Open science and open scholarship (in Europe and the rest of the world) No way back

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Key messages

- Science is changing fast to the modis operandi of ''open science''
- European & several global policies support this
- Open science is science of the 21st century
- Science in 2030 will be mainly data driven and publishing will reflect this
- Universities need to invest in data stewardship and skills

Times are changing? … Times did change
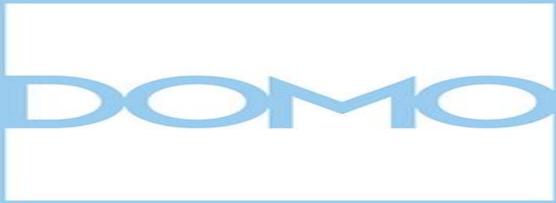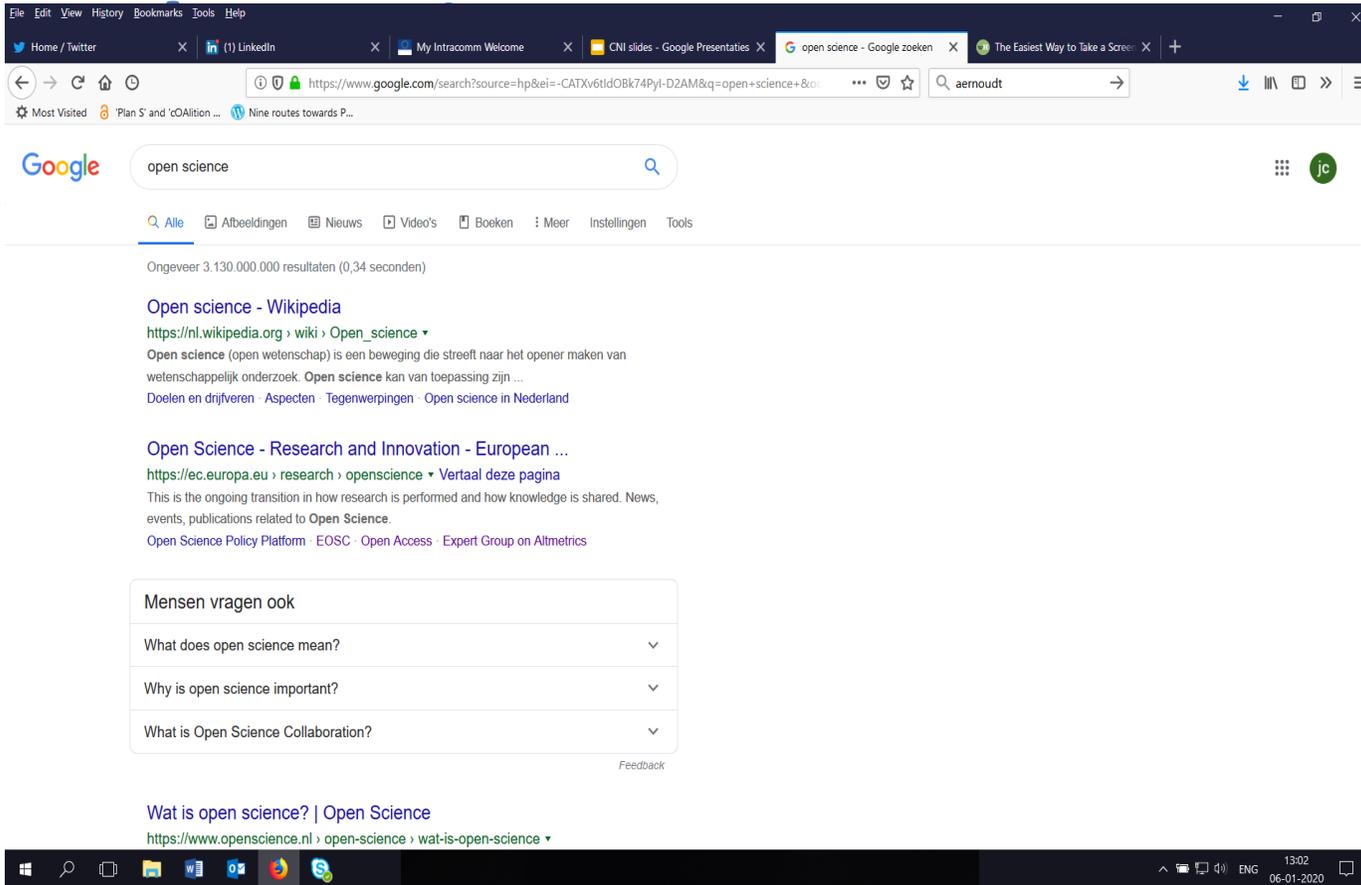

