SITOLA SEMINAR

OPEN SCIENCE – CURRENT STATUS AND EMERGING TRENDS

15.4.2020

EVROPSKÁ UNIE
Evropské strukturální a investiční fondy
Operační program Výzkum, vývoj a vzdělávání

MINISTERSTVO ŠKOLSTVÍ, MLÁDEŽE A TĚLOVÝCHOVY

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Open Science – Current status and emerging trends

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15.4.2020

Todays‘ topics

1. Open Science Concept
2. Open Access
3. Open/FAIR Data

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Open Science

EC Definition of Open Science?

"Open Science represents a new approach to the scientific process based on cooperative work and new ways of diffusing knowledge by using digital technologies and new collaborative tools" (European Commission, 2016b:33).

Source: https://www.fosteropenscience.eu/node/1420

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OECD Definition of Open Science?

"*To make the primary outputs of publicly funded research results – publications and the research data – publicly accessible in digital format with no or minimal restriction*" (OECD, 2015:7).

Source: https://www.fosteropenscience.eu/node/1420

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FOSTER Definition of Open Science?

"Open Science is about extending the principles of openness to the whole research cycle, fostering sharing and collaboration as early as possible thus entailing a systemic change to the way science and research is done."

Source: https://www.fosteropenscience.eu/node/1420

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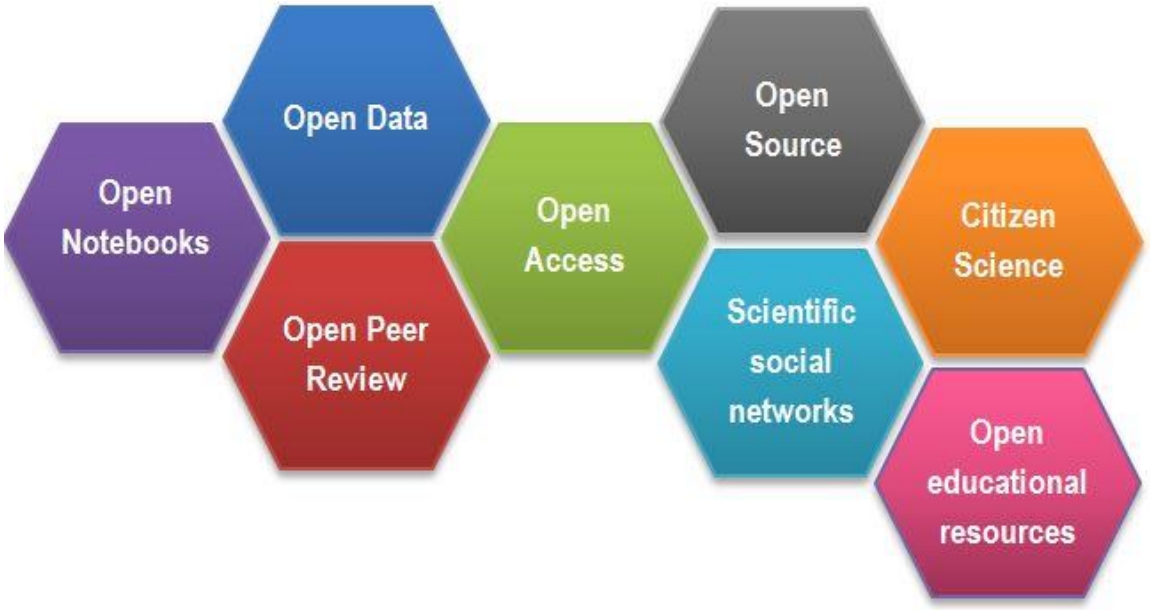
What is Open Science?



