic autonomy by leading the development of key digital, enabling and emerging technologies, sectors and value chains** to accelerate and steer the digital and green transitions through human-centred technologies and innovations.'

- KSO C, '**Making Europe the first digitally led circular, climate-neutral and sustainable economy** through the transformation of its mobility, energy, construction and production systems

Proposals for topics under this Destination should set out a credible pathway to contributing to the following expected impact of Cluster 4 as set out in Horizon Europe Strategic Plan:

- **Globally attractive, secure and dynamic data-agile economy**, by developing and enabling the uptake of the next-generation computing and data technologies and infrastructures (including space infrastructure and data), enabling the European single market for data with the corresponding data spaces and a trustworthy artificial intelligence ecosystem.

As data becomes the new fuel of the economy and a key asset to address our societal challenges, the EU cannot afford to have the data of its businesses, public sector and citizens stored and exploited largely outside its borders. This is affecting not only our economic performance but also our security, safety and sovereignty.

As announced in the EU data strategy (COM(2020) 66), the EU has the means to become the world's most secure and trustful data hub. For that to happen, an important investment effort in the development of data technologies is needed to support the use, interoperability and analytical exploitation of EU-wide common data spaces targeting essential economic sectors and areas of public interest. The COVID-19 crisis showed how essential it is to master data technologies to address our societal challenges and to incentivize public and private stakeholders to trustfully share data.

The investments should cover the necessary data infrastructure and service platforms to enable virtualisation, adaptation of data and meta-data (including standards for data sharing) as well as common analytics tools. Investment in this Destination will reinforce the cloud and data infrastructure supply industry and make data accessible to research, education, businesses and governments across the EU in a way that meets European values and requirements. It will focus on energy-efficient and trustworthy data infrastructures and related services. The EU also needs to swiftly develop generic cloud to edge to IoT technologies, methods, tools and platforms for the support of future hyper-distributed applications in any business/societal sector.

Europe's lead in the data economy also increasingly depends on its capability to autonomously develop key High Performance Computing (HPC) technologies, provide access to world-class supercomputing and data infrastructures, maintain global leadership in HPC applications, and foster the acquisition of HPC skills. This is the purpose of the activities funded by the EuroHPC Joint Undertaking.

Investments in this Destination contribute substantially to climate change objectives. Energy efficiency is a key design principle in actions, which will lead to new technologies and solutions that are cornerstones for a sustainable economy and society. These solutions range from environmentally sustainable data operations to balancing loads among centralised clouds and distributed edge computing, from decentralised energy sources to energy-harvesting sensors/devices, etc.

Finally, a robust data ecosystem rests as much on the wide, practical availability of top solutions and results, as on the transparency of the research and innovation process. To ensure trustworthiness and wide adoption by user communities for the benefit of society, actions should promote high standards of transparency and openness. Actions should ensure that the processes and outcomes of research and innovation align with the needs, values and expectations of society, in line with Responsible Research and Innovation.

This Destination is structured into the following headings, which group topics together with similar outcomes to address a common challenge:

- Data sharing and analytics capacity

As noted in Europe's Digital Decade Communication, the ability to process vast volumes data is one of the key enablers for other technological developments, supporting the competitiveness of the EU's industrial ecosystems. This is also an essential condition for the successful deployment of data spaces in several sectors as announced in the proposal for the 2030 Policy Programme "Path to the Digital Decade".

Data sharing and data interoperability are still at their infancy; few data markets for sharing industrial data exist. In a recent survey[207], more than 40% of the SMEs interviewed claim they had problems in acquiring data from other companies. The diffusion of platforms for data sharing and the availability of interoperable datasets is one of the key success factors which may help to drive the European data economy and industrial transformation. On the other hand, Europe is developing a strong legal framework for data and is well positioned to exploit data from the public sector. The potential of European industrial data (from digitising industry) creates great synergies to feed European data ecosystems with industrial, personal, and public sector data, to be shared and exploited in full compliance with the ethical and legal framework.

In line with the FAIR principles (Findable, Accessible, Interoperable and Reusable), the overall objective is to make Europe the most successful area in the world in terms of data

[207] https://ec.europa.eu/digital-single-market/en/news/sme-panel-consultation-b2b-data-sharing

sharing and data re-use while respecting the legal framework relating to security and privacy and fostering collaboration and building on existing initiatives.