DATA NEVER SLEEPS 8.0

How much data is generated *every minute?*

In 2020, the world changed fundamentally—and so did the data that makes the world go round. As COVID-19 swept the globe, nearly every aspect of life—from work to working out—moved online, and people depended more and more on apps and the Internet to socialize, educate and entertain ourselves. Before quarantine, just 15% of Americans worked from home. Now over half do. And that's not the only big shift. In our 8th edition of Data Never Sleeps, we bring you the latest stats on how much data is being created in every digital minute—a trend that shows no sign of stopping.

ZOOM HOSTS **208,333** PARTICIPANTS IN MEETINGS

REDDIT SEES **479,452** PEOPLE ENGAGE WITH CONTENT

NETFLIX USERS STREAM **404,444** HOURS OF VIDEO

DOORDASH DINERS ORDER **555** MEALS

INSTAGRAM USERS POST **347,222** STORIES

FACEBOOK USERS UPLOAD **147,000** PHOTOS

YOUTUBE USERS UPLOAD **500 HRS** OF VIDEO

WHATSAPP USERS SHARE **41,666,667** MESSAGES

TWITTER GAINS NEW USERS **319**

$3,805 IS SPENT ON MOBILE APPS

CONSUMERS SPEND **$1,000,000** ONLINE

1,388,889 PEOPLE MAKE VIDEO/VOICE CALLS

MICROSOFT TEAMS CONNECT **52,083** USERS

2020 *every* **MINUTE** *of* **DAY** *the* PRESENTED BY DOMO

AMAZON SHIPS **6,659** PACKAGES

INSTAGRAM BUSINESS PROFILE ADS SEE **138,889** CLICKS

SPOTIFY ADDS **28 TRACKS** TO ITS MUSIC LIBRARY

VENMO USERS SEND **$239,196** WORTH OF PAYMENTS

TIKTOK IS INSTALLED **2,704** TIMES

LINKEDIN USERS APPLY FOR **69,444**

FACEBOOK USERS SHARE **150,000** MESSAGES

Times are changing in science ...
OS and OA/OD is a global topic in policy

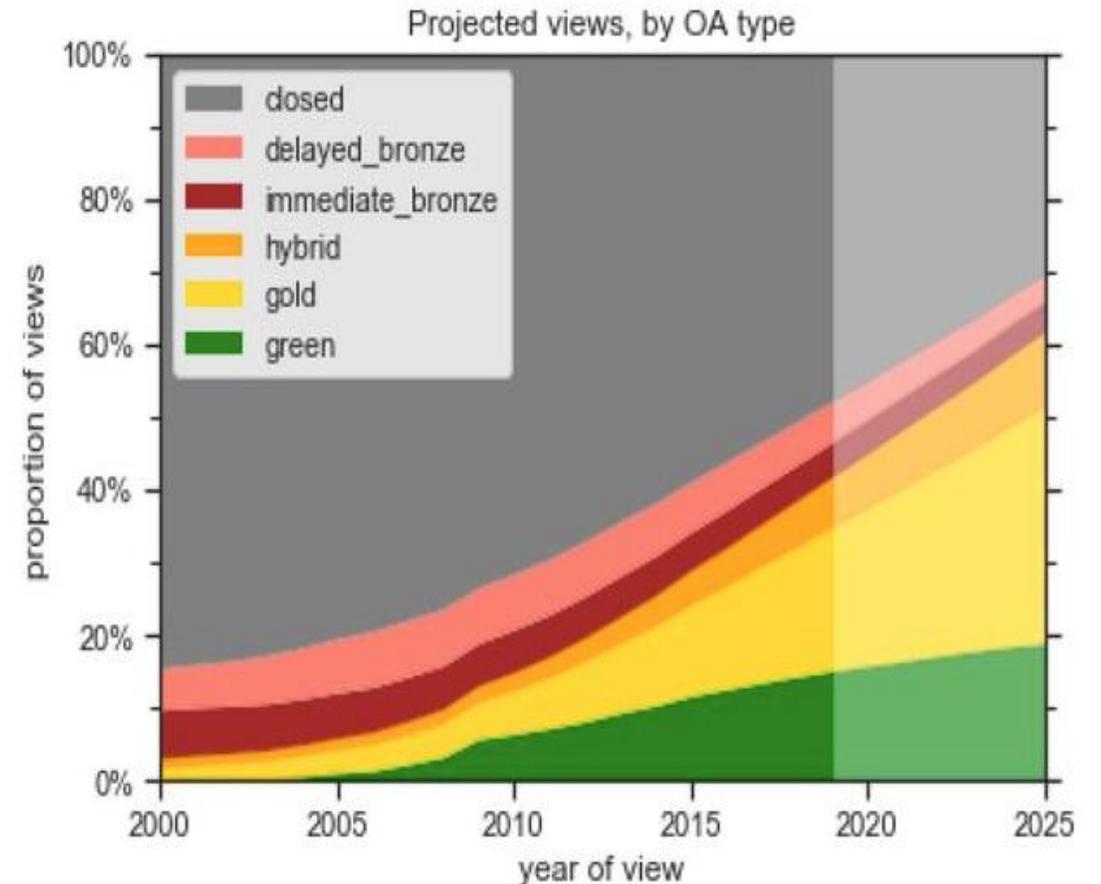
➢ 3.6 billion hits in Google search (6/7//2020)

