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Open science

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Content

- Open Science
- FAIR data principles
- Why open science and open data?
- EC Study of Open Data/Open Science (2021)
- reSEArch-EU
- Benefits of OA
- How to increase open science in your context?

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Definitions

- The OECD defines Open Science as: 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)
- The sharing of 'everything data, scientific opinions, questions, ideas, folk knowledge, workflows and everything else as it happens ' (Nielsen, 2009:32)
- "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, 2016: 33).
- 'Open Science is the practice of science in such a way that others can collaborate and contribute, where research data, lab notes and other research processes are freely available, under terms that enable reuse, redistribution and reproduction of the research and its underlying data and methods .' (https://www.fosteropenscience.eu/)

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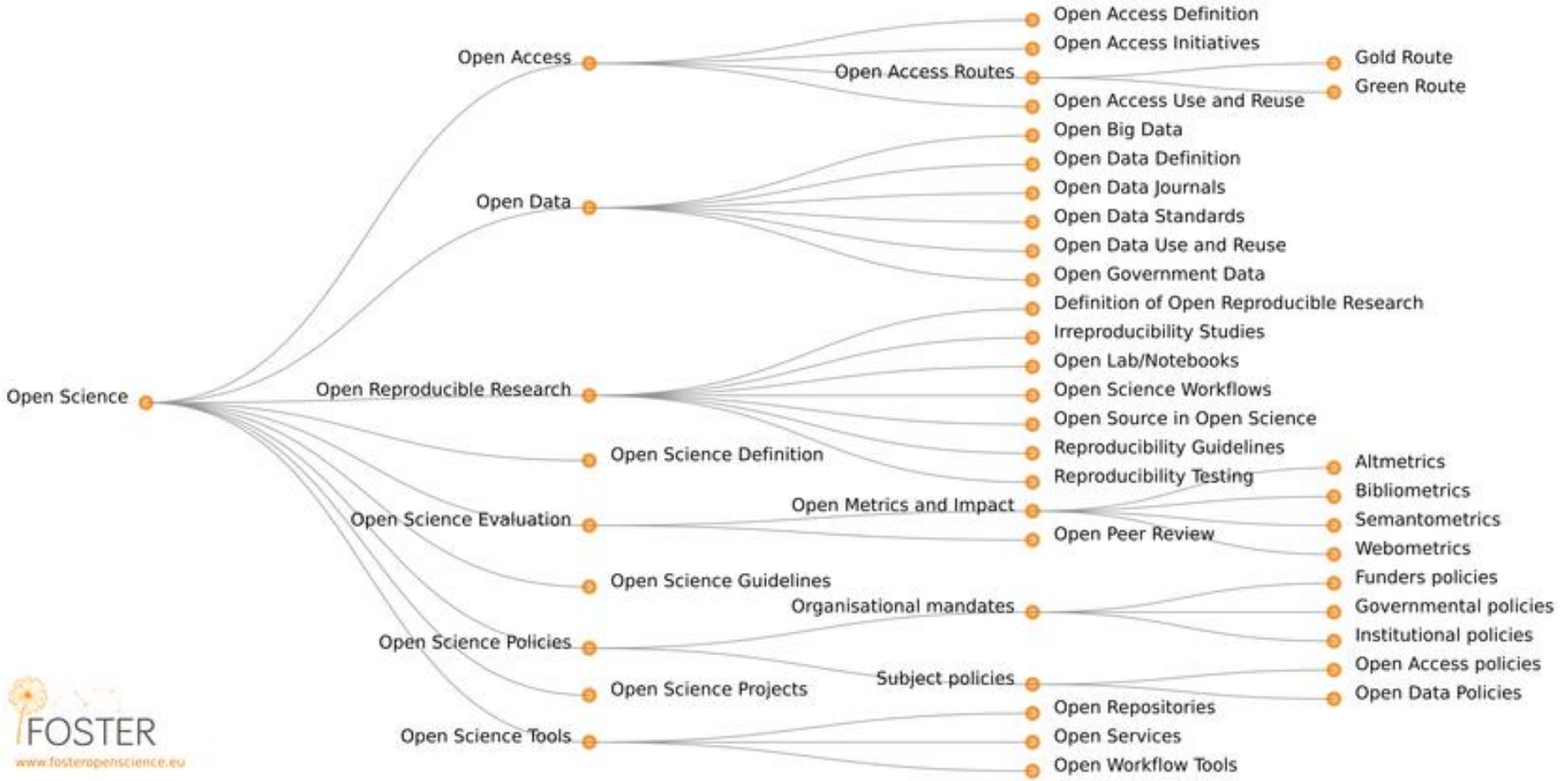
Structure and Taxonomy



