



The European Open Science Cloud as an enabler for data driven science



**United Nations/Italy Workshop on the
Open Universe Initiative**

Monday 20th November 2017

Carmela ASERO, European Commission, DG RTD.A.6

The Commission vision



European
Commission



#DigitiseEU
#DigitalSingleMarket

“

The industrial revolution of our time is digital. We need the right scale for technologies such as cloud computing, data-driven science and the internet of things to reach their full potential. The EU has this scale.



#DigitiseEU
#Cloud

“

European Cloud Initiative will unlock the value of big data by providing world-class supercomputing capability, high-speed connectivity and leading-edge data and software services for science, industry and the public sector.



Günther H. Oettinger
@GOettingerEU



Digital Single Market

”



#DigitiseEU
#openscience

“

The European Open Science Cloud will make science more open, efficient and productive.



Carlos Moedas
@Moedas



Digital Single Market

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COM 2016/178 - European Cloud Initiative (19 April 2016)

1. European Open Science Cloud (EOSC)

- Integration and consolidation of e-infrastructures
- Federation of existing research infrastructures and scientific clouds
- Development of cloud-based services for Open Science
- Connection of ESFRIs to the EOSC

2. European Data Infrastructure (EDI)

- Development and deployment of large-scale European HPC, data and network infrastructure

3. Widening access and building trust

- eGovernment (EU eGovernment Action Plan 2016-2020 – accelerating the digital transformation of government) SMEs, industry, citizens.



**EUROPEAN
CLOUD INITIATIVE**
UNLOCKING THE POWER OF
BIG DATA FOR OPEN SCIENCE

Key challenges



1. Still a lack of widespread **awareness** of the value of data and of **incentives** for data sharing.
2. Lack of common standards to ensure **inter-operability** of data.
3. **Not enough hardware capacity** for scientific computing, storage, connectivity.
4. **Fragmentation and lack of coordination** over different scientific communities and countries.
5. Need to translate recent **changes in privacy, data protection and copyright rules** to the research data domain.

EOSC: the vision



- The cloud will **federate** existing and emerging horizontal and thematic data infrastructures, effectively **bridging today's fragmentation and ad-hoc solutions**.
- It will provide 1.7m EU researchers an environment with **free, open services for data storage, management, analysis and re-use** across disciplines.
- It will **add value** (scale, data-driven science, inter-disciplinarity, data to knowledge to innovation) and leverage current and past infrastructure investment (10b per year by MS, two decades EU investment)..

Key Commitments in the COM

1. Governance

Develop roadmap for governance and financing
Create a global level playing field for research data sharing
Widen user-base to public services, Industry and EU-13

2. Content (open data)

Make Open research data default in H2020
Foster scientific data sharing in MS

3. (Open data) Infrastructure

Action Plan for scientific data Interoperability (e.g. FAIR)
Connect key EU RI (e.g. ESFRIs)
Consolidate / federate data-infrastructure

**Hardware
Infrastructure (CNECT)**

**High-Performance
Computing**

**Big-data
storage**

**High-speed
connectivity**

EOSC Summit: figures



- **110** key stakeholders
- **80** from all categories of scientific fields
- **15** national scientific infrastructures
- **13** research funders
- **19** officials from Member States and Associated Countries
- Overall, **23** Member States and Associated Countries represented
- **1800** via web stream and extensive coverage via Twitter



EOSC Summit Highlights

*Ground European science in a **common culture of data stewardship & sharing** throughout research data lifecycle. Only a **considerable cultural change** will enable long-term reuse of research data*

*Develop the **EOSC as a commons** of research data, knowledge and infrastructure with different roles and responsibilities by actors at EU and MS level*

*Stimulate compliance through **incentives and rewards***

***Data management plans** need to be made simple but mandatory*



EOSC Summit Highlights

*Make **FAIR principles pragmatic and technology-neutral**, equally encompassing all four dimensions: findability, accessibility, interoperability and reusability*

*Apply **FAIR principles to all digital research objects**, incl. data-related algorithms, tools, workflows, protocols & services*

*Disciplines must develop their notion of FAIR in a coordinated fashion. **Standards are fundamental** but a one-size-fits-all approach must be avoided*



EOSC Summit Highlights

*Build **trust between all stakeholders**, e.g. scientific communities, e-infrastructures, research infrastructures, funders - "look outside the organisational boxes and work together"*

*Set out both **the science case and the financial case** to raise commitments for the EOSC, in particular of MS – "whatever we do needs to be integrated with the national systems"*

*Develop a **formal framework for governing the EOSC** (process vs. project) to sustain and strengthen related policies & programmes and secure commitment of funders and users - "what needs to be governed and how?"*