Source: https://www.fosteropenscience.eu/node/1420

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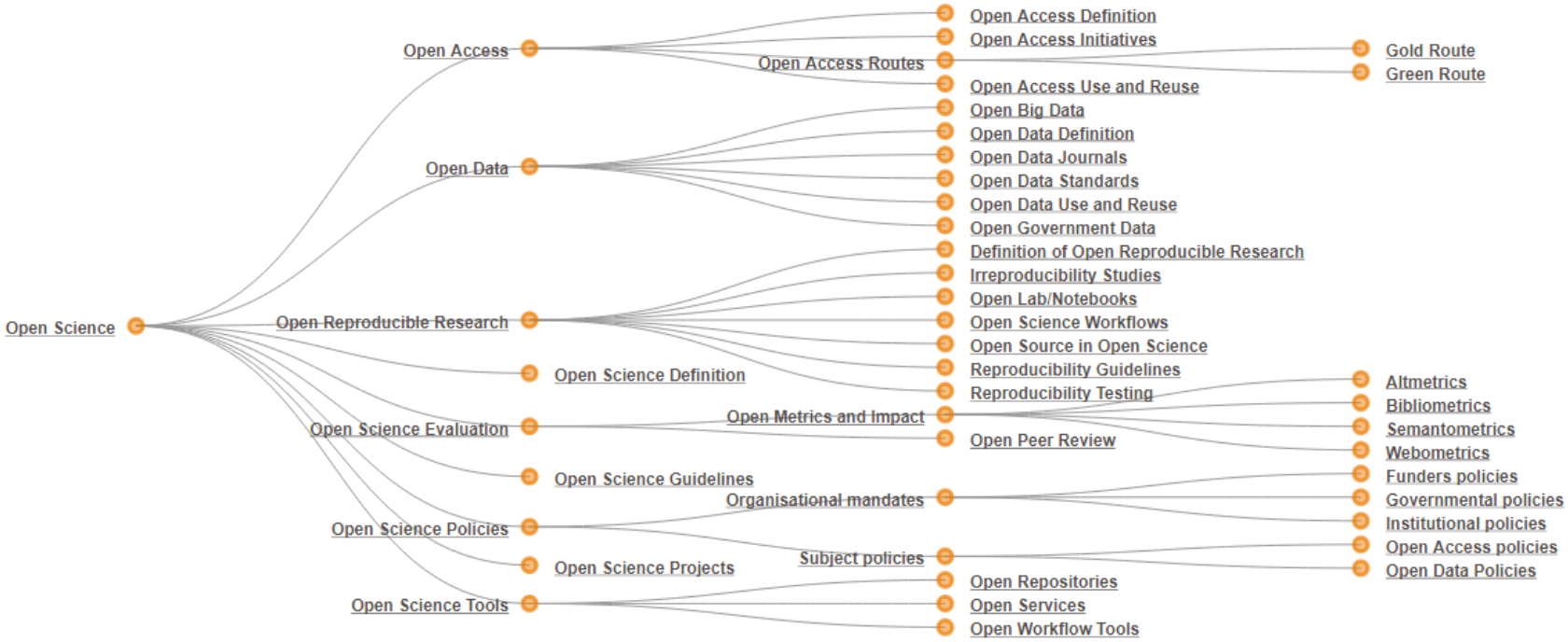
What is Open Science 2?



Source: https://www.fosteropenscience.eu/foster#taxonomy

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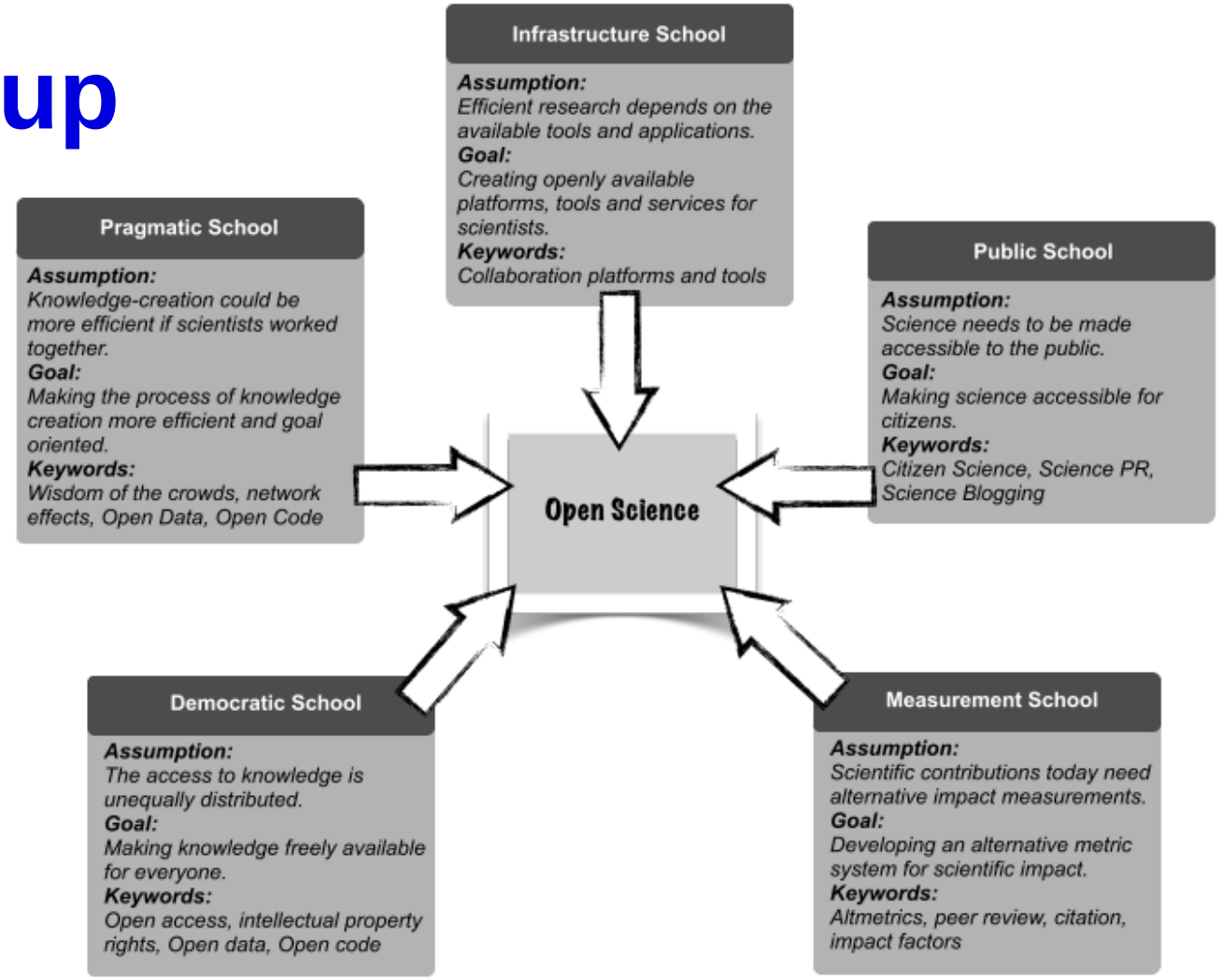
To sum up



