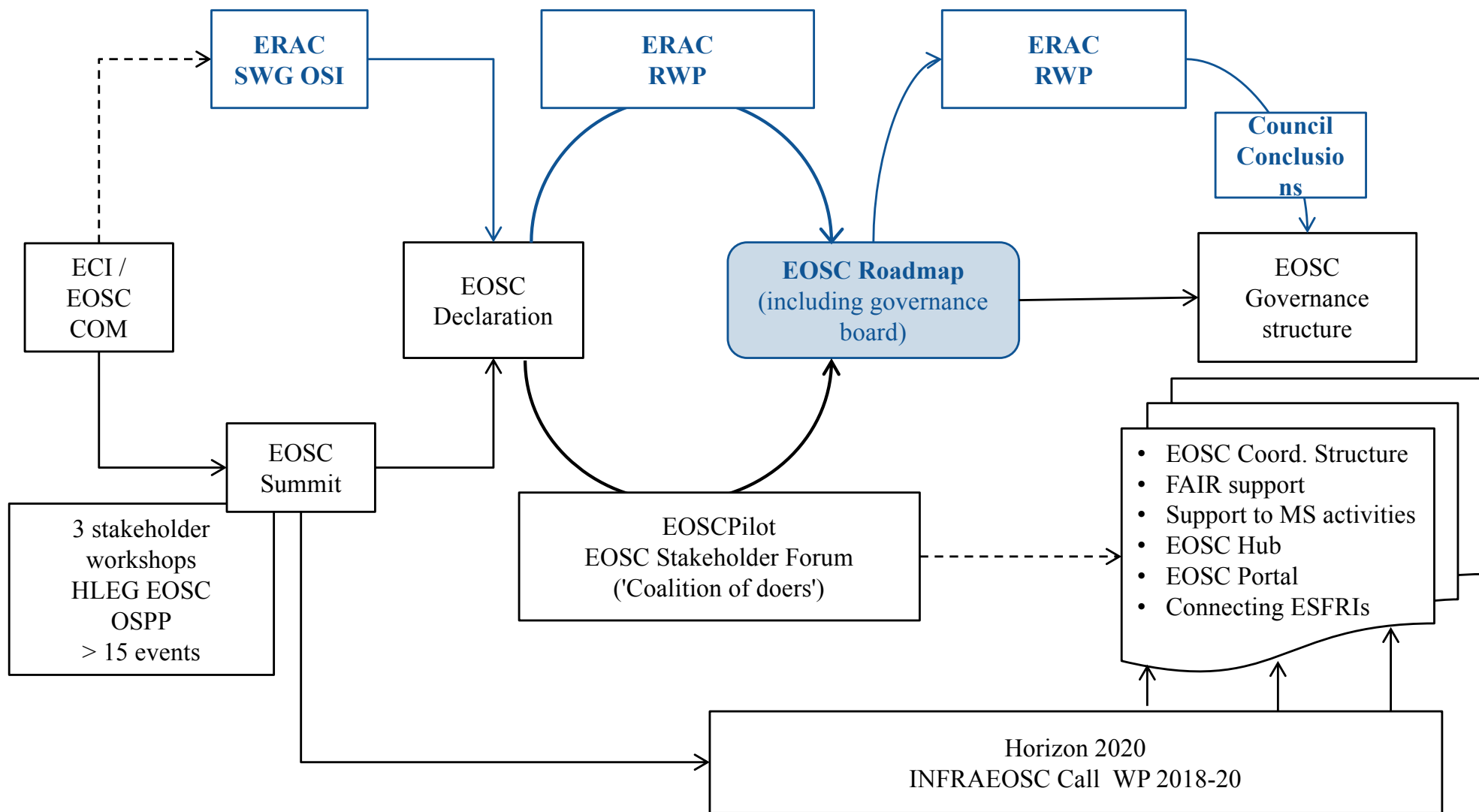European Commission

The European Open Science Cloud State of play

EOSC

The Canadian National Data Services Framework Summit

22 September 2017

EOSC implementation process

ERAC
SWG OSI

ERAC
RWP

ERAC
RWP

Council
Conclusions

ECI /
EOSC
COM

EOSC
Declaration

EOSC Roadmap
(including governance board)