EOSC – the way forward



EOSC Declaration (Sept 2017)

- key input for the Roadmap
- basis for follow-up discussion with MS (ERAC SWG 5+)
- Formally endorsed by more than 50 organisations so far

EOSC Roadmap (Dec 2017)

- **Governance structure** , incl. mandate & selection procedure for Gov. Board
- Broad (federated) architecture, incl. EOSC core services
- Financing

EOSC Horizon 2020 Support (Jan 2018-)

- ~260 to 300 mEuro until 2020 - INFRAEOSC
- Supporting service, governance and coordination

EOSC Stakeholders Forum (Nov 2017)

- open to ALL categories at Summit
- initially based on EOSCpilot project (Stakeholder Engagement Event 28-29 Nov)



EUROPEAN COMMISSION
DIRECTORATE-GENERAL FOR RESEARCH & INNOVATION

The Director-General

Brussels, 10 July 2017

EOSC Declaration

RECOGNISING the challenges of data driven research in pursuing excellent science;

GRANTING that the vision of European Open Science is that of a research data commons, widely inclusive of all disciplines and Member States, sustainable in the long-term,

CONFIRMING that the implementation of the EOSC is a process, not a project, by its nature iterative and based on constant learning and mutual alignment;

UPHOLDING that the EOSC Summit marked the beginning and not the end of this process, one based on continuous engagement with scientific stakeholders, the European Commission,

PROPOSES that all EOSC stakeholders consider sharing the following intents and will actively support their implementation in the respective capacities:

Data culture and FAIR data

- **[Data culture]** European science must be grounded in a common culture of data stewardship, so that research data is recognised as a significant output of research and is appropriately curated throughout and after the period conducting the research. Only a considerable cultural change will enable long-term reuse for science and for innovation of data created by research activities: no disciplines, institutions or countries must be left behind.
- **[Open access by-default]** All researchers in Europe must enjoy access to an open-by-default, efficient and cross-disciplinary research data environment supported by FAIR data principles. Open access must be the default setting for all results of publicly funded research in Europe, allowing for proportionate limitations only in duly justified cases of personal data protection, confidentiality, IPR concerns, national security or similar (e.g. 'as open as possible and as closed as necessary').
- **[Skills]** The necessary skills and education in research data management, data stewardship and data science should be provided throughout the EU as part of higher education, the training system and on-the-job best practice in the industry. University associations, research organisations, research libraries and other educational brokers play an important role but they need substantial support from the European Commission and the Member States.
- **[Data stewardship]** Researchers need the support of adequately trained data stewards. The European Commission and Member States should invest in the education of data stewards via career programmes delivered by universities, research institutions and other trans-European agents.
- **[Rewards and incentives]** Rewarding research data sharing is essential. Researchers who make research data open and FAIR for reuse and/or reuse and reproduce data should be rewarded, both

EC gathering endorsement and commitments on the EOSC declaration

- Action list/commitment its evolutive part
- Roadmap will follow (and will have future updates)

By endorsing the principles of the EOSC Declaration, stakeholders signal their intention to be involved in the making of the EOSC (eg. by taking specific action, by joining the Executive Board, by providing inputs via the annual stakeholder forum, or again by joining consortia , to implement the EOSC via Horizon 2020).

Objectives:

- Identifying 'doers' out of wide range of stakeholders
- Promote accountability

EOSC Declaration

- 33 high level statements meant to capture our common understanding on the required
 - ✓ Data culture & FAIR data,
 - ✓ Research data services & architecture,
 - ✓ Governance and funding
- Sent to Summit participants for agreement (stakeholders) and discussion (EU Member States' + Associated Countries' representatives)
- Endorsed by more than 50 stakeholders organisations so far



Annex 4

G7 EXPERT GROUP ON OPEN SCIENCE

Executive Summary

28th September 2017

The G7 Open Science Working group (OS WG) recognizes that an international approach for some actions can help the speed and coherence of the transition towards Open Science. Overall, the G7 Open Science Working Group recommends that each G7 nation convene and engage with relevant stakeholders who can support moves towards incentivizing the increased adoption of Open Science in their national context.

Alongside these efforts, it would be useful for G7 nations to continue sharing their perspectives and progress on developing policies and fostering adoption of Open Science principles and practices, and working together to find common areas of action to support more effective implementation of Open Science practices. The OS WG focused its efforts on developing recommendations for two important aspects of Open Science: Incentives and Infrastructure, as described below.