Source: https://www.fosteropenscience.eu/node/1420

Open Science is still the same „old“ science

Open Science = is still the same science, only its form is transformed for 21. century

More information: https://genomebiology.biomedcentral.com/articles/10.1186/s13059-015-0669-2

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Openness is only a form of publication

„Knowledge is open if anyone is free to access, use, modify, and share it — subject, at most, to measures that preserve provenance and openness.“

Zdroj: https://opendefinition.org/od/2.1/en/

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Impact for Science: Development of Scientific Method

„A method of procedure that has characterized natural science since the 17th century, consisting in systematic observation, measurement, and experiment, and the formulation, testing, and modification of hypotheses. 'criticism is the backbone of the scientific method'.

Source: Scientific method. Oxford English Living Dictionaries [online]. Oxford University Press. Availbale at: https://en.oxforddictionaries.com/definition/scientific_method.

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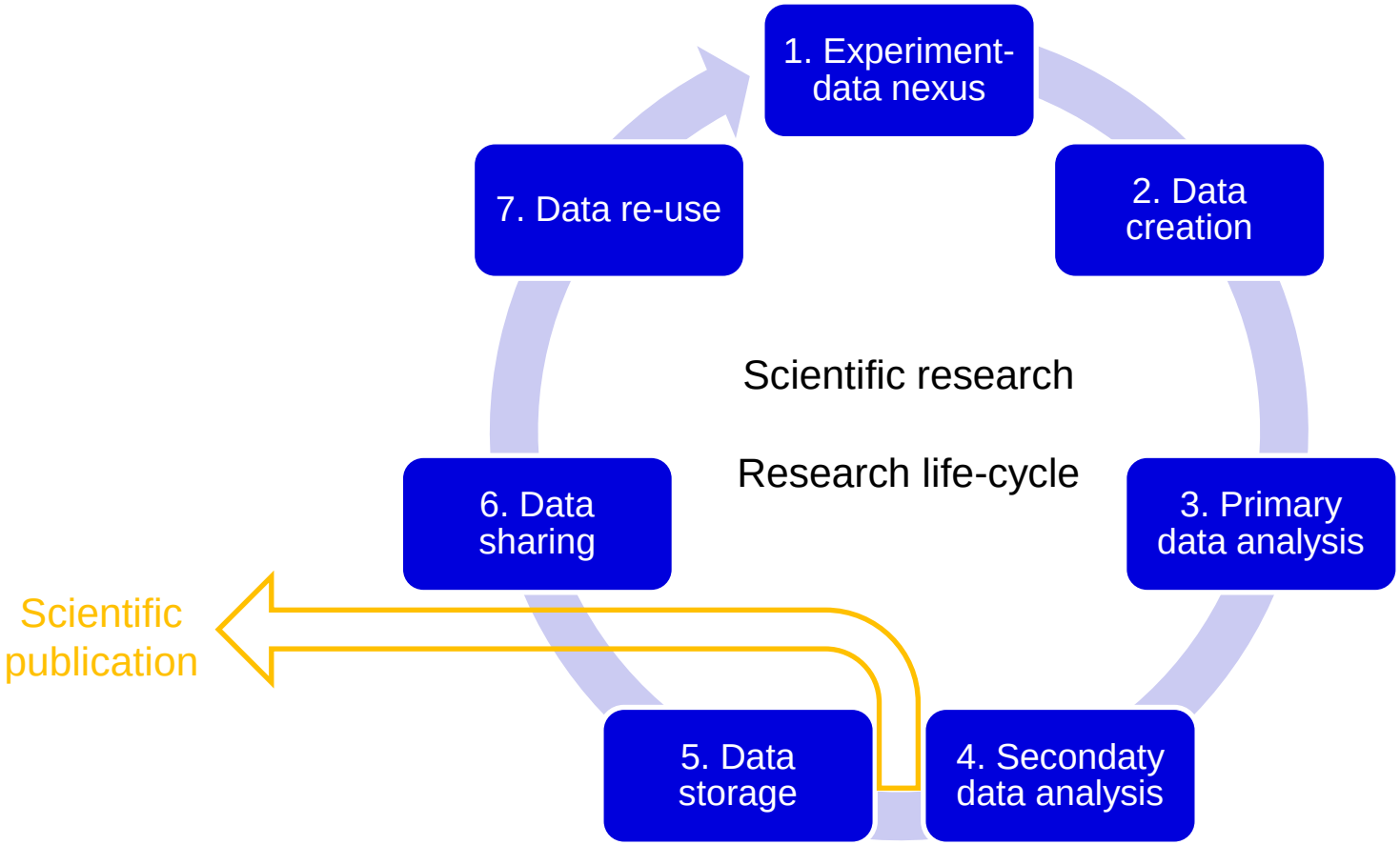
Several ideas to consider when thinking about openning your research

Research process (data vs. publ.)



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Interoperability is the key

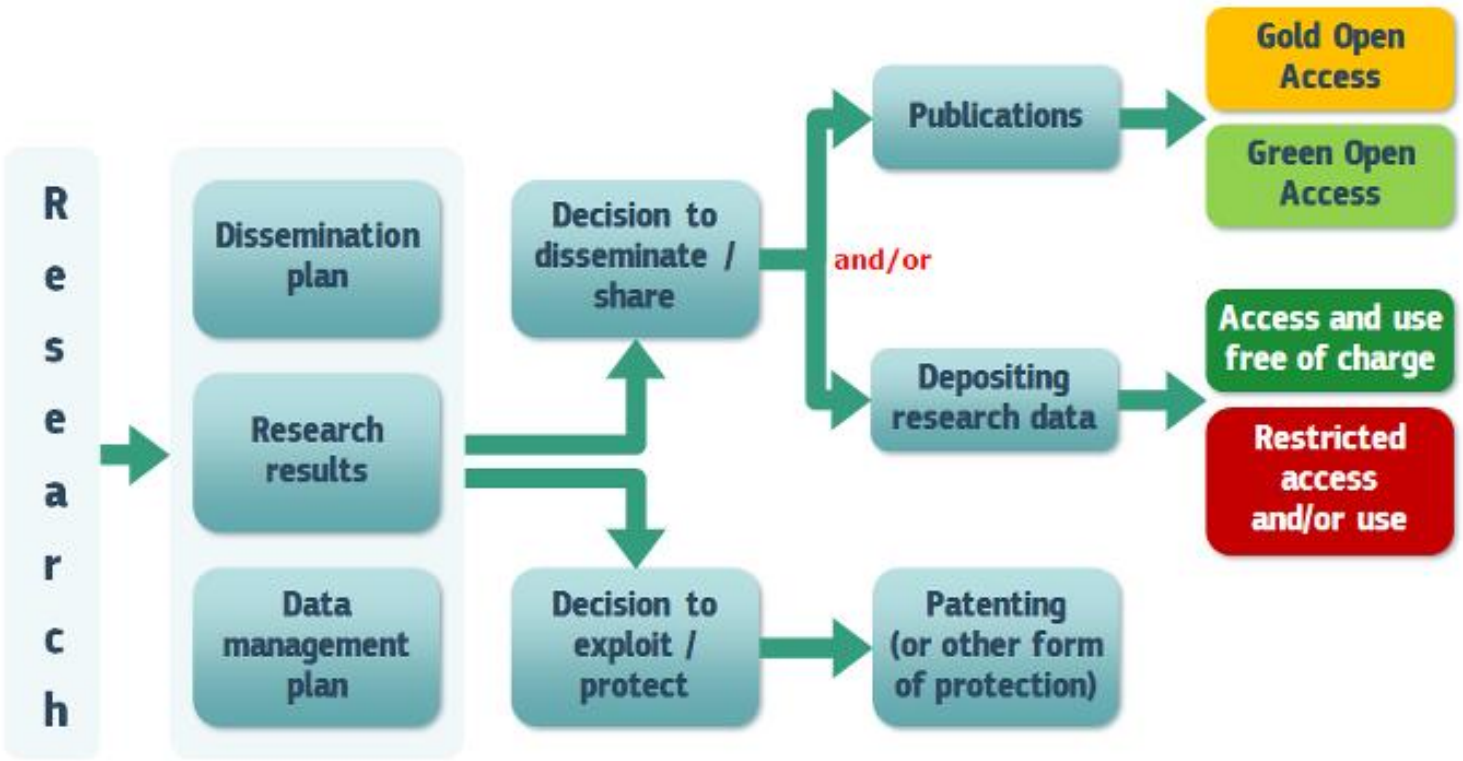
3 layers to take into consideration:

1. Managerial (strategy, metodology)
2. Technical (repositories)
3. Legal (directives, licenceses CC)

Open Science Stakeholders

1. Scientists
2. Librarians
3. Data Specialists
4. Lawyers
5. Universities
6. Funders
7. Readers/Citizens

Open Science vs. Commercialization



Zdroj: https://ec.europa.eu/research/participants/docs/h2020-funding-guide/cross-cutting-issues/open-access-data-management/open-access_en.htm

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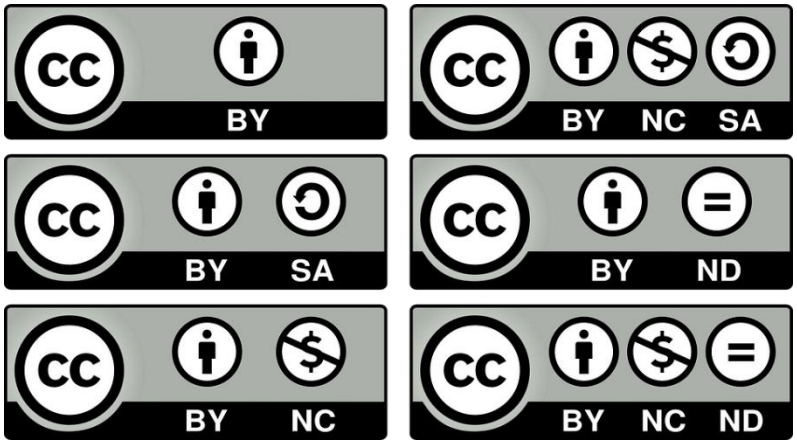
CC Licence as legal tool to make OS reality

creative commons



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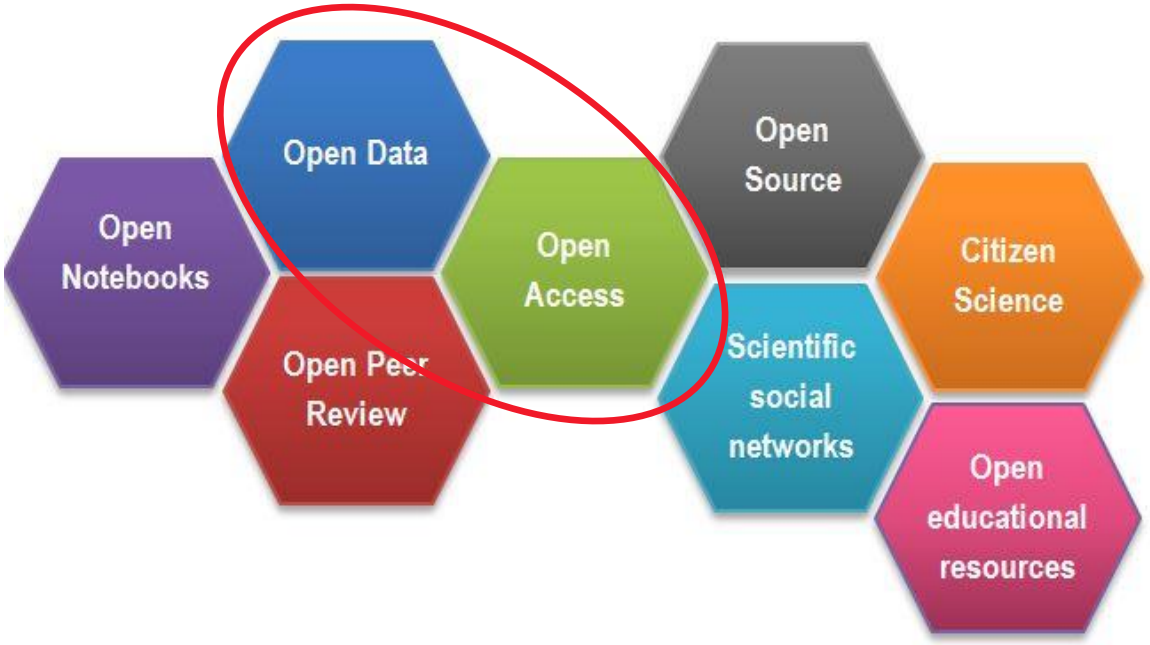
Practial Open Science issues