EOSC
Governance
structure

EOSC
Summit

3 stakeholder workshops
HLEG EOSC
OSPP
> 15 events

EOSCPilot
EOSC Stakeholder Forum
('Coalition of doers')

- EOSC Coord. Structure
- FAIR support
- Support to MS activities
- EOSC Hub
- EOSC Portal
- Connecting ESFRIs

Horizon 2020
INFRAEOSC Call WP 2018-20

2017

2018

2019-2020

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

1. European Open Science Cloud (EOSC)
- o Integration and consolidation of e-infrastructures
- o Federation of existing research infrastructures and scientific clouds
- o Development of cloud-based services for Open Science
- o Connection of ESFRIs to the EOSC

2. European Data Infrastructure (EDI)
- o Development and deployment of large-scale European HPC, data and network infrastructure

3. Widening access and building trust
- o eGovernment (EU eGovernment Action Plan 2016-2020 – accelerating the digital transformation of government) SMEs, industry, citizens.

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.
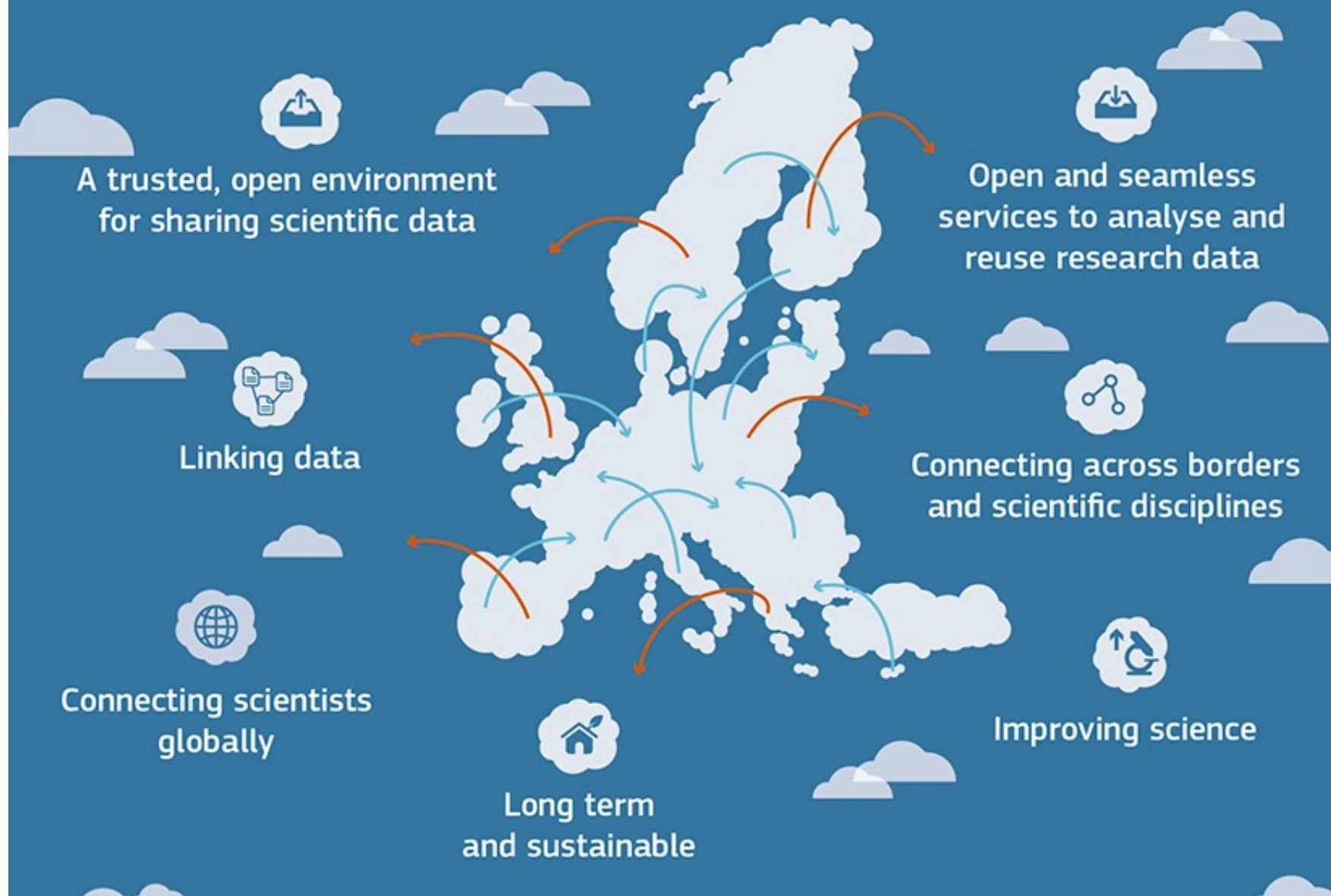
EOSC: the vision

o The cloud will **federate** existing and emerging horizontal and thematic data infrastructures, effectively **bridging todays fragmentation and ad-hoc solutions**.