➢ Discussed globally

➢ Deployed globally

➢ Europe's main Coll/petitors waking up (China, US)

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Open Access to publications is mainstreaming

- Pinowar, Priem & Orr study (2019)
- (based on a global analysis of 70 million scientific articles published between 1950-2019)

- 2019: 31% available in OA
          52% of all article views are OA articles

- 2025: 44% available
         78% viewed

''If we would have to reinvent the publication system today starting from scratch: most likely every one would go for immediate open access''
(D. Rogers, former CEO SN, Summer 2019)

Projected views, by OA type

Legend:
- closed
- delayed_bronze
- immediate_bronze
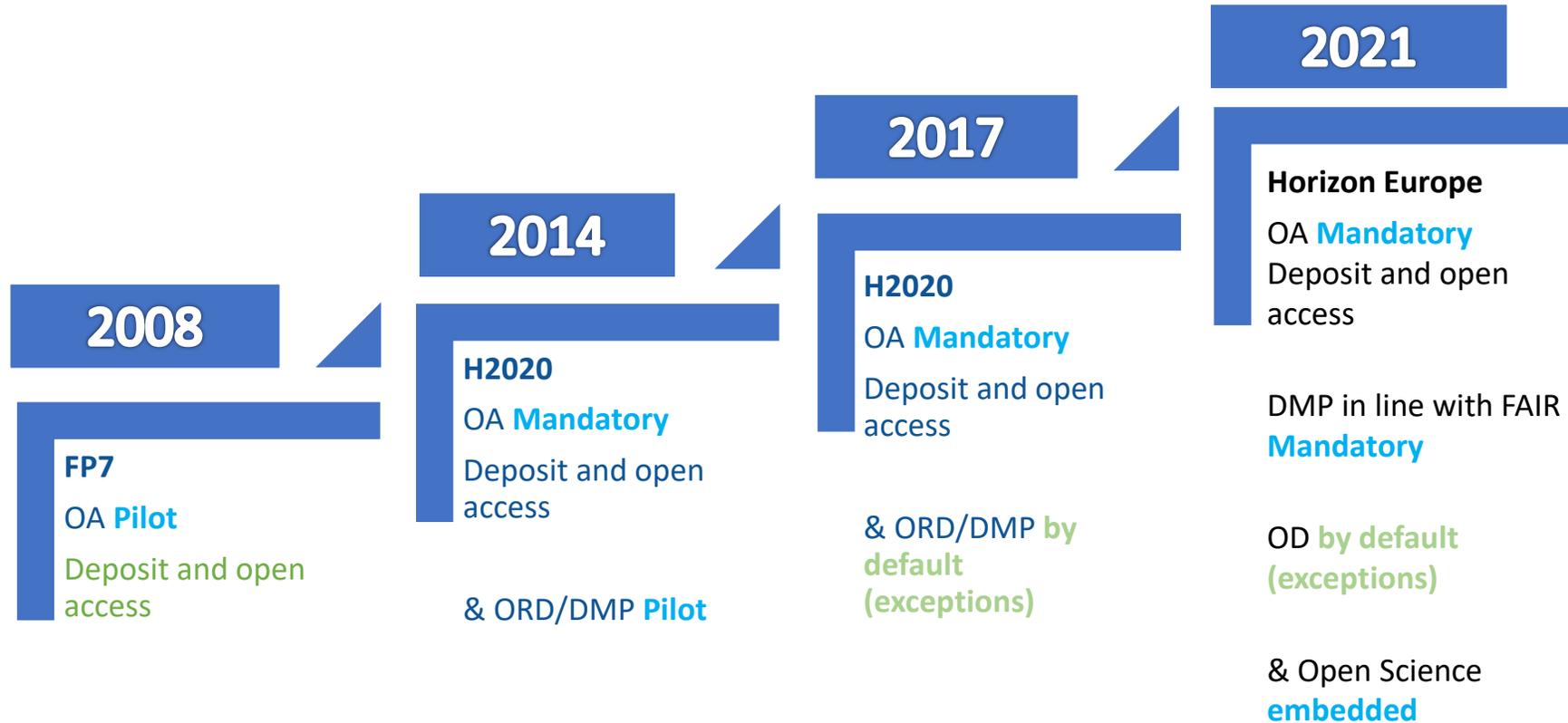- hybrid
- gold
- green