1. Predatory journals/publishers
2. Funders conditions regarding the publication (Plan S)
3. APC fee – project planning
4. Development of evaluation of science
5. Data stewardship support

What is Open Science at MUNI?



Source: https://www.fosteropenscience.eu/node/1420

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Open Access

History of Open Access

Milestones

- **20. century** – start of more intense scientific sharing
- BBB Initiatives:
  - 2002 – Budapest OA Initiative (Open Society Fund, George Soros)
  - 2003 – Besthesda statement on Open Access Publication
  - 2003 – Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities (Max Planck Institute)
- …
- **2018** – Plan S (cOAlition S)
- **2021** – Horizon Europe

The development until now

- **2018** – only 28 % of all scientific literature in OA (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5815332)

Open Access/Open Science

„*By 'open access' to the literature, we mean its free availability on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself.*

Source: https://en.unesco.org/open-access/what-open-access

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Types of Open Access publishing model

1. Green OA
2. Gold OA
3. Hybrid OA
4. Bronze OA
5. Platinum/Diamond OA
6. Black „OA“

Types of Open Access publishing model

Gold route

publication in open access journals
(OA provided by publishers)

Green route

self-archiving in open repositories
(OA provided by authors)

Types of Open Access publishing model

Hybrid route

OA publication in journal with restricted access (to open an article, you have to pay APC fee)

(Libre OA provided by publishers)

Bronze route

free to read publication without public licenses

(Gratis OA provided by publishers)

Types of Open Access publishing model

Platinum/Diamond route

publiction in open access journals without APC fee

(Libre OA provided by publishers)

Black route

illegally shared articles

(article is provided by 3. party)

Global Context of OA

OA Mandates development:

- 2008 **NIH/USA** – PubMed Central (12 months)
- 2008 **EU OA pilot in FP7 funding programme**
- 2013 **USA Government decisiion on OA**
- 2013 **Research Councils UK OA policy**
- 2014 **EU Horizon 2020** + pilot pro OpenData
- 2018 **Plan S** (cOAlition S) – from 2021 „full & immediate OA“ , 10 conditions

- **Sherpa/JULIET** – funders policies about OA

Global Context of OA

Other OA initiatives:

- 2012 **EC Recommendation** for member states
- 2012 **Finch Report** (UK) – OA in UK
- 2014 **SCOAP3** – CERN approach to OA
- 2015 **MPDL White Paper**
- 2015 **OA2020 Iniciativa** (MPDL) – transformation for OA Gold
- 2016 **Amsterdam Open Access Call for Action**

National Context

- **2017** Czech National Strategy 2017-2020 – open access to **scietific information** (publications and data)
- **2017** CzechElib consortium
- **2019** Action Plan for Czech National Strategy 2017-2020 (only publications)
- **2021** ?Under development… (National Open Access repository, Plan S position, National Funders OA Mandates)

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Open/FAIR Data

History of Open/FAIR Data

Research data are still the same research data, but the format and cooperation is changing

- **1953** – DNA structure (Watson and Crick)
- …
- **2002** – First research data journal (CODATA)
- **2003** – Directive ES 2003/98/ES, re-use of public sector information
- **2007** – OECD Principles and Guidelines for Access to Research Data from Public Funding
- **2014** – Open Research Data Pilot in H2020 for selected research fields
- **2016** – Amsterdam Open Access Call for Action (Dutch presidency)
- **2016** – Codification of FAIR principles: WILKINSON, Mark D. a kol. (53 authors, Nature)
- **2017** – Open Research Data Pilot v H2020 for all fields
- **2019** – Directive EU 2019/1024, open data and re-use of public sector information
- **2020** – EU Data Strategy
- **2021** – Horizon Europe, Data Act etc…

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Why is sharing of research data important?