o It will provide 1.7m EU researchers an environment with **free, open services for data storage, management, analysis and re-use** across disciplines.

o 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)..

EUROPEAN OPEN SCIENCE CLOUD

BRINGING TOGETHER CURRENT AND FUTURE DATA INFRASTRUCTURES

A trusted, open environment for sharing scientific data

Open and seamless services to analyse and reuse research data

Linking data

Connecting across borders and scientific disciplines

Connecting scientists globally

Improving science

Long term and sustainable

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-infrastructures

| **Hardware Infrastructure (CNECT)** | High-Performance Computing | Big-data storage | High-speed connectivity |

EOSC Summit: figures

- o **110** key stakeholders

- o **80** from all categories of scientific fields

- o **15** national scientific infrastructures

- o **13** research funders

- o **19** officials from Member States and Associated Countries

- o Overall, **23** Member States and Associated Countries represented

- o **1800** via web stream and extensive coverage via Twitter

EOSC Summit – main messages

➢ 12 June 2017: beginning of the implementation

➢ The EOSC will be developed as <u>European Commons</u> :
  - Common culture of data sharing, supported by research funders
  - Common practices, tools and standards regarding FAIR data
  - Common data and service catalogues
  - Common governance framework

➢ All willing participants can both benefit from and contribute to <u>specific implementation actions</u> (EOSC Roadmap).

➢ EC will table a course of action with Member States in the Summer 2017, aiming to arrive at a shared Roadmap for governance and funding by the end of 2017.

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)

- o key input for the Roadmap
- o basis for follow-up discussion with MS (ERAC SWG 5+)

EOSC Roadmap (Dec 2017)

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

EOSC Horizon 2020 Support (Jan 2018-)

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

EOSC Stakeholders Forum (Nov 2017)

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

DG RTD

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 (MS representatives)