In parallel, recent developments in sensor networks, cyber-physical systems, and the ubiquity of the Internet of Things (IoT) and Artificial Intelligence (AI) have increased the collection of data (including health care, social media, smart communities, industry, manufacturing, education, construction, agriculture, water management finance/insurance, tourism, education, and more) to an enormous scale (by 2025, 463 exabytes of data will be produced every day in the world). There is significant potential for advances of data analytics at the intersection of many scientific, technology and societal fields (e.g. data mining, AI, complex systems, network science, statistics, natural language understanding, mathematics, particle physics, astronomy, earth observation…), and new methods and approaches are needed along the whole data life-cycle and value chain.

The overall objective is to make the EU fully autonomous in processing, combining, modelling and analysing such large amounts of data for efficiently predicting future courses of action with high accuracy and advanced decision-making strategies. The use of natural resources is reduced and waste avoided by making it possible to replace classical experiments by data-driven digital models. The technological achievements under this heading will support the development of responsible and useful AI solutions, built on high-quality and high-value data.

- From Cloud to Edge to IoT for European Data

Recent intelligence and policy development like the 2030 Digital Decade target of 10.000 climate-neutral edge nodes further confirm the crucial role of next generation Cloud-Edge-IoT in Europe’s technological base. Moreover, they provide significant elements to guide the Research needs and priorities.

Today, 80% of the processing and analysis of data takes place in data centres and centralised computing facilities, and 20% in smart connected objects; only 1 European company in 4 use cloud technologies; 75% of the European cloud market is dominated by non-EU players. Considering the pace of development in this area outside of the EU, the implementation of the activities will require R&I instruments with great flexibility, including the support of SMEs and start-ups, to nurture a European ecosystem and deliver swift results.

In line with Europe’s data, green and industrial strategies, for capitalising on the paradigm shift to the edge, Europe needs to pool major investments. Focus must be on the development and deployment of the next generation computing components, systems and platforms that enable this transition to a compute continuum with strong capacities at the edge and far edge in an energy efficient and trustworthy manner.

The overall objective of the topics in this heading is to establish the European supply and value chains in cloud to edge computing to Internet of Things (IoT) and tactile internet by integrating relevant elements of computing, connectivity, IoT, AI cybersecurity. New

cloud/edge technologies with enhanced performance enabled by AI will increase European autonomy in the data economy required to support future hyper-distributed applications.

Finally, actions on high-end computing for exascale performance and beyond will be entirely implemented in the Joint Undertaking EuroHPC.

The overall objective such actions is to ensure digital autonomy for Europe in key high-end supercomputing technology (hardware and software) and applications, and developing the first exascale supercomputer based predominantly on European technology by 2026.

Activities beyond R&I investments will be needed to realise the expected impacts: testing, experimentation, demonstration, and support for take-up using the capacities, infrastructures, and European Digital Innovation Hubs made available under the Digital Europe Programme; large-scale roll-out of innovative new technologies and solutions (e.g. interconnections between High-Performance Computing centres) via the Connecting Europe Facility; further development of skills and competencies via the European Institute of Innovation and Technology, in particular EIT Digital; upscaling of trainings via the European Social Fund +; and use of financial instruments under the InvestEU Fund for further commercialisation of R&I outcomes.

Expected impact

Proposals for topics under this Destination should set out a credible pathway to contributing to **world-leading data and computing technologies**, and more specifically to one or several of the following impacts:

- Improved European leadership in the global data economy
- Maximised social and economic benefits from the wider and more effective use of data

Reinforced Europe’s ability to manage urgent societal challenges (e.g. data for crisis management, digital for clean).

Innovation Actions — Legal entities established in China are not eligible to participate in Innovation Actions in any capacity. Please refer to the Annex B of the General Annexes of this Work Programme for further details.

The following call(s) in this work programme contribute to this destination:

Call	Budgets (EUR million)		Deadline(s)
	2023	2024	
HORIZON-CL4-2023-DATA-01	76.00		29 Mar 2023
HORIZON-CL4-2024-DATA-01		85.00	19 Mar 2024

Overall indicative budget	76.00	85.00	

Call - World leading data and computing technologies

HORIZON-CL4-2023-DATA-01

Conditions for the Call

Indicative budget(s)[208]

Topics	Type of Action	Budgets (EUR million)	Expected EU contribution per project (EUR million)[209]	Indicative number of projects expected to be funded
		2023		
Opening: 08 Dec 2022 Deadline(s): 29 Mar 2023				
HORIZON-CL4-2023-DATA-01-02	RIA	45.00 [210]	Around 9.00	5
HORIZON-CL4-2023-DATA-01-04	RIA	28.00 [211]	4.00 to 6.00	6
HORIZON-CL4-2023-DATA-01-06	CSA	2.00 [212]	Around 2.00	1
HORIZON-CL4-2023-DATA-01-07	CSA	1.00 [213]	Around 1.00	1
Overall indicative budget		76.00		

General conditions relating to this call	
Admissibility conditions	The conditions are described in General Annex A.
Eligibility conditions	The conditions are described in General

208 The Director-General responsible for the call may decide to open the call up to one month prior to or after the envisaged date(s) of opening.
The Director-General responsible may delay the deadline(s) by up to two months.
All deadlines are at 17.00.00 Brussels local time.
The budget amounts are subject to the availability of the appropriations provided for in the general budget of the Union for years 2023 and 2024.