FOSTER
www.fosteropenscience.eu

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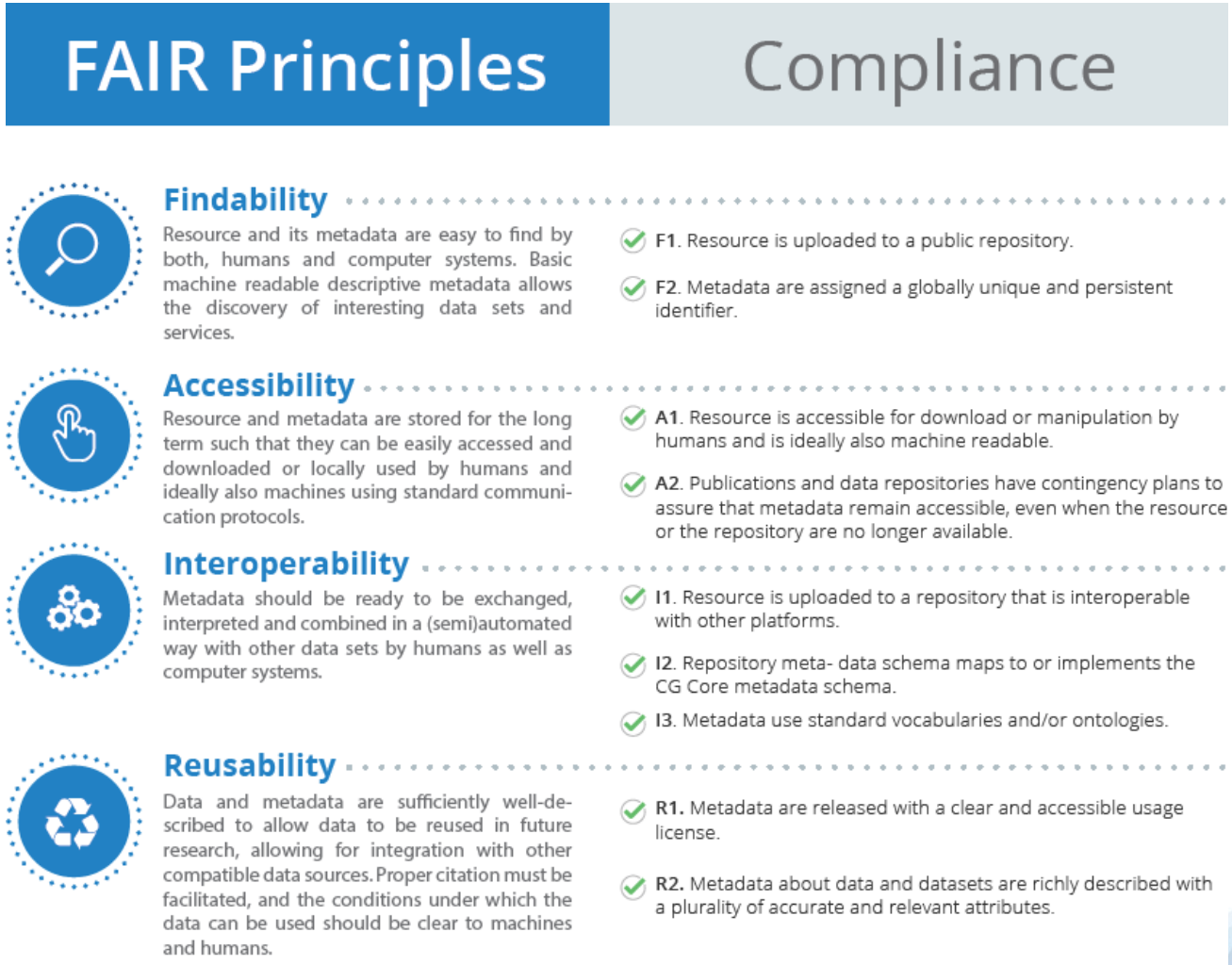
Open data: FAIR data principles (2016)

Open Data are online, free of cost, accessible data that can be used, reused and distributed provided that the data source is attributed and shared alike.