Open Data is de facto a fact of research life

The state of open data - main findings
(Digital Science/Figshare, 2019)

- 79% of 2019 respondents (>8500 researchers) were supportive overall of a national mandate for making primary research openly available

- 67% of respondents think that funders should withhold funding from, or penalise in other ways, researchers who do not share their data if the funder has mandated that they do so

- 69% of respondents think that funders should make the sharing of research data part of their requirements for awarding grants

- 36% of respondents expressed the concern that their data may be misused if it was shared

- 42% of researchers would be encouraged to share their data if it resulted in a co-authorship

- 1000ds of specialists and policy makers globally are working on open data (EOSC, RDA, CODATA, GOFAIR, G7, UN DATA COMMONS....)

EU policies were ahead or on top of the curve

2008

FP7

OA **Pilot**

Deposit and open access

2014

H2020

OA **Mandatory**

Deposit and open access

& ORD/DMP **Pilot**

2017

H2020

OA **Mandatory**

Deposit and open access

& ORD/DMP **by default (exceptions)**

2021

Horizon Europe

OA **Mandatory**
Deposit and open access

DMP in line with FAIR **Mandatory**

OD **by default (exceptions)**

& Open Science **embedded**

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And will stay there (Horizon 2020)

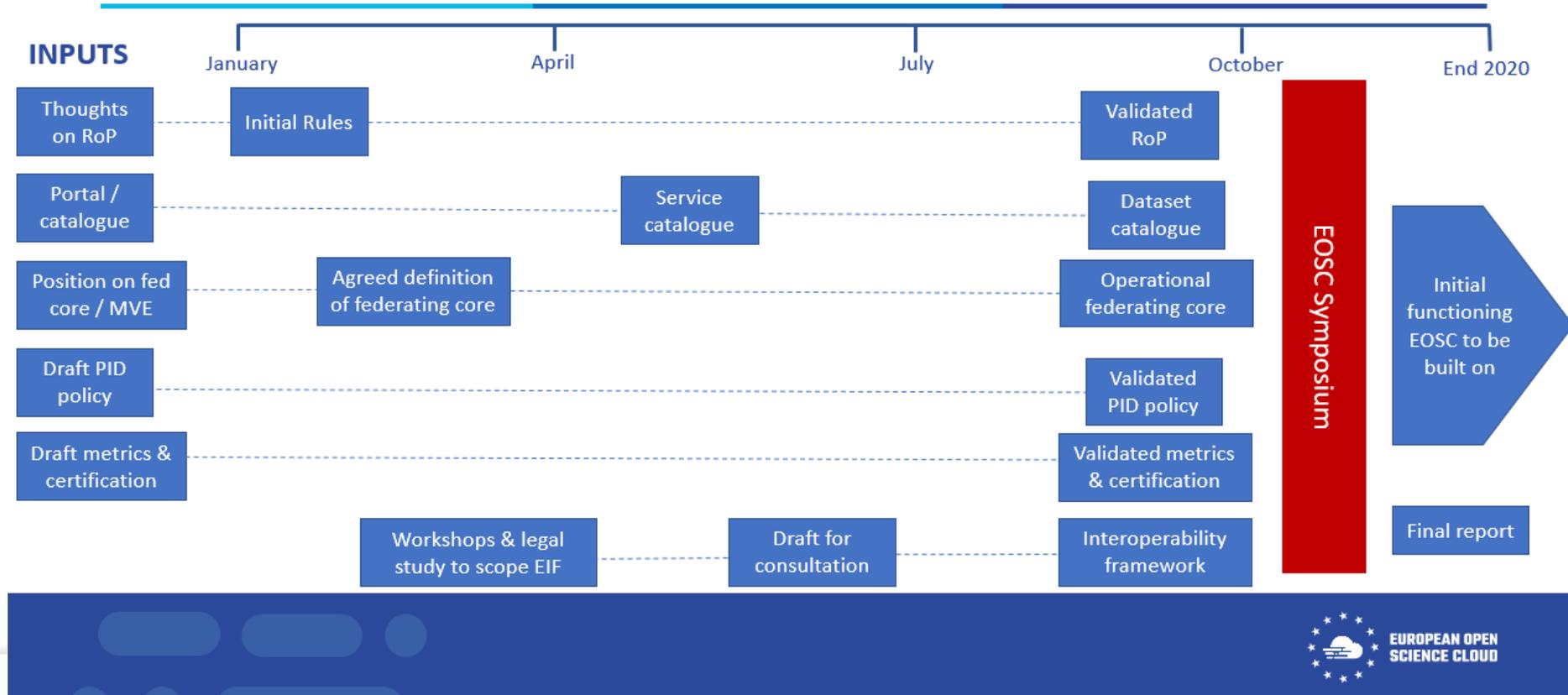1. Alignment of Horizon Europe with main Plan S principles