209 Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.

210 Of which EUR 15.75 million from the 'NGEU' Fund Source.

211 Of which EUR 11.20 million from the 'NGEU' Fund Source.

212 Of which EUR 0.70 million from the 'NGEU' Fund Source.

213 Of which EUR 0.35 million from the 'NGEU' Fund Source.

	Annex B.
Financial and operational capacity and exclusion	The criteria are described in General Annex C.
Award criteria	The criteria are described in General Annex D.
Documents	The documents are described in General Annex E.
Procedure	The procedure is described in General Annex F.
Legal and financial set-up of the Grant Agreements	The rules are described in General Annex G.

Data sharing and analytics capacity

Proposals are invited against the following topic(s):

HORIZON-CL4-2023-DATA-01-02: Integration of data life cycle, architectures and standards for complex data cycles and/or human factors, language (AI, data and robotics partnership) (RIA)

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 9.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 45.00 million.
Type of Action	Research and Innovation Actions
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: If projects use satellite-based earth observation, positioning, navigation and/or related timing data and services, beneficiaries must make use of Copernicus and/or Galileo/EGNOS (other data and services may additionally be used).
Technology Readiness Level	Activities are expected to start at TRL 2-3 and achieve TRL 4-5 by the end of the project – see General Annex B

Expected Outcome: Projects are expected to contribute to the following outcomes:

- ability to process vast volumes data as one of the key enablers for other technological developments, supporting the competitiveness of the EU's industrial ecosystems;
- successful deployment of data spaces involving several sectors of economy or society;
- improve data access (in line with the FAIR [214] principles), data sovereignty, data interoperability and data protection as an essential factor in the development of sustainable value chains respecting all stakeholder interests, particularly SMEs, but also the public sector as data providers and innovation/market ecosystem enablers. The European Strategy for Data[215] calls for actions to support and promote data sharing and the use of data for social and economic benefit.

Scope: Proposals should address the entire data life cycle from data generation/collection to the final use and disposal/deletion of data (especially when required by applicable legislation, for example the General Data Protection Regulation (GDPR)[216]. Proposals should build on existing and emerging standards, models and architectures and complement/expand them as necessary in view of interoperability of systems and portability of data, especially between sectors, between private and public sectors and between different communities/constituencies of actors, including consideration of cybersecurity issues and analysing the use and re-use potential, especially in view of use of data across sectors. Envisaged architectures and systems should enable correct allocation and enforcement of data-related rights, obligations and responsibilities across the life cycle. Proposals should address relevant human language issues at all stages of data life cycle, addressing the social and cultural factors as necessary. Systems and approaches should be able to process human-generated and human-related data (e.g. speech, text, images) and put data into context (including cultural, linguistic and social context). Likewise, the seamless integration of "human in the loop" (whenever full automation is not possible/desirable) should be considered and implemented where applicable. To achieve this, proposals should consider multidisciplinary research and involve all necessary competences in the consortium.

Proposed actions should build on or seek collaboration with existing projects and develop synergies with other relevant European, national or regional initiatives, funding programmes and platforms. Based on an analysis of cross-fertilisation potential of data re-use, the proposal should include use cases or pilots addressing or involving at least three different common European Data spaces and/or related ecosystems. In particular, they should create links with the Data Spaces support centre funded under the Digital Europe programme, and work in close collaboration with the emerging Common European data spaces in order to ensure interoperability and coordination of data architectures. Proposals should build on existing standards or contribute to standardisation. Interoperability for data sharing should be addressed, in line with the European Interoperability Framework (EIF), and contributing to open, standardized and trusted federated concepts, enabling cross-domain data sharing and data markets.

214 FAIR = Findable, Accessible, Interoperable, Re-usable
215 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0066
216 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32016R0679

This topic implements the co-programmed European Partnership on AI, data and robotics.