(Source: Fosteropenscience.eu)



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EC Study of Open Data (2021)

- Key findings:
- A lack of awareness among many researchers on the benefits of open data.
- Journals and research funders are the main actors who (can) provide incentives.
- Simultaneously, they constitute the key building blocks of the current reward system of science that discourages researchers to openly share research data. Current initiatives and requirements by funders, journals and academic organizations will contribute to the necessary awareness.
- There is increasing evidence that sharing research data is not only beneficial for society and the economy, but also for researchers themselves.
- One universal barrier is that it simply takes time for authors, editors, peer reviewers and editorial support staff to enable it.
- Other barriers to open data are field specific, ex concerns about being outcompeted (ex Levin et al. 2016), about misuse of data and with regard to privacy issues.

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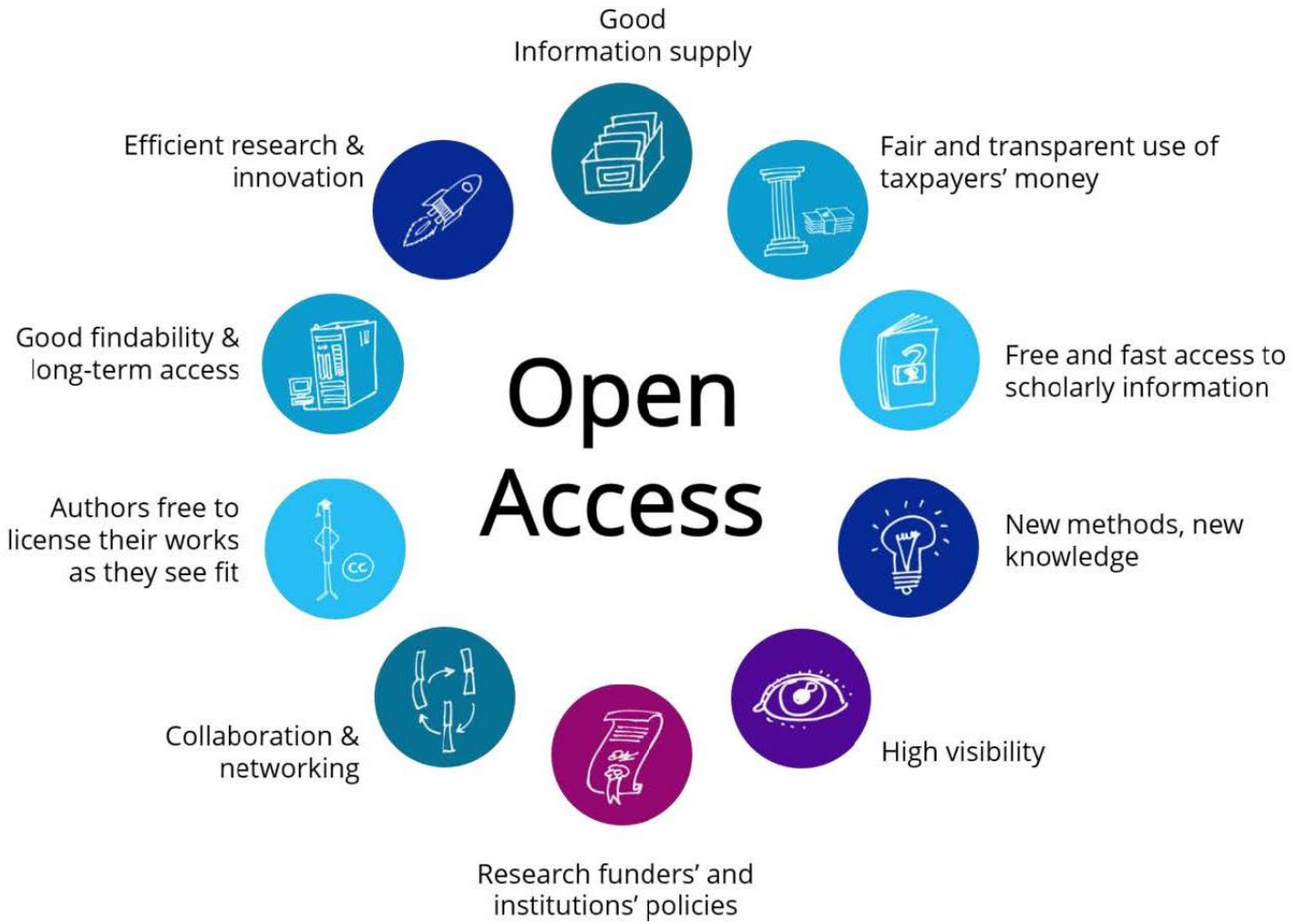
Open access

Open Access refers to online, free of cost access to peer reviewed scientific content with limited copyright and licensing restrictions.



