

ICT-51-2020

Big Data Technologies and extreme-scale analytics

1. What are you looking for?

- Big Data analytics methodologies and engineering solutions addressing industrial and/or societal challenges. Of interest: machine learning/deep learning, architectures, deep analysis, precise predictions... - considering computing capacity and connectivity issues.
- Responding to industrial requirements
- Quantifiable progress beyond the state-of-the-art whatever the technical domain chosen – performance measured against industry validate benchmarks.
- Data assets must be sufficiently large, realistic, available to the project and described in the proposal.

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2. What do you NOT want?

- Exact same project proposals as submitted for ICT-12 topic in 2018 – state-of-the art has advanced!
- Loosely coupled use cases with low impact and little relevance for the overall objectives and approach of the proposal.
- Consortia or industries trying to 'catch-up' on the state-of-the-art. This topic is to extend and progress beyond the state-of-the-art.

ICT-51-2020 – topic evolution

3. Is this new or has it been called before?

- Not a new topic, but continuation of ICT-12a RIA topic of the H2020-ICT-2018-2020 Work Programme
- Linked with topic DT-ICT-05-2020 Big Data Innovation Hubs

ICT-51-2020 – topic evolution

4. Unique instructions for evaluators on this WP topic? Excellence, Impact and more

Specific focus on Excellence:

- solid understanding of the current state-of-the-art and how the proposals plan to go beyond
- sound concept and objectives, meaningful industry-driven use cases

ICT-51-2020 – topic evolution

5. Current project portfolio of ICT-12a-2018

- **INFORE**
- **ExtremeEarth**
- **SmartDataLake**
- **ELASTIC**
- **CloudButton**
- **EXA MODE**

<https://cordis.europa.eu/programme/rcn/703771/en>

ICT-51-2020 – key actors

6. Who are the leading players?

- Academia and Research Centers
- IT providers
- Application domain companies

7. Is there a key group of actors (eg. cPPP or other) driving this?

- Big Data Value Association (BDVA)

<http://www.bdva.eu/>

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8. Additional / background documents

Strategic Research and Innovation agenda (SRIA)
developed by the Big Data Value Association
<http://www.bdva.eu/SRIA>

Future Outlook

This topic paves the way to **Horizon Europe Programme:**

- Pillar II 'Global Challenges and industrial competitiveness'; Cluster 'Digital and Industry'; Area of intervention 3.2.6 *Advanced Computing and Big Data*
- and also Area of intervention 3.2.4 *Artificial Intelligence and Robotics*



Upcoming events / information days

- Digital excellence forum Horizon 2020 Proposers' day 19-20 Sep 2019 in Helsinki
<https://ec.europa.eu/digital-single-market/en/news/digital-excellence-forum-ict-proposers-day-2019>
- European Big Data Value Forum 14-16 Oct 2019 in Helsinki
<https://www.european-big-data-value-forum.eu/>



LEIT ICT WP 2018-20

ICT-40-2019 Cloud Computing: towards a smart cloud computing continuum

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Cloud Computing – topic evolution

FP7 Topics: "software & services and cloud computing"

- Total EU contribution: €351.5 million
- Number of projects: 95 (s/w and cloud)
- Average per project: €3.7 million/project

H2020 Topics: "Advanced Cloud Infrastructures and Services"
"Cloud Computing"
"International collaboration with Japan, Korea and Brazil"

- Total EU contribution: € 195 million up to now
- Number of projects: 53 (cloud)
- Average per project: €3.8 million/project

H2020	Budget [MEUR]	EU contribution	RIA	PCP	IA	CSA	Total
WP2014-(ICT7)	73.0	73.15	16		2	5	23
WP2015 (ICT8)	22.0	4.72		1			1
WP2016 (ICT-06)	45.5	49.7	8		3		11
WP2014-18 (Japan, Korea, Brazil)	17.20	17.20	10			1	11
WP2019 (ICT-15)		30	6			1	7
→ WP2020 (ICT-40)		20					

- WP2014-ICT7: Advanced Cloud Infrastructures and Services
- WP2015-ICT8: Boosting Public Sector Productivity and Innovation through Cloud Computing Services
- WP2016-ICT-06: Cloud Computing

International Collaboration with Japan, Korea and Brazil (WP2014-18):

- EUJ 1 – 2014: Technologies combining big data, internet of things in the cloud
- EUB 1 – 2015: Cloud Computing, including security aspects
- EUJ-02-2016: IoT/Cloud/Big Data platforms in social application contexts
- EUK-03-2016: Federated Cloud resource brokerage for mobile cloud services
- EUB-01-2017: Cloud Computing
- EUK-01-2018: Cloud, IoT and AI technologies
- EUJ-01-2018: Advanced technologies (Security/Cloud/IoT/BigData) for a hyper-connected society in the context of Smart City