HORIZON-CL4-2023-DATA-01-07: Collaboration with NSF on fundamental research on new concepts for distributed computing and swarm intelligence (CSA)

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 1.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 1.00 million.
Type of Action	Coordination and Support Actions

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

- Support structure for EU-NSF cooperation: networking events, exchange and fellowship programmes, and vision workshops for the academic and industrial computing community, at least one annual EU-US workshop.

Scope: DG Connect and the relevant entity at US National Science Foundation (NSF) have identified mutual interest in collaborating on longer-term on fundamental research on new concepts for distributed computing and swarm intelligence. Preparing the grounds for cooperation, support is needed in terms of a landscaping analysis of relevant tools and frameworks in this field, with clearly identified mutual benefit, organising brokerage events for matching of on-going work streams in projects, especially linked to but not limited to the topic HE-CL4-2022-DATA-01-03 - Programming tools for decentralised intelligence and swarms, whilst promoting the emergence of open, collaborative programming frameworks and software development tools. Collaboration shall address common needs emerging on managing complexity through high levels of abstraction, in particular related to large numbers of distributed objects, evolving computational capacity at the edge, and on new AI-based concepts leading to self-organised, dynamic, and adaptive management..

Support for this collaboration is envisaged along the following lines:

• Yearly common workshops for exchange of research results organised in close collaboration with the HIPEAC CSA under Horizon Europe Cluster 4 “From Cloud-to-Edge-to-IoT for European Data”.

• Support to the collaboration through support for secretarial services, networking including travel, research exchange and fellowship programmes, promotion and brokerage events.

• NSF would provide supplement of funding to drive joint research and support collaboration.

Due to the current competitive position between world regions, for Europe it is critical here that collaboration should be based on pre-competitive work between research establishments and academic partners in the context of pairs of projects supported by NSF and the EU.

From Cloud to Edge to IoT for European Data

Proposals are invited against the following topic(s):

HORIZON-CL4-2023-DATA-01-04: Cognitive Computing Continuum: Intelligence and automation for more efficient data processing (AI, data and robotics partnership) (RIA)

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of between EUR 4.00 and 6.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 28.00 million.
Type of Action	Research and Innovation Actions
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: If projects use satellite-based earth observation, positioning, navigation and/or related timing data and services, beneficiaries must make use of Copernicus and/or Galileo/EGNOS (other data and services may additionally be used).
Technology Readiness Level	Activities are expected to start at TRL 2 and achieve TRL 5 by the end of the project – see General Annex B
Legal and financial set-up of the Grant Agreements	The rules are described in General Annex G. The following exceptions apply: Eligible costs will take the form of a lump sum as defined in the Decision of 7 July 2021 authorising the use of lump sum contributions under the Horizon Europe Programme – the Framework Programme for Research and Innovation (2021-2027) – and in actions under the Research and Training Programme of the European Atomic Energy Community (2021-2025). [217].

Expected Outcome: Projects are expected to contribute to the following outcomes:

[217] This decision is available on the Funding and Tenders Portal, in the reference documents section for Horizon Europe, under 'Simplified costs decisions' or through this link: https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/guidance/ls-decision_he_en.pdf

- Enhanced openness and open strategic autonomy in the evolving data and AI-economies across the computing continuum including adapted system integration at the edge and at device level, validation of key sectors and nurturing European value chains to accelerate and steer the digital and green transitions.

- Paving the way to strategic industrial cooperation in data processing required to support future hyper-distributed applications by building open platforms, underpinning an emerging industrial open edge ecosystem critical to establishing a mature European supply chain.

- Establishment of adaptive hybrid computing, cognitive clouds and edge intelligence beyond today's investments on data infrastructure.

- Better international collaboration with trusted partner regions, guaranteeing a minimum level of interoperability, portability thereby fostering competition in the Cloud/Edge services market for the European cloud/edge and software industry and facilitate European access to foreign markets.

Scope: The Cloud-Edge Continuum must provide seamless management schemes to allow services and data to be processed across various providers, connectivity types and network zones. This requires innovative management techniques and computational methods of the whole computing continuum from Cloud to Edge to IoT that are enabled by Swarm computing and decentralised intelligence.

It involves hyper-distributed computing approaches encompassing resources from IoT and far-edge constrained devices, to federated fog/edge computing nodes to central cloud computing centres and hybrid cloud models which exploit Artificial Intelligence techniques to advance automation and dynamic adaptation of resource management in Cloud and Edge systems, and thus intelligently balance computing tasks across decentral and central computing environments to optimize resources and quality of service.