EOSC Roadmap

Governance – (3-layered structure, mandates, working procedures)

- Member States and EC (strategic)
- Executive Board (operational)
- Stakeholders Forum and related Working Group (advisory)

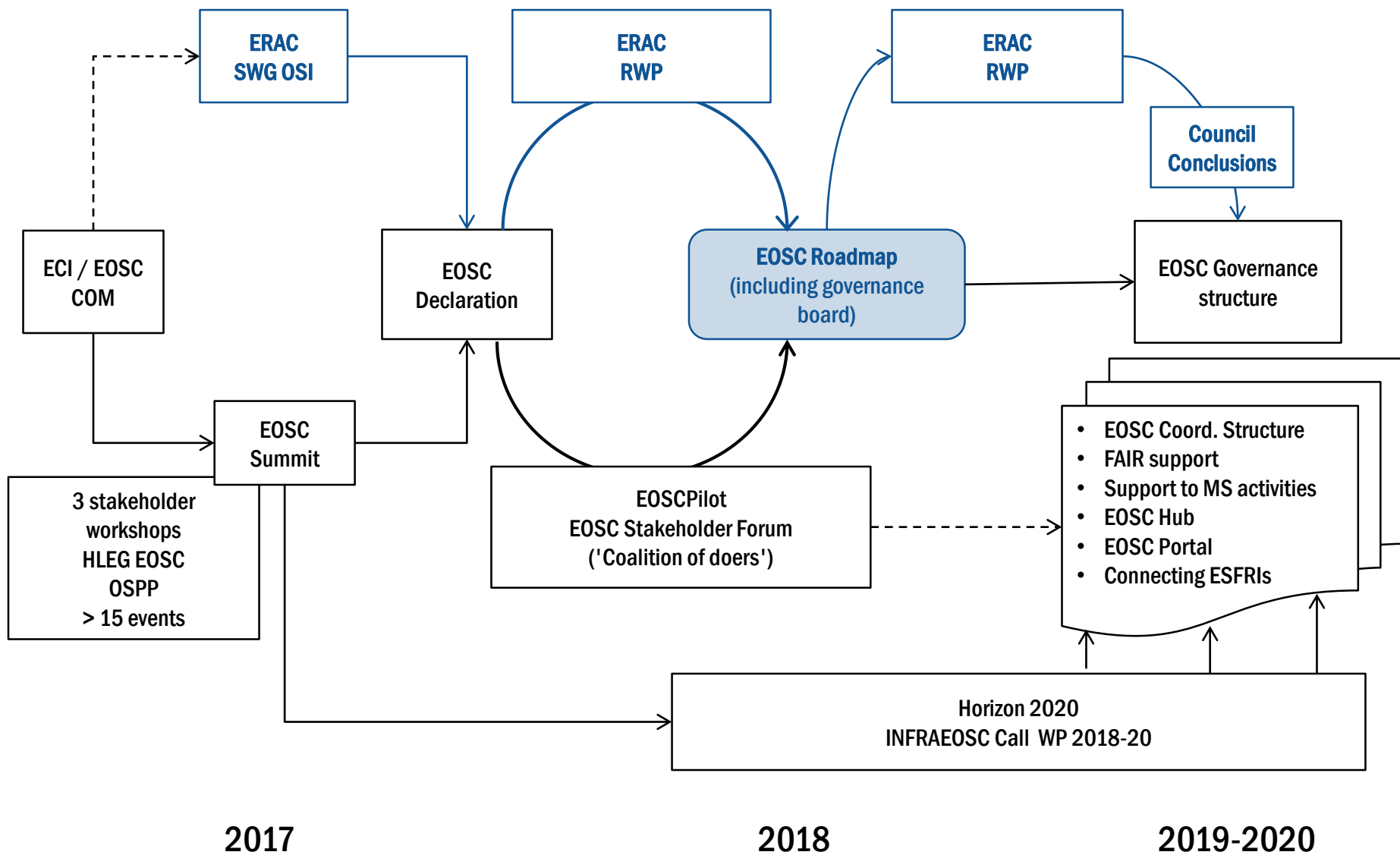
Architecture – launching EOSC stage 1 by 2020

- Supporting EOSC components (geographical & thematic)
- Core data & services through an EOSC Hub
- Advanced services by certified actors
- Catalogues of data & Catalogues of services
- Rules of participation
- EOSC Portal as a universal entry point
- FAIR data / FAIR Action Plan

Financing – stage 1 / stage 2

- H2020 – RI, in particular through WP2018-20
- Developing an EOSC Business Model for long-term sustainability

EOSC implementation process



WP 2018-2020: Call INFRAEOSC

Topic 1: Access to commercial services through the EOSC hub (2018)

Topic 2: Prototyping new services (2019)