Total EU contribution: € 195 million
 Number of projects: 53
 Average per project: €3.8 million/project

Software Engineering for Services and Applications

H2020 Projects

Aligned, ARCADIA, CloudTeams, DICE, ENTICE, HyVar, Supersede, SWITCH, TANGO, STAMP, Q-Rapids, MELODIC, COLA, Decide, DITAS, Elastest, MegaMart2(ECSEL), Radon, FASTEN, SODALITE, UNICORE

Policy Areas

Open source, Artificial Intelligence/Algorithmic transparency

Data Protection, Security and Privacy in the Cloud

H2020 Projects

CLARUS, CREDENTIAL, ESCUDO-CLOUD, MUSA, OPERANDO, PAASWORD, PRISMACLOUD, SERECA, SECURECLOUD, SLALOM, SLA-READY, STRATEGIC, SUNFISH, SWITCH, COEMS, RESTASSURED, TREDISEC, TRESCCA, WITDOM, MSEC

Policy Areas

Free Flow of Data, Cloud Security Certification

Future Cloud

*(Merging of two former clusters:
Inter-cloud Challenges, Expectations and Issues
and Novel approaches and technologies for resource and
service management)*

H2020 Projects

CloudSocket, BEACON, SICLOPS, ENTICE, CYCLONE, CLOUDLIGHTNING, SWITCH, BASMATI, ARCADIA, BEACON, CloudLightning, CloudSpaces, ClouT, CloudWave, DICE, iKaaS, INPUT, IOStack, Mikelangelo, LIGHTKONE, CLOUDAPPLIANCE, PRESTOCLOUD, Mobile Cloud Networking, MUSA, RAPID, SWITCH, BIGCLOUT, MF2C, Fed4IoT, DECENTER, ATMOSHPERE, NECOS