Focus should be on autonomous and AI-enabled management schemes and data processing methods that enable this transition to a compute continuum with strong capacities at the edge and fog/IoT edge in an energy efficient and trustworthy manner. Intelligent compute, data and code orchestration mechanisms need to be integrated, which allow efficient value extraction from the huge volumes of generated data at the edge of the network and which support unprecedented levels of resource dynamicity and scalability across the compute continuum.

Concept should cater for novel automated management tools, programming models, learning and decision-making methods, and approaches able to cope with end-to-end security and identity management, resources heterogeneity, extreme scale and fault-tolerance together with elasticity to flexibly allocate resources and tasks. For learning, methods need to be able to deliver a solution to (continuous) federated learning from data distributed over the edge and in the network. For security and identity management, proposals are expected to apply state-of-the-art technologies, develop synergies and relate to activities and outcomes in Cluster 3 (namely, HORIZON-CL3-2023-CS-01-01: Secure Computing Continuum (IoT, Edge, Cloud,

Dataspaces) and HORIZON-CL3-2023-CS-01-02: Privacy-preserving and identity management technologies).

Resource heterogeneity should consider the diversity of devices equipped with storage and processing capacities at the Edge and their specific characteristics (e.g., resource-constrained devices), but also the increasingly available variety of processor architectures for these devices, including where possible, emerging open solutions (e.g. RISC-V).

Novel approaches are needed to support distributed machine learning and decision-making by providing the right balance between centralized and decentralized solutions to maximize the energy efficiency, resilience and effectiveness of the system while increasing privacy and interaction between different organizations without explicit sharing of data.

In addition, proposed solutions should incorporate tools and mechanisms enabling the optimisation of energy efficiency and ecological sustainability taking into account end-to- end data processing across the continuum. Interoperability approaches (based on open standards, interoperability models and open platforms) should be considered where appropriate.

Projects are expected to develop synergies and relate to activities and outcomes of the Digital Europe Programme (DEP) and any existing or emerging Important Projects of Common European Interest (IPCEI) initiative.

In this topic the integration of the gender dimension (sex and gender analysis) in research and innovation content is not a mandatory requirement.

International cooperation is encouraged, especially with Japan and S. Korea.

This topic implements the co-programmed European Partnership on AI, data and robotics.

HORIZON-CL4-2023-DATA-01-06: Coordination and Support of Cognitive Computing Continuum research and policy (CSA)

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 2.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 2.00 million.
Type of Action	Coordination and Support Actions
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: If projects use satellite-based earth observation, positioning, navigation and/or related timing data and services, beneficiaries must make use of Copernicus and/or Galileo/EGNOS (other data and services may

	additionally be used).

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

- Support structure for the European Computing ecosystem: networking events and vision workshops for the academic and industrial computing community.
- Yearly updated roadmaps on the computing continuum addressing the area from a broad perspective from edge device to edge cloud to cloud to HPC, from scientific to industrial to societal and research applications, and addressing all relevant aspects such as real-time, security, etc. Developments should complement the Industrial Roadmap from the European Alliance for Industrial Data, Edge and Cloud by offering a long-term research perspective which enables disruptive innovations.
- Creation of a sustainable European forum of stakeholders representing the whole Cloud to Edge to IoT Computing research, industry and users from different domains/sectors.

Scope:

- To support the European Commission and the European computing constituency by providing to them annually updated roadmaps for research and innovation.
- To seek collaboration with other relevant initiatives in the field, such as those related to the Important Project of Common European Interest on Cloud Infrastructure and Services (IPCEI CIS) and the European Alliance for Industrial Data, Edge and Cloud.
- To facilitate awareness of stakeholders in research and policy matters related to Cloud-Edge-IoT Computing continuum.
- To coordinate stakeholders in the Cloud to Edge to IoT Computing Continuum and act as support to R&D programmes/activities by disseminating project results and organising scientific and policy events, and addressing pre-standardisation initiatives.

International cooperation is encouraged, especially with Japan and South Korea.

In this topic the integration of the gender dimension (sex and gender analysis) in research and innovation content is not a mandatory requirement.

Call - World leading data and computing technologies

HORIZON-CL4-2024-DATA-01

Conditions for the Call

Indicative budget(s)[218]

Topics	Type of Action	Budgets (EUR million)	Expected EU contribution per project (EUR million)[219]	Indicative number of projects expected to be funded
		2024		
Opening: 15 Nov 2023 Deadline(s): 19 Mar 2024				
HORIZON-CL4-2024-DATA-01-01	IA	38.00	8.00 to 10.00	4
HORIZON-CL4-2024-DATA-01-03	IA	45.00	20.00 to 25.00	2
HORIZON-CL4-2024-DATA-01-05	CSA	2.00	Around 2.00	1
Overall indicative budget		85.00		

General conditions relating to this call	
Admissibility conditions	The conditions are described in General Annex A.
Eligibility conditions	The conditions are described in General Annex B.
Financial and operational capacity and exclusion	The criteria are described in General Annex C.
Award criteria	The criteria are described in General Annex D.
Documents	The documents are described in General Annex E.