- Mandatory and Immediate open access
  - Embargoes not accepted any longer
  - Open access via repositories kept
  - Already in Horizon Europe's impact assessment
- Publication in hybrid journals allowed yet not funded (i.e. costs not eligible)
  - Already in Horizon Europe's impact assessment
- Copyright retention and open license
  - Copyright retention already in the HE Regulation
  - Open license to be required (in line with new standard licence adopted by the EC for its own information production)
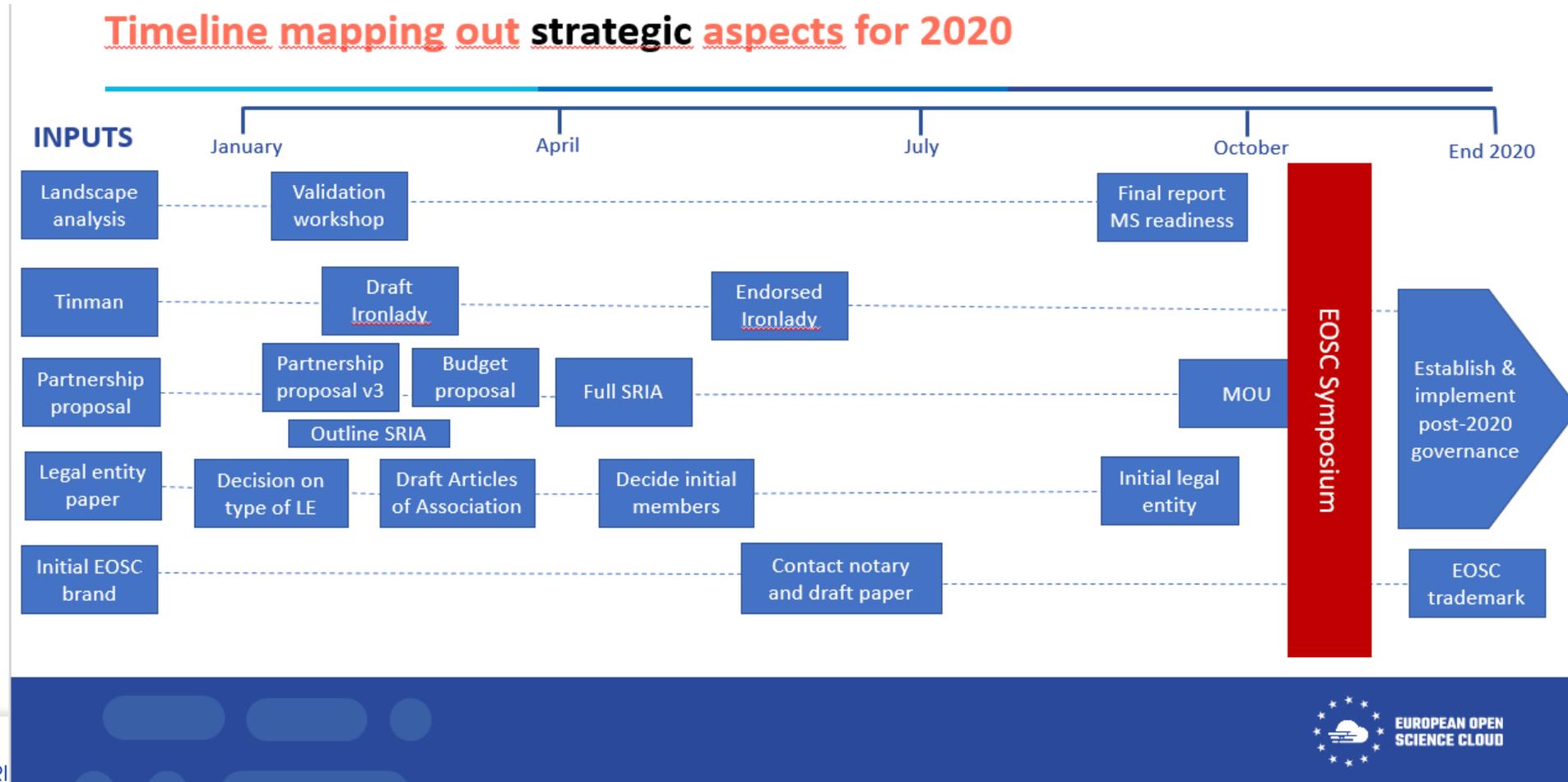
2. Making EOSC an operational reality

EOSC - Draft time line till end 2020
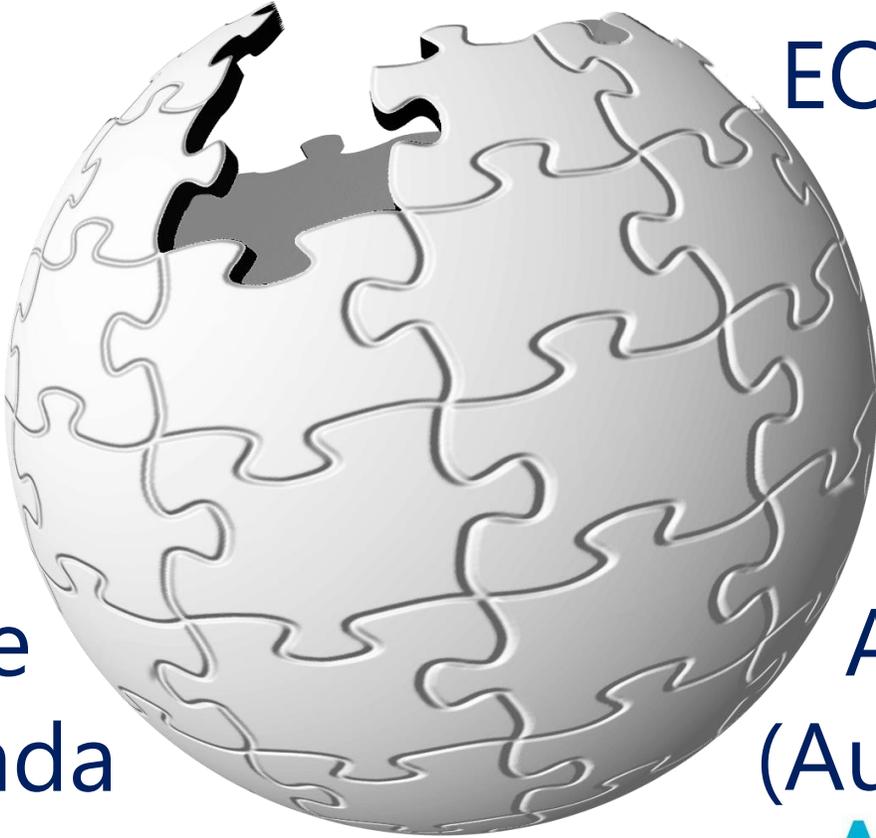
(Source M. Schouppe, DG RTD, G4)