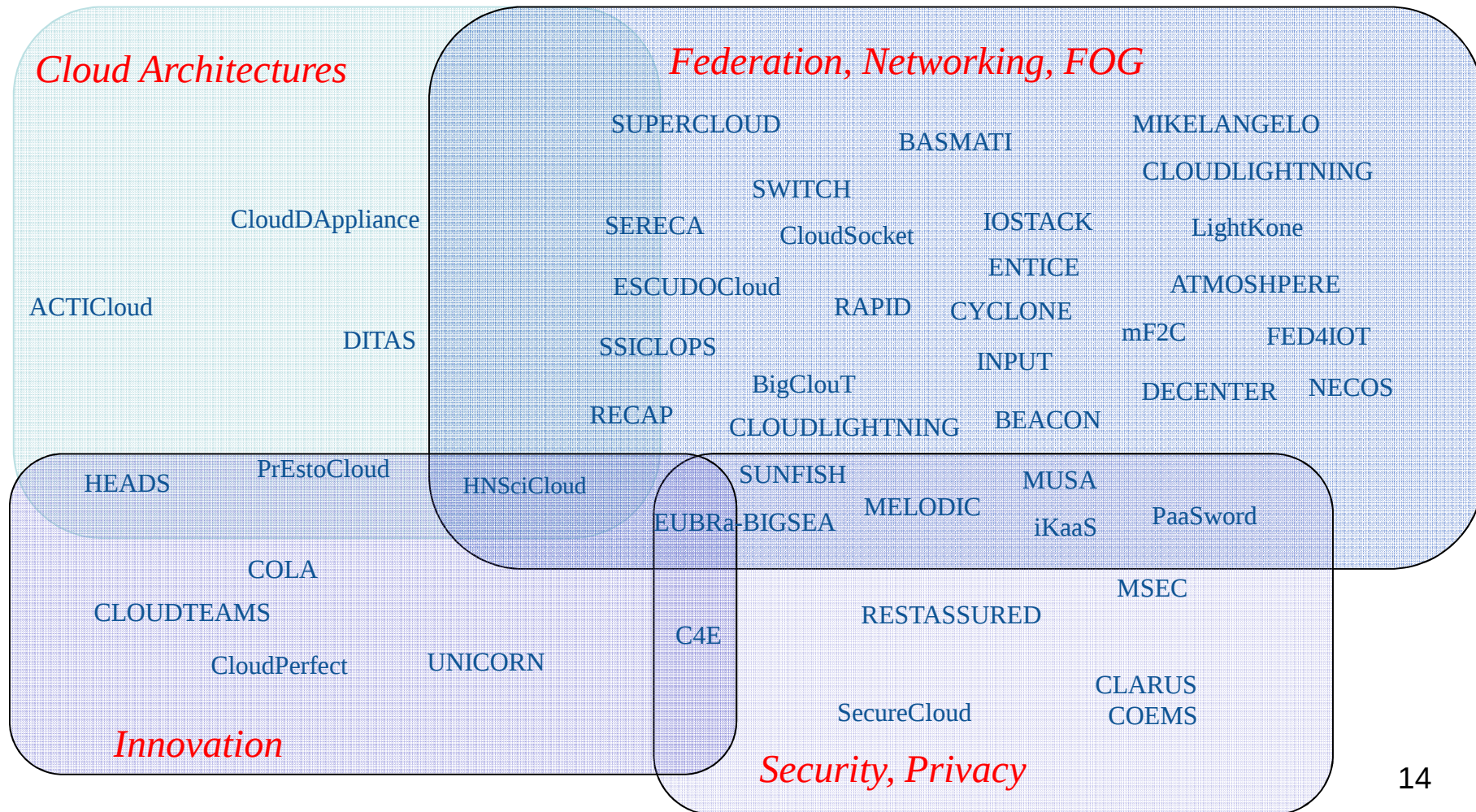
Policy Areas

Interoperability & Portability

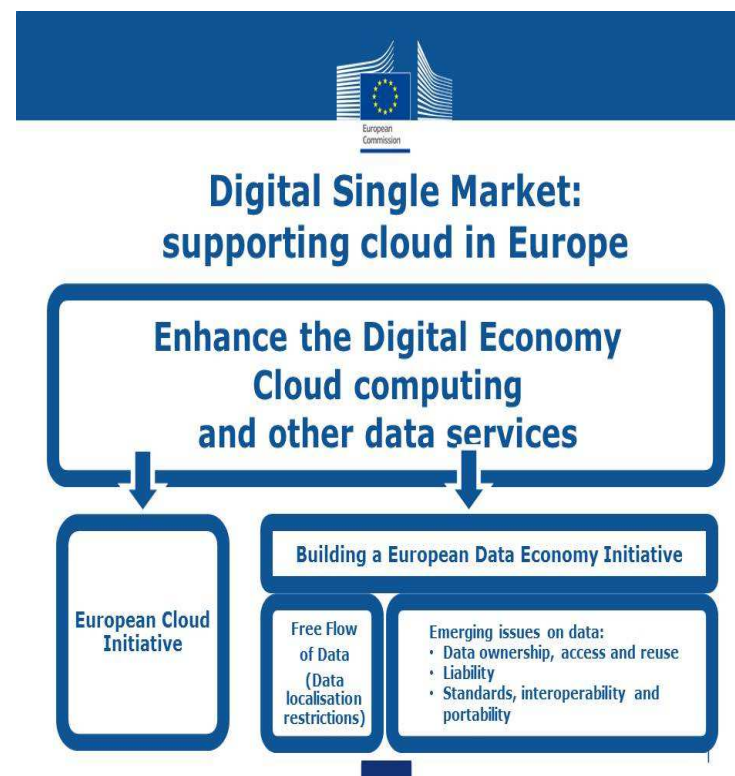
Crosscutting Co-ordination & Support Actions

REACHOUT, AppHub, CloudWatch 2, EUBrasilCloudForum

Horizon 2020 project portfolio in Cloud



- ❖ **European Cloud initiative** - tackle fragmentation and raise the trust and confidence of users in cross-border cloud services through EU-wide specifications and certification
- ❖ **Building a European data economy** - enable the best possible use of the potential of digital data to benefit the economy and society. Unlock the re-use potential of different types of data and its free flow across borders to achieve a European digital single market
- ❖ **Free flow of data** - address key obstacles to the freedom of movement of data within the EU
 - ❖ DSM Cloud Stakeholders Group (SWIPO/CSCPRT groups)
- ❖ **Interoperability and standardisation**—increase interoperability of products and services key aspects of EC's Digitising European Industry Initiative



- Internal consultation
- Position papers from Industry consultation, Experts, NESSI, CloudWatch, HolaCloud, Cloud Project Clusters, etc.
- Open web consultation
- Workshop → Final report: <https://ec.europa.eu/digital-single-market/en/news/consultation-cloud-computing-research-innovation-challenges-wp-2018-2020>

The specific Challenge

Cloud computing is changing from a pure elastic provisioning of virtual resources (or platforms) to a transparent and adaptive hosting environment that fully realizes the “everything as a service” provisioning concept, from centralized cloud to the edge, and from network and computing infrastructure up to the application layers.