Revision of results

- Wrong methodology, omission of „bad data“, discovery of „manipulation“ with data)

Reproducibility of science

- Possibility to repeat the experiment and compare results

Re-use of generated data

- Cost savings (there is no need to make an expensive experiment again)
- Uniqueness of data (use of data, that are not possible to gather again)
- Use of unused data (astronomy – pictures of night sky)
- Use of data in new contexts and for new uses

Acceleration of Innovation cycle (economic benefit)

- Possibility to innovate more rapidly by using the existing data
- Possibility for companies to use research data for innovation

What to consider when thinking about Open/FAIR Data

- No immediate access („first use right“)
- Not possible to open always (personal information or private know-how)
- Size of Data (GB, TB, PB, thousands of files)
- Variability of format and types (not only text)
- Differences between research fields – standards

- Different data categories (which one to share?)
  - Raw data (primary research data – analog from sensors and measurements,…)
  - Processed data (digitalization, cleaning, certification, anonymization)
  - Analyzed data (models, graphs, tables, visualizations -> discoveries, conclusions)
- Difficulties connected with sharing data for someone else (description, etc.)
- There is a lot thing to develop still
  - reliability, comprehensiveness, quality, ownership, long-term storage, data curation, …
  - Positive feedback from scientific community?

Process definition of research data

„*Data created during the research experiment*“.

Source: Koščík et al. *Výzkumná data a výzkumné databáze.* ISBN 978-80-7552-952-7

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Two types of data to share

1. Data supporting a journal article

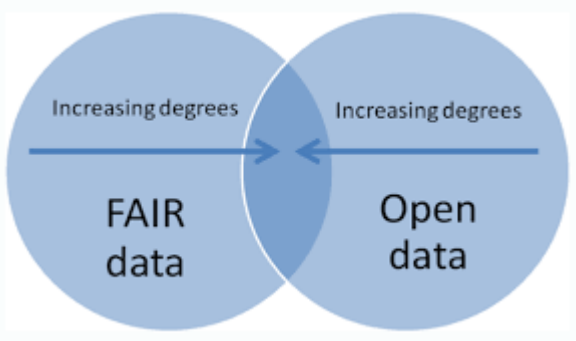
   „Data, including associated metadata, needed to validate the results presented in scientific publications.“

2. Individual data sets

   „Other data, including associated metadata connected to particular research project (as specified in the ‘data management plan“)

Source: H2020 Programme AGA – Annotated Model Grant Agreement Version 5.2 – 26.6.2019. [online] s. 248. Available at: http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/amga/h2020-amga_en.pdf

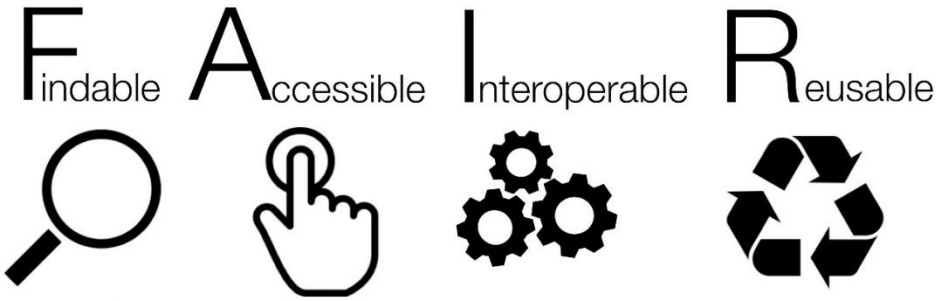
Open/FAIR data



Open Data ↔ FAIR Data

„As Open as Possible, as Closed as Necessary“

- **F**indable – metadata, registration, global persistent identifiers
- **A**ccessible – standards for machine-readibility, AAI
- **I**nteroperable – semantic description of data and metadata, standards
- **R**eusable – clear licensing, data provenance (reproducibility)