- Web-posting for wider diffusion/agreement expected early September

DG RTD

EC gathering endorsement and commitments on the EOSC declaration

- EOSC Declaration won't be modified

- 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*

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

EOSC Roadmap

Governance – (3-layered structure, mandates, working procedures)
- Member States and EC (strategic)
- Executive Board (operational)
- Stakeholders Forum (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 Governance structure
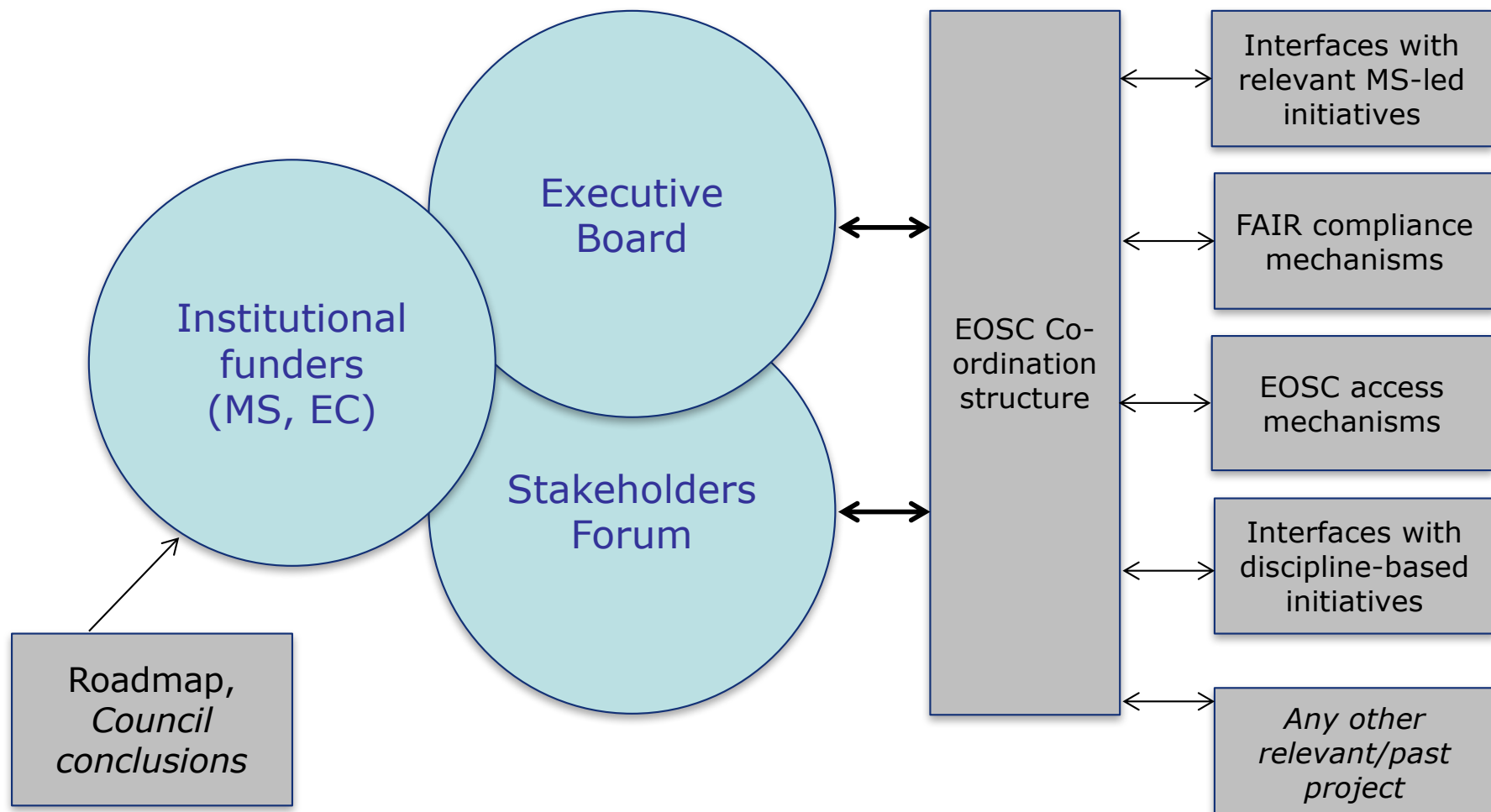
EU support to the EOSC in 2016-2017

➢ **Pilot action** for EOSC in 2016 under the H2020 RI WP part

To demonstrate how to ensure availability of scientific data and data-analysis services through a cloud infrastructure and design a stakeholder driven governance framework.

➢ E-Infrastructures topics in 2017 under the H2020 RI WP part for **federation & interoperability of data e-infrastructures**

➢ *Building over substantial investments in previous years (more than 500 M€ under FP7 and first two years of H2020) supporting :*

❑ integration at EU level of national scientific data infrastructures,

❑ development and interoperability (even at global level) of pan-European Thematic Data RI,

❑ development of data & distributed computing e-infrastructures, e-Infrastructure for open access, VRE