218 The Director-General responsible for the call may decide to open the call up to one month prior to or after the envisaged date(s) of opening.
The Director-General responsible may delay the deadline(s) by up to two months.
All deadlines are at 17.00.00 Brussels local time.
The budget amounts are subject to the availability of the appropriations provided for in the general budget of the Union for years 2023 and 2024.

219 Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.

Procedure	The procedure is described in General Annex F.
Legal and financial set-up of the Grant Agreements	The rules are described in General Annex G.

Data sharing and analytics capacity

Proposals are invited against the following topic(s):

HORIZON-CL4-2024-DATA-01-01: AI-driven data operations and compliance technologies (AI, data and robotics partnership) (IA)

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of between EUR 8.00 and 10.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 38.00 million.
Type of Action	Innovation Actions
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: If projects use satellite-based earth observation, positioning, navigation and/or related timing data and services, beneficiaries must make use of Copernicus and/or Galileo/EGNOS (other data and services may additionally be used).
Technology Readiness Level	Activities are expected to start at TRL 4-5 and achieve TRL 6-7 by the end of the project – see General Annex B.
Legal and financial set-up of the Grant Agreements	The rules are described in General Annex G. The following exceptions apply: The funding rate is up to 60% of the eligible costs. This funding rate applies both to members and non-members of the partnership, except for non-profit legal entities, where the funding rate is up to 100% of the total eligible costs.

Expected Outcome: Projects are expected to contribute to the following outcomes:

- To enable companies and public sector to easily comply with existing and emerging regulation (e.g. GDPR[220], Data Governance Act[221], Data Act, Artificial Intelligence Act[222]) and create value on data assets that they possess or that they acquire from the market, and to allow citizens to feel more confident that data-driven systems treat them in a fair, unbiased and compliant way and respect their privacy/anonymity and other rights, and keep track of the use of personal data in a world where "everything" moves online.

- Define, quantify and measure bias in data sets (especially those used for AI development).

- Shorten the time-to-market and reduce development costs of compliant data solutions

- Contribute to open, trusted and federated Common European data spaces.

- Quantify and reduce the environmental footprint of data operations which will contribute to the Green Deal target "no net emissions of greenhouse gases by 2050"[223].

Scope: Developing, piloting and integrating systems, compliance tools and data economy enablers that process the increasing data volumes more efficiently, distil more useful knowledge from data, and contribute to the measurement, labelling, certification and reduction of the environmental footprint of massive data operations (e.g. by minimizing data transfers/traffic, improving energy reuse and/or reducing energy consumption of AI training/machine learning, privacy preservation and other processes).

The technologies should respond to the emerging needs for practical, affordable and automated compliance tools (e.g. privacy preservation, smart contracting, consent management, bias detection, quality measurement, tracking of uses of data etc.), as well as design principles and architectures that are inherently compliant, addressing the relevant cybersecurity issues. Compliance should be understood in the broad sense, involving legal, ethical and environmental compliance. The competences represented in the consortium should cover all the relevant aspects (technical, legal, commercial, societal, ethical) appropriately.

The aim is to provide Common European data spaces[224] and AI data provision with reliable mechanisms to monitor, control and track/record transactions on data, to ensure compliance.

To this end, projects are invited to employ appropriate technologies and methods, such as federated and distributed AI/analytics and associate them with trustworthy AI techniques; protect privacy and confidentiality of AI training data and reduce energy footprint.

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220 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32016R0679

221 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32022R0868

222 The Data Act and the Artificial Intelligence Act are (at the time of writing this WP) at the stage of Commission legislative proposals. They are likely to be adopted by the closure of the call, and will appear in the Eur-lex repository of legislation.

223 See the communication "The European Green Deal" https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1576150542719&uri=COM%3A2019%3A640%3AFIN

224 As defined in the communication "A European strategy for data", see https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0066

Proposed actions should build on or seek collaboration with existing projects and develop synergies with other relevant European, national or regional initiatives, funding programmes and platforms. In particular, they should build on the results of the Horizon 2020 data platform projects (topic ICT-13-2019) and the results of projects selected under topic HORIZON-CL4-2021-DATA-01-01, as well as the projects to be selected under topic HORIZON-CL4-2023-HUMAN-01-01. Likewise, the proposed actions should create links and seek synergies, where appropriate, with the Common European Data Spaces and European Digital Innovation Hubs funded under the Digital Europe programme. Interoperability for data sharing should be addressed, where relevant, focusing on open, standardised, and trusted concepts.