Timeline mapping out implementation aspects for 2020

INPUTS	January	April	July	October	End 2020

- Thoughts on RoP
- Initial Rules
- Validated RoP
- Portal / catalogue
- Service catalogue
- Dataset catalogue
- Position on fed core / MVE
- Agreed definition of federating core
- Operational federating core
- Draft PID policy
- Validated PID policy
- Draft metrics & certification
- Validated metrics & certification
- Workshops & legal study to scope EIF
- Draft for consultation
- Interoperability framework

EOSC Symposium

Initial functioning EOSC to be built on

Final report

EUROPEAN OPEN SCIENCE CLOUD

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EOSC Draft time line till end 2020 (cont.)

Timeline mapping out strategic aspects for 2020

INPUTS | January | April | July | October | End 2020

A global Science Cloud emerging...

EOSC (Europe)

Compute Canada

ARDC (Australia)

NSF (US)

The value of OS as a system change (modus operandi) is now widely accepted

- Open Science is a system change allowing for better science through open and collaborative ways of producing and sharing knowledge and data, as early as possible in the research process, and for communicating and sharing results.

- Open Science increases the quality and impact of science by fostering reproducibility and inter disciplinarity.

- It makes science more efficient through better sharing of resources, more reliable through better verification and more responsive to society's needs.

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Because the he value of open science for science is self evident

- Better ROI of the R&I investments: if all the results of our public research are made reusable, it will follow that better use is made.
  Norori: Eco impact Human Gnoom sequencing: 1 billion eco output, 4 million jobs, 30% more genetic testing, innovative new methods, cures etc)

- Faster circulation of new ideas: we have 22 million EU SME's that will have access to top notch research without having to significantly pay for it!

- More transparency of the science system: the public taxpayer has this right & and it helps auto correction of the system

- Fit for 21st century science purpose: all grand societal challenges NEED cross disciplinary research (and thus FAIR open data)

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European actors of the science system are adapting and even leading

Europe has:

- Top players advocating and implementing new OS practices (LERU, Caesar, EUA))
- Strong support from funders (Coalition S)
- Early and successful innovators of OS science dynamics (Mendeley, Figshare,…)
- Early and successful innovators of new practices and publishing business models (F1000, Frontiers, Hindawi …)
- (parts of) Some big players starting to follow (Transformative Journals, Dutch deal)
- Huge data communities working for open data (GO Fair)
- Proactive OS policy makers: emerging council of national OS coordinators, EOSC communities, EC…..

Commissioner Gabriel

Hearing at the European Parliament, Sept. 30th, 2019

- "The Open Science issue is [...] an issue that is dear to my heart"

- "Today, more than ever, we need researchers to share the results of their projects [...] and to capitalize on the research of others"

- "I will insist on having data that are [...] reusable, accessible, of quality"

President U. von der Leyen

World Economic Forum, Davos, Jan. 22nd, 2020

- "We are creating a European Open Science Cloud now"

- "It is a trusted space for researchers to store their data and to access data from researchers from all other disciplines"

- "We will create a pool of interlinked information, a web of research data"

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The Von Der Leyen Commission is not business as usual