The challenge is to develop comprehensive cloud solutions and testbeds combining various execution platforms for ubiquitous and seamless execution computing environments as a foundation for a complete computing continuum.

- This requires novel solutions for **federating infrastructures, programming applications and services, and composing dynamic workflows**, which are capable of reacting in **real-time** to unpredictable data sizes, availability, locations, and rates. This will provide application developers with greater control over network, computing and data infrastructures and services, and the end-user will benefit from seamless access to continuous service environments.
- Such solutions should also address **security, semantic interoperability, heterogeneous data integration, organisation and linking, data protection, performance, resilience and energy-efficiency requirements** to respond to the future digitisation needs of industry and the public sector.

Addressing these challenges will also be part of and contribute to the technological ambitions of the Next Generation Internet (NGI).

Proposals will address at **least one** of the following:

- I. **Advanced cloud technologies and testbeds combining aspects of network, computing and data/information resources** (i.e., next generation networks, novel datacenter architectures, fog/edge computing and sensor networks, large-scale analytics and simulation, public, hybrid, multi-cloud computing, etc.) to provide complete solutions encompassing network, computing and data services. The key aspect of these advanced cloud technologies is to **seamlessly combine computation resources all along the data path and support the complete service lifecycle** (i.e. from the end-user request/context to creation of workflows, monitoring of execution platforms, application deployment and adaptation while optimising the execution).
- II. **Advanced Cloud Data Privacy and Security techniques** taking into account issues such as integrating data protection principles, unifying security policies across cloud services and applications, defining personal data semantics, managing data locality, migration and latency.

III. Novel programming models and semantically interoperable services to support dynamic environments that respond intelligently to changes in application behaviour or data variability; automatic deployment and continuous dynamic composition of semantically annotated services; adaptability of services to different resources & usage contexts; automatic reasoning, scheduling and deployment of workflows on top of the resulting infrastructure.

The proposals should demonstrate the applicability and viability of the proposed solution across multiple application domains.

The Commission considers that proposals requesting a contribution from the EU of between EUR 3 and 5 million would allow this area to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Proposals in this action will address the following:

- Coordinate stakeholders in Cloud Computing and act as support to R&D programmes/activities by disseminating project results and organising scientific and policy events, developing research and innovation roadmaps, and addressing pre-standardisation initiatives.

The Commission considers that proposals requesting a contribution from the EU between EUR 400.000 to 600.000 would allow this area to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Research & Innovation Actions (RIA)

- Contribute to the development of an ecosystem and testbeds that will respond to the future digitisation needs of industry and the public sector;
- Assist the development of new cloud-based services and infrastructures in Europe and foster an industrial capability in the cloud computing sector;
- Create new opportunities to encourage European-based providers, in particular SMEs, to develop and offer cloud-based services based on the most advanced technologies;
- Leverage research and innovation projects to support the development and deployment of innovative cloud-based services and next generation applications, for the public and private sectors (including standardisation and applications for AI, Big-Data and other sector-specific applications).

Coordination & Support Actions (CSA)

- Creation of a sustainable European forum of stakeholders representing the Cloud Computing research, industry and users.

Provide appropriate metrics for claimed impacts

Hints to Proposers

What are we looking for?

- ✓ Development of **generic and advanced cloud technologies, mechanisms, techniques, etc.**
- ✓ The proposals should **demonstrate the applicability and viability of the proposed technological solutions** across multiple application domains.

What do we NOT want?

Any User Application development using existing cloud technologies



ICT-15-2019 Cloud

Upcoming events / information days

ICT Proposers' Days 2019 in Helsinki
September 19-20, 2019



ICT-40-2020: "Cloud Computing: towards a smart cloud computing continuum" will be presented in session:

"Cloud and software challenges beyond 2020"
→ September 20th, from 15:00 - 16:15

(call opens 19/11/19 - closes 22/04/20)

Further Information

H2020 Work Programme 2018-2020

Tbc

Digital Agenda – Cloud Computing

<https://ec.europa.eu/digital-single-market/en/cloud>

European Cloud Computing Strategy - DSM

<https://ec.europa.eu/digital-agenda/en/european-cloud-computing-strategy>

Report from the Public consultation :

<https://ec.europa.eu/digital-single-market/en/news/consultation-cloud-computing-research-innovation-challenges-wp-2018-2020>

Cloud Projects:

- <https://ec.europa.eu/digital-single-market/en/projects/75981/3494>
- http://www.cloudwatchhub.eu/sites/default/files/BookletA4_June2017_inner_v04_web.pdf