This topic implements the co-programmed European Partnership on AI, data and robotics.

From Cloud to Edge to IoT for European Data

Proposals are invited against the following topic(s):

HORIZON-CL4-2024-DATA-01-03: Piloting emerging Smart IoT Platforms and decentralized intelligence (IA)

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of between EUR 20.00 and 25.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 45.00 million.
Type of Action	Innovation Actions
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: If projects use satellite-based earth observation, positioning, navigation and/or related timing data and services, beneficiaries must make use of Copernicus and/or Galileo/EGNOS (other data and services may additionally be used).
Technology Readiness Level	Activities are expected to start at TRL 3-4 and achieve TRL 6-7 by the end of the project – see General Annex B.
Procedure	The procedure is described in General Annex F. The following exceptions apply: To ensure a balanced portfolio covering as many strategic sectors as possible, grants will be awarded to proposal not only in order of ranking but also to achieve broadest coverage of the following sectors which are

	not covered by higher-ranked proposals, provided that the proposals attain all thresholds:, strategic for European competitiveness: industrial automation, renewable energy, electro-mobility, and farming, and which are not covered by higher-ranked proposals, provided that the proposals attain all thresholds.
Legal and financial set-up of the Grant Agreements	The rules are described in General Annex G. The following exceptions apply: Beneficiaries may provide financial support to third parties to increase the innovation capacity of industry, in particular SMEs, through take-up and validation of emerging edge platform interfaces, in particular to foster edge solutions, which represent a modular functional spectrum of executable apps and services. The support to third parties can only be provided in the form of grants, for maximum of 20% of the requested EU contribution.. The maximum amount to be granted to each third party is EUR 200 000 in order to support industry, in particular SMEs, in take-up and validation of emerging edge platform interfaces, in particular to foster edge solutions, which represent a modular functional spectrum of executable apps and services.

Expected Outcome: Projects are expected to contribute to the following outcomes:

- Implementations of edge paradigms in real environments leading to matured and customised IoT and next generation edge computing technologies for adoption in key applications and sectors.
- Paving the way to strategic industrial cooperation in data processing required to support future hyper-distributed applications by building open platforms, agreement on common architectures and standards, critical to establishing a mature European supply chain.
- Open platforms underpinning an emerging open edge ecosystem including midcaps, SMEs and start-ups that foster edge solutions, which represent a modular functional spectrum of executable apps and services critical to establishing a mature European supply chain under challenging and extremely competitive market conditions.
- Demonstrating cross-domain standardisation and up-scaling of edge infrastructure solutions

Scope: Proposals should target up-take and up-scaling of emerging EU-driven smart industrial internet of things and edge computing systems to perform under real life conditions, as to mature particular technologies like meta-operating systems for the IoT and the Edge, cognitive cloud technologies and tools for decentralized intelligence and swarm computing

for adoption across key applications and sectors crucial for Europe's competitiveness and open strategic autonomy.

Such systems must be targeted in order to create value in orchestrating multi-tiered data processing with control and automation on the edge, minimizing energy footprint, stimulating multi-sided marketplaces, and fostering open standards for virtualization, interoperability and secure and trusted data sharing between different stakeholders of the value chain – both horizontally and vertically, thereby providing an environment of multi-platform capabilities and preventing lock-in effects for users. Pilots are to implement and demonstrate mature solutions, on technology integration such as sensors, actuators, distributed control, connectivity and edge computing and embedded reasoning to demonstrate security, resilience and autonomy of system with low data processing latency for analytics and AI-inference and decentralised intelligence at the edge. In order to avoid concurrent solutions and fragmented standards and tools, pilots should validate cross-domain interfaces and common standards and foster cross-sector industrial agreements on architectures, design tools and governance. With the cross-domain up-take these pilots will demonstrate shorter development circles, accelerate adoption of edge infrastructure through shared cross-domain usage, especially through the creation of common management tools and standardised edge architectures

The objective is the development of systems to become open platforms underpinning an emerging open edge ecosystem including midcaps, SMEs and start-ups that foster edge solutions, which represent a modular functional spectrum of executable apps and services critical to establishing a mature European supply chain under challenging and extremely competitive market conditions

Innovation Actions are used to customise, explore the limits, test, optimise and validate emerging European smart IoT and edge computing systems under the constraints of industrial mass-market applications, by taking a system-level approach from hardware of smart devices to operating systems at device and at system level, to middleware and to application software. Pilots are expected to address cross-sector platforms in more than one application domain, which are strategic for European competitiveness such as renewable energy, buildings and electro-mobility, farming and/or industrial automation, including strategic aspects such as condition-monitoring/predictive maintenance and logistics, or other relevant application domains.