Topic 3: *Integration & consolidation of pan-European access mechanisms to public e-infrastructures & commercial services through the EOSC hub (2020)*

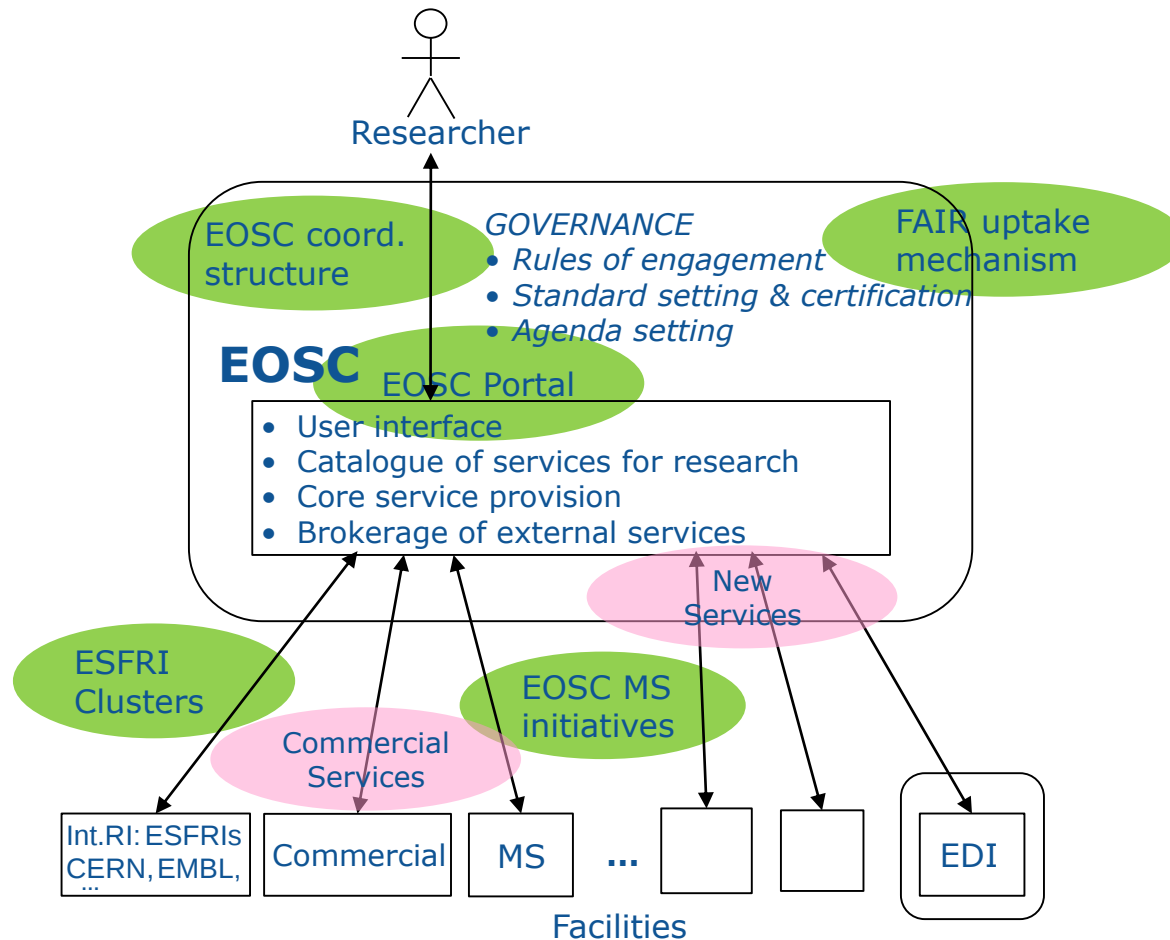
Topic 4: Connecting ESFRI RI through Cluster projects (2018)

Topic 5: Support to the EOSC governance (2018-2019)

Topic 6: Enhancing the EOSC portal *and connecting thematic clouds* (2019-2020)

Mapping of 2018-2019 actions

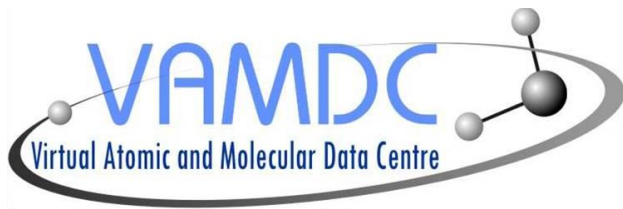
DRAFT



Relevant EU funded projects on space data



HELIO
Heliophysics Integrated Observatory



ESA SSEP Use Case



Questions?

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