- Clearly defending ''European interests'' – including in science

- Rethinking Industrial policy

- Hard on data protection

2020:
CORONA pandemic as point of no return in open acces

- All publications made available in direct open access by almost all publishers
- All data in reproducible formats.
- Massive explosion of pre prints (and significnt problems too...)
- In 3 months happened bottom up what we tried to make happen for 15 years
- Scientist realising that open access is not a policy game, but a necessity for better and faster science

In one word: open access saves lives

Likely way forward due to CORONA (txs to)

Data level	Default Action level / Open access ''as open as possible as closed as needed''	Mandatory FAIR data formats findable, accessible, interoperable, reusable
Publicly funded research (including publications)	Yes	Yes
Clinical trials	Depends IP protected or no	yes
Patient data	No (GDPR protected)	yes
Contextual data (mobility, economic, etc)	Depends	yes

Open research data is already de facto a big issue in European R&I policy making

- Mandatory OD (including algoritmes) in EC and several MS.
- EOSC – Speech Van Der Leyen
- Go-Fair community

Driven by

- Everything will become a data point (the Internet of Everything) and thus researchable
- Reproducable science (opp cost of non fair open data estimated 10 billion)
- Data as the new oil for European economy – research data a strategic asset.
- No new dependencies (like Google, Facebook etc)

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This explains why AI services for science booming
(Source C. Pascu, DG RTD G4)

Source: iHUb

Source: http://innoscholcomm.silk.co

How is/should this (be) reflected in RDM

0. Every research project funded should have a mandatory RDM plan that is FAIR

1. EOSC has to become the place of the SCIENCE COMMONS in Europe.

2. Extend the FAIR principles to all the tools the FAIR data are subject to (meaning FAIR research workflows)

3. Smart open deals with publishing/platform providers (e.g. the Dutch agreement with Elsevier) to guarantee a fair trade off between commons and commercial services

4. Embed compliance in the design of the SW of ORD services and standards (GDPR compliant) or the architecture of the sharing and access system (see PHT - VODAN).

There is no other way: how science will look like by 2030

- ''real time'' or 'liquid'' scholarship* - like in SW development or in Corona times - enabled by open science practices and supported or even co-produced by AI tools and services.

- Full & immediate open access to the whole life cycle of a research process

- Quality assurance and control (peer review) of the whole life cycle

- Multiple ways to measure and reward scientific productivity

- Science as an open source resource ''commons'' to address the societal challenges

* This correlates with the observed epistemic shift in the rationale of science: from demonstrating the absolute truth (what is proven forever to be so) - via a unique article or publication; to understanding what at that moment is needed to move forward in the production of knowledge to address problem X
(H.W. de Regt, *Understanding Scientific Understanding*. New York: Oxford University Press, 2017)

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Open science in 2030 – implications for publishing

If it is accepted that science in the 21st century will be ''liquid'' and thus a continuous flow of knowledge produced and used by (mainly) machines and people, it follows

- That an article will be the smallest entity and often the least important output of the knowledge stream and scholarship production
- That publishing will have to offer in the first place a platform where all parts of the knowledge stream will be made available as such – via peer review.
- That most of future revenue will be made via value added services (mining, intelligence, networking, etc) for people and machines. Just like in telecom btw.

- And that we have to reinvent our academic institutions and knowledge centres too: where the old knowledge producing model, the Humboldt university, gave Germany and Europe an incredible edge in the late 19th and early 20th, which others imitated after WW2, the changing nature of science should inspire Europe to conceptualise a new model for the 21th OS/modern knowledge/research institutions too.

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Lessons learned and looking forward

- Knowledge is a resource for societal progress and has to be ''defended''
  → **no winner take all to be allowed**

- No way back to the old system of ''doing'' science (CORONA effect)
  → **get prepared for the new reality**

- The future of scientific repporting/publishing is data and on top of that articles (and not the other way round)
  → **invest in knowledge managment (services) and data stewarship (skills)**

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Thank You

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To have an overview of what Europe did the last 7 years:
1. (2019) Open Science, Open Data, and Open Scholarship: European Policies to Make Science Fit for the Twenty-First Century https://www.frontiersin.org/articles/10.3389/fdata.2019.00043/full
2. (2019) Architectures of Knowledge: The European Open Science Cloud.
https://www.degruyter.com/downloadpdf/j/abit.2019.39.issue-2/abitech-2019-2006/abitech-2019-2006.pdf