❑ global interoperability through the Research Data Alliance

and delivering a wealth of generic and thematic data services, work-flows, interoperable standards and ontologies, ….
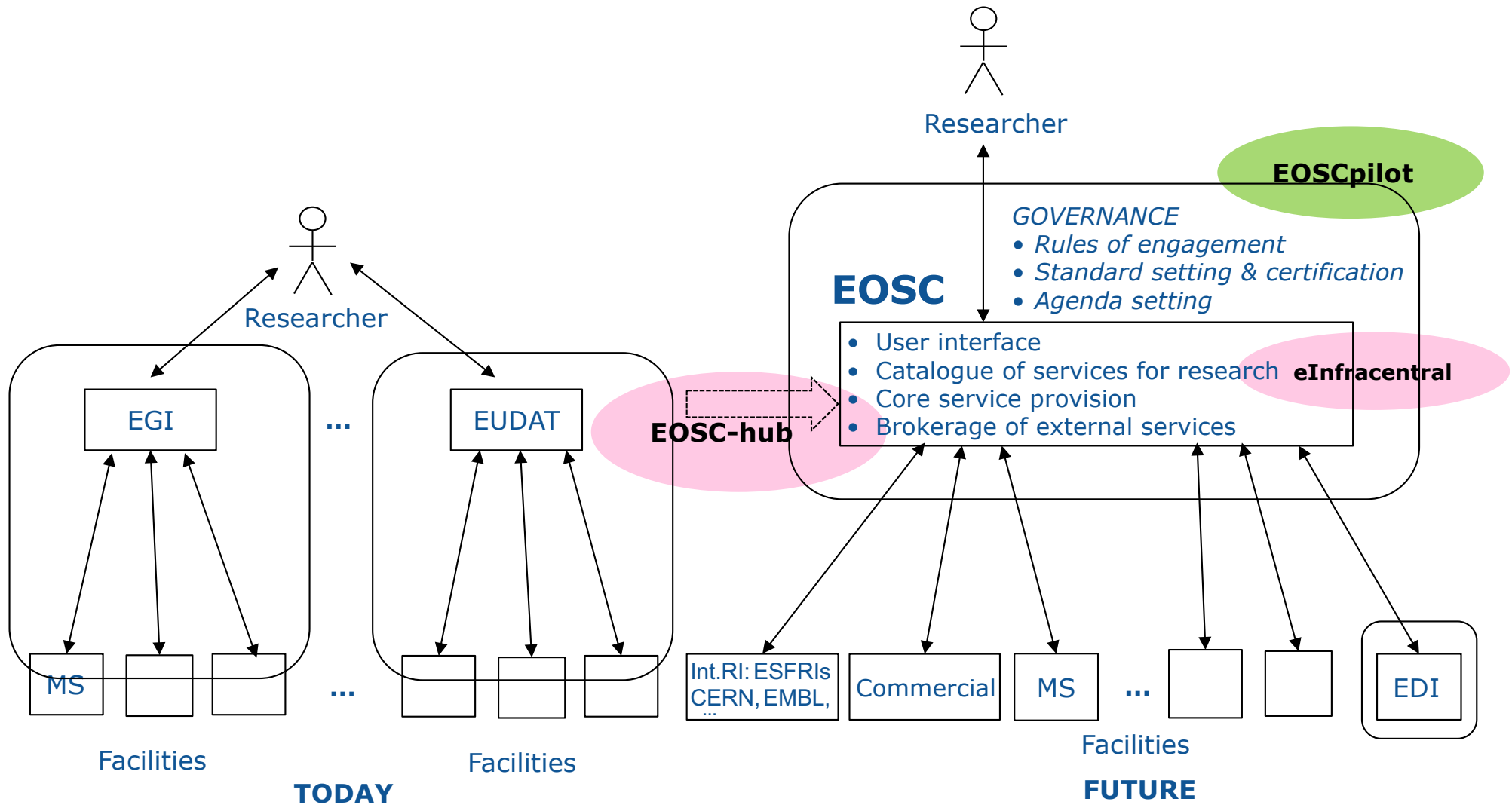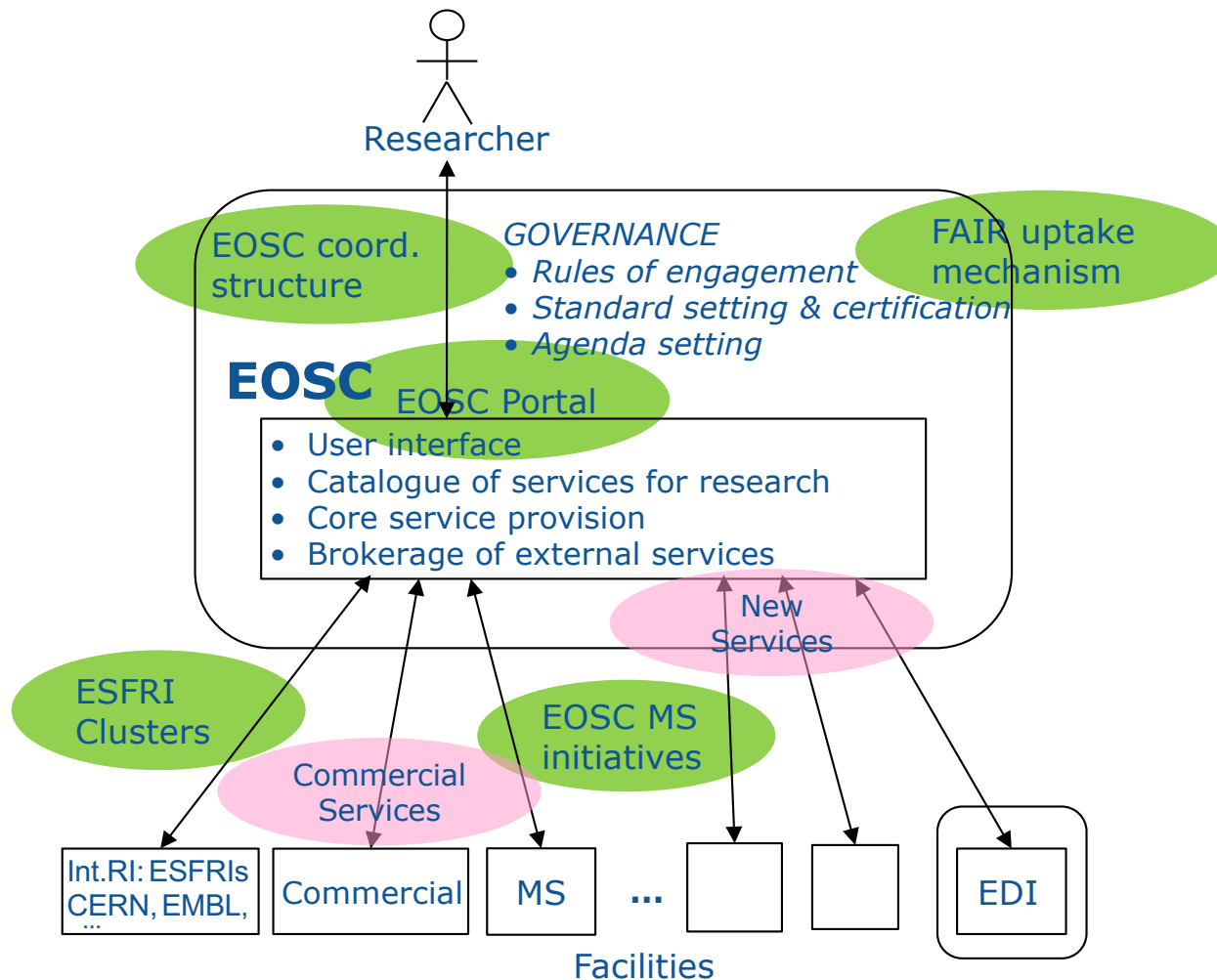
EU support to the EOSC in 2016-2017