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EC Study of Open Access (2021)

- More and more research funders require open access publication of results.
- The diversity of publication routes and the variety of funders' and publishers' open access policies create legal and practical uncertainties.
- More awareness is needed both of the technical aspects and of the benefits of publishing this way.
- Researchers generally regard open access as a positive phenomenon. However, researchers experience several barriers.
- Traditional recognition and reward systems still consider publishing in high impact journals of great importance.
- Many research councils are removing financial disincentives ex. coverage of article processing charges.
- Types of infrastructures were developed for different routes to open access publishing, including: online platforms of open access journals and publishers; and large institutional and subject repositories.

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Future of Open Science (2021): Drivers

- Giving credit to open science practices (for instance as additional points in research proposal evaluation and/or in researcher career assessment).
- Evidence of benefits for researchers (team work, cooperation, internationalisation, et cetera).
- Integration of open science in infrastructures and assisted by tools and services.
- Increasing awareness of open science practices and benefits.
- Education and training available on open science practices.
- Financial incentives by funders for open science practices.
- Incentives to publish in open access on online platforms.
- Incentives to reuse research outputs.
- Adaptation of university curricula (for open science).
- Engagement with citizen science.
- Fostering open peer review.

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Future of Open Science (2021): Barriers

- Lack of credit or acknowledgement.
- Concerns about being outcompeted.
- (Uncertainty about) legal constraints (for instance copyright law, licensing restrictions et cetera).
- Cost and time of sharing data or of engaging with a broad spectrum of stakeholders.
- Concerns about misuse of data.
- Lack of skills (for instance data stewardship).
- Privacy issues.
- Uncertainty about socio-economic benefits of open science.

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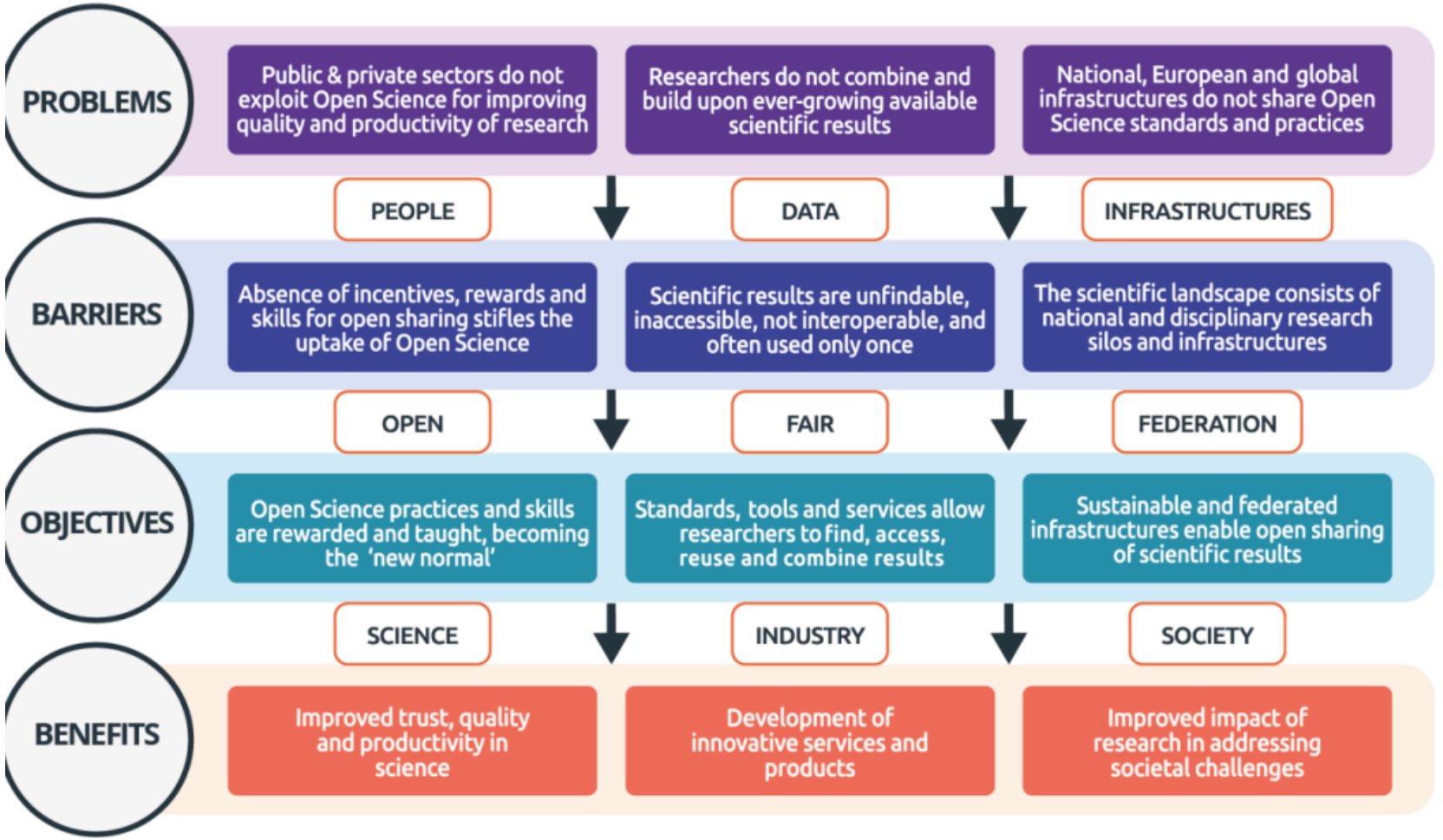
European Open Science Cloud