Pilot projects will contribute to the coherence/cluster work that will be implemented by the CSA called under WP2024-DATA-01-05, supporting the activities defined under ""Horizontal Activities"" below. This requires that they contribute to clustering their results of horizontal nature (interoperability approach, standards, security and governance approaches, validation of emerging business models for an emerging IoT/edge infrastructure and sustainability, methodologies, metrics, etc.). Links to RRF investments towards the next wave of modernization of European infrastructure should be explored.

Multidisciplinary research activities should address all the following aspects:

- Proposals submitted under this topic should include a business case and exploitation strategy.
- Research should build on existing standards or contribute to standardisation. Interoperability for data sharing should be addressed.
- Projects should build on or seek collaboration with existing projects and develop synergies with other relevant European, national or regional initiatives, funding programmes and platforms such as KDT JU, GAIA-X, et al.

In this topic the integration of the gender dimension (sex and gender analysis) in research and innovation content is not a mandatory requirement

HORIZON-CL4-2024-DATA-01-05: Platform Building, standardisation and Up-scaling of the 'Cloud-Edge-IoT' Solutions (Horizontal Activities - CSA)

Specific conditions	
Expected EU contribution per project	The Commission estimates that an EU contribution of around EUR 2.00 million would allow these outcomes to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
Indicative budget	The total indicative budget for the topic is EUR 2.00 million.
Type of Action	Coordination and Support Actions
Eligibility conditions	The conditions are described in General Annex B. The following exceptions apply: If projects use satellite-based earth observation, positioning, navigation and/or related timing data and services, beneficiaries must make use of Copernicus and/or Galileo/EGNOS (other data and services may additionally be used).

Expected Outcome: Projects are expected to contribute to the following outcomes:

- Supporting the Commission and the constituency in coordinating the proposal portfolio in particular resulting from HORIZON-CL4-2024-DATA-03, and ensure consistent exploitation of the outcomes.
- Alignment with national or regional initiatives will create an expanding innovation eco-system, anchored in local contexts across Europe.
- Underpinning an emerging open edge ecosystem including midcaps, SMEs and start-ups, critical to establishing a mature European supply chain.
- Outcomes are expected to accelerate the pick-up of novel advanced edge technology in most important sectors for Europe's economy, and competitiveness as well as an

analysis of cross cutting aspects like open standards, open-source frameworks, data compliance, security as well as synergies across sectors.

Scope: CSA actions provide consistency and linkages between the pilots and complement them by addressing horizontal challenges critically important for the take-up of edge computing at the anticipated scale. Support programme implementation across projects and topics in the area of Cloud-Edge-IoT, especially foster consensus on interoperability and standards as well as ecosystem building in and across verticals, an environmental and green impact. The CSA should ensure an efficient interplay of the various elements of computing, network connectivity, AI and learning, etc. establish a concept through a forum to link to relevant European and national initiatives and partnerships like KDT JU and add value by active cross-fertilisation across academia and industry and sectors.

A fertile communication strategy for broader stakeholder engagement is expected. Concrete activities should include trend scouting, portfolio analysis, a variety of participatory workshops, analysis of emerging business cases, accelerator of technology up-take and promotion of open calls, especially for SMEs and midcaps.

Better international collaboration with trusted partner regions, guaranteeing a minimum level of interoperability, portability thereby fostering competition in the Cloud/Edge services market for the European cloud/edge and software industry and facilitate European access to foreign markets

Multidisciplinary research activities should address all of the following issues:

- Proposals should involve appropriate expertise in Social Sciences and Humanities (SSH), in particular in relation to privacy preservation and security at the edge.
- Activities should build on existing standards or contribute to standardisation. Interoperability for data sharing should be addressed.
- Projects should build on or seek collaboration with existing projects and develop synergies with other relevant European, national or regional initiatives, funding programmes and platforms; such as KDT JU – explore links to INSIDE and EPOSS especially on Cyber Physical Systems and Smart Systems Integration.

In this topic the integration of the gender dimension (sex and gender analysis) in research and innovation content is not a mandatory requirement.