Mapping of 2018-2019 actions

DRAFT

Questions?

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EOSC Declaration / Data culture

[Data culture]
European science must be grounded in a common culture of data stewardship… only a considerable cultural change will enable long-term reuse for science and for innovation of data……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… allowing for proportionate limitations only in duly justified cases…(e.g. 'as open as possible and as closed as necessary').

[Skills]
The necessary skills and education in research data management…should be provided throughout the EU…substantial support from the European Commission and the Member States.

[Data stewardship]
Researchers need the support of adequately trained data stewards…via career programmes delivered by universities, research institutions and other trans-European agents.

[Rewards and incentives]
Rewarding research data sharing is essential…go hand in hand with other career policies…

[Data Management Plans]
A key element of good data management is a Data Management Plan (DMP)…should become obligatory in all research projects generating or collecting publicly funded research data…

EOSC Declaration / FAIR principles

[FAIR principles]
Implementation of the FAIR principles must be pragmatic and technology-neutral…disciplinary sectors must develop their specific notions of FAIR data in a coordinated fashion…FAIR principles should apply not only to research data but also to…other kinds of digital research objects.

[Standards]
The EOSC must be underpinned by minimal and rigorous global standards…must combine long-term sustainability with optimal freedom of local implementation… jointly defined by the research communities, taking into account existing instruments…Variations across scientific disciplines and their specific efforts of making research data open and FAIR should be respected.

[Implementation and transition to FAIR]
…The FAIR Data Action Plan 2018-2020 is an important collaborative instrument for the embedding of FAIR principles in the first phase of the EOSC…existing activities to make data FAIR (e.g. GO-FAIR) must be complemented by new initiatives that embed FAIR principles in all the phases of data lifecycle.