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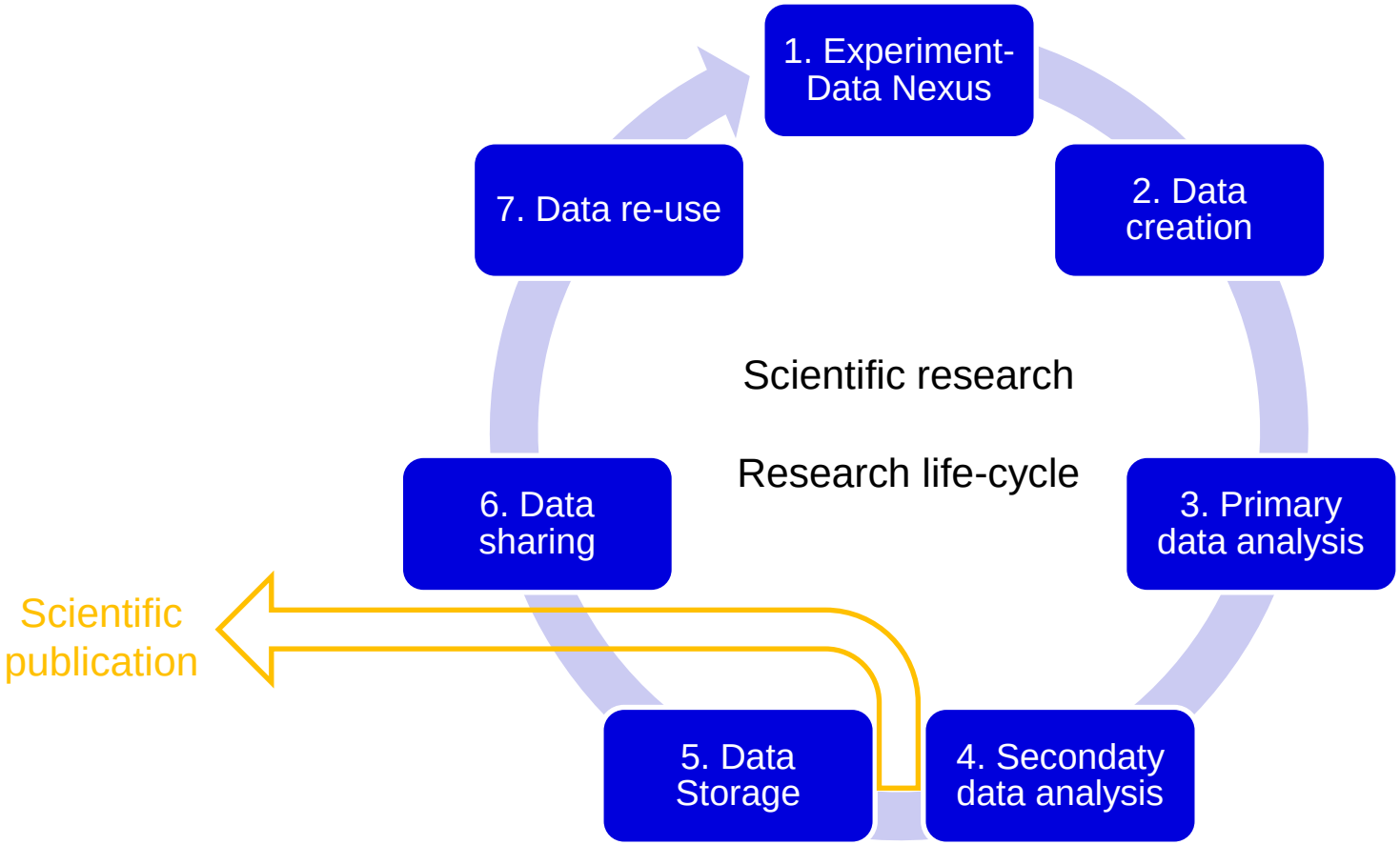
Research proces (data vs. publ.)



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European/National Context

European Context

- **2019** New EU Open Data Directive
- **2020** New EU Data Strategy (**9 + 1 data spaces**)
- **2021** Horizon Europe – mandatory OS policy
- **2021** Preparation of new Data Act
- **2025** European Open Science Cloud (EOSC)
- Continuous development of Elixir and other field specific initiatives

National Context

- **2017** Czech National Strategy 2017-2020 – open access to **scientific information** (publications and data)
- …

History of OA/OS at MUNI

- **2006** e-Archive of bachelor/master thesis
- **2010** MUNI signed the Berlin Declaration
- **2011** Rector´s Directive: Institutional Repository (mandatory)
- **2012** MUNI Repository (IS MU)
- **2013** Rector´s Directive: Institutional Repository revision (voluntary)
- … Directives on Research Data, GDPR, Ethics; TTO brochures,…
- **2020** OA-HR4MUII – Institutional support restart for OA and development of Open/FAIR Data area

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