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Pre-registration of research (Bakker et al, 2020)

- Specification of procedures and analysis before the research begins
- Has a long history in clinical medicine, but is expanding to other fields
- Structured formats and guidance result in better study designs
- It is possible to peer review studies before they begin
- Reduces the possibility of HARKing

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Motivations for data sharing (Zuiderwijk et al, 2020)

	Categories derived from our thematic analysis	**Examples of identified factors included in existing theories**	**Examples of theories (partly) addressing the identified factors**
1	*Background*	Age and gender	The extended Unified Theory of Acceptance and Use of Technology (UTAUT2) [65]
2	*Requirements and formal obligations*	Voluntariness of use	Unified Theory of Acceptance and Use of Technology (UTAUT) [66]
3	*Personal driver / Intrinsic motivations*	Intrinsic motivation	Cognitive Evaluation Theory [63, 64]
4	*Facilitating conditions*	Curiosity and joy	Hedonic-Motivation System Adoption Model (HMSAM)) [67]
		facilitating conditions	The integrated UTAUT-ECT (Expectation Confirmation Theory) Theory of Information Systems continuance [68]
5	*Trust*	Trust	UTAUT-ECT Theory of Information Systems continuance [68]
6	*Expected performance*	Performance expectancy	The extended Unified Theory of Acceptance and Use of Technology (UTAUT2) [65]
		Reputation and sense of achievement	Equity Theory [69–71]
		Rewards	Two Factor Theory of motivation [72–75], Expectancy Theory [76]
7	*Social influence and affiliation*	Support of colleagues	Equity Theory [69–71]
		Norms of the social system	Innovation Diffusion Theory [77]
8	*Effort*	Skills, time and education	Equity theory [69–71]
9	*Experience and skills*	Experience	ARCS Motivational Model [78, 79]
10	*Legislation and regulation*	Regulative pressures	New institutional theory [61, 62]
11	*Data characteristics*	Ease of use	Multi-motive Information Systems Continuance model [80]

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reSEArch-EU and Open Science (WP5)

- Open Science Ambassadors (OS promotion)
- Identification of best practices
- Training delivery in Open Science
- Collection of tools

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What universities can do?

- Recognition of sharing practices in credit structures
- Creation of more meaningful incentives for researchers to engage with Open science
- Recognition of the role of alternative metrics (‘ altmetrics ’) and changing publication cultures
- Adjusting evaluation systems in careers and research grants

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What universities can do?

- League of European research universities
- Sharing data increases visibility and enables replication
- Open science makes scientist work easier to monitor
- The minimum should be sharing data of the research paper
- Improved citation metrics
- Follow the FAIR principles
- Increased focus on research integrity

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What universities are doing?

- The European University Association (EUA) Open Science Agenda 2025
- 850 universities
- Open science measures instead of Impact factors
- Open Access
- Data sharing

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Thank you