[Research data repositories]
…Scientist must be able to find, re-use, deposit and share data via trusted data repositories that implement FAIR data principles…and ensure long-term sustainability of research data across all disciplines. Data repositories must be easy to find and identify…

EOSC Declaration / FAIR principles

[Accreditation / Certification]
*Scientists must be assured that the European and national scientific research infrastructures …
conform to clear rules and criteria (e.g. certified)…An accreditation or certification mechanism
must be set in place…maintain an up-to-date and accessible catalogue of certified repositories…*

[Technical implementation]
*…researchers also need handy tools to make data FAIR. These include: a data citation
system…catalogues (e.g. for datasets, services, standards)…a common set of FAIR tools and
services… allowing meaningful data exchange and reuse among scientific disciplines and countries*

[Legal aspects]
*…address the legal uncertainty of Open Access to research data…Legal barriers to access and
reusability of research data must be identified and overcome and the underpinning legal
framework must be made simpler and more coherent…issues of ownership must be addressed…
allow easier integration of research data across different legal frameworks…*

[FAIR data governance]
*…inclusive stakeholder participation…Policy will go hand in hand with the implementation of
technical and human resources, and a social infrastructure including education and
training….engage stakeholders and relevant multipliers…division of responsibilities…align their
data-related business processes…*

EOSC Declaration / Services & Architecture

[EOSC architecture]
The EOSC will be developed as a data infrastructure commons serving the needs of scientists…EOSC will federate existing resources…service provision will be based on local-to-central subsidiarity…Users should contribute…continuous dialogue to build trust and agreements…

[Implementation]
Resources, components and initiatives of pan-European relevance will be federated on the basis of objective criteria…to deliver EOSC main functionalities…

[Legacy]
The EOSC should incentivise the re-use of existing building blocks, state-of-the-art services and solutions…It should facilitate learning from the past…

[User needs]
Users should see the EOSC as a one-stop-shop…Services and functionalities shall be user driven and determined by clear use cases…

[Service provision]
Research Data Infrastructures, e-infrastructures and commercial operators will develop and provide services based on user needs…Services will be offered at highest Technology Readiness Levels (TRLs) and kept future-proof…avoid lock-in by individual service providers…

[Service deployment]
The EOSC shall support different deployment models…Software sustainability should be treated on an equal footing as data stewardship.

EOSC Declaration / Services & Architecture

[Thematic areas]
The EOSC shall promote the co-ordination and progressive federation of open data infrastructures developed in specific thematic …implement a common reference scheme…

[Research infrastructures]
The role of ESFRI and EIROFORUM research infrastructures and organisations in the EOSC will be enhanced…research infrastructures should be 'the steward of the community of standards' and provide scientists with a ramp-up for the utilisation of the EOSC.

[EU-added value and coordination]
…national and European measures is required to link the initiative to national strategies, to maximise the added value of inter-disciplinarity…and to preventing duplication of efforts and investments…minimizing overlap and reducing fragmentation of infrastructures and services…

[High Performance Computing and the EOSC]
European commitment to HPC is clearly demonstrated by signature of the EuroHPC agreement…to make available across the EU an exascale high performance computing infrastructure…build on the progresses made by PRACE and by GÉANT. This European infrastructure could support the European Open Science Cloud…

[Innovation]
The EOSC should create a level playing field for businesses and innovative SMEs…Funding should support the migration of cutting-edge solutions to the EOSC…

EOSC Declaration / Governance & Funding

[Governance model]
…strong and flexible governance model based on trust and increasing mutuality...based on representativity, proportionality, accountability, inclusiveness and transparency.

[Governance framework]
The EOSC governance framework will be co-designed, stakeholder driven and composed of three main layers: 1) institutional…2) operational…and 3) advisory…

[Governance board]
…The board will have an advisory role and an implementing role of the decisions by Member States and European Commission concerning the programming, financing and towards the setting up of a long-term governance and business model….

[Coordination structure]
A coordination structure, funded by Horizon 2020, will help the governance board to manage the implementation…

[Funding]
…a co-funding mechanism mixing different revenue streams for the EOSC will be set up…Early implementation of the EOSC will pilot innovative business models and support an integrated data and service platform for European research.

[Global aspects]
The EOSC will be European and open to the world…It will increase the global value of open research data and support stakeholder engagement…