

# Open Science and Open Innovation

What will you learn in this module?

*In this module you will learn about ...*

- The concepts of open innovation, Open Science, and citizen science
- The linkages between these different concepts
- The role of these concepts within Horizon Europe

## Open Innovation

The idea behind open innovation is that the innovation process should be opened up to people with experience in other fields outside of academia and science. This will allow the knowledge to circulate freely and ultimately to be transformed into new products and services (European Commission, 2016). The name ‘open innovation’ has been defined 17 years ago by Chesbrough, the concept is however much older.

Definition by Chesbrough (2006): “Open Innovation refers to the collaboration between companies, individuals, and other types of institutions to develop innovative products and services and, in the process, share the risks and rewards of research, development, and commercialisation.”

The concept of open innovation is building and expanding on knowledge transfer, as you can see in figure 1. Whereas knowledge transfer relies mainly on bringing external knowledge into internal innovation process (Outside In), open innovation relies on co-innovation with complementary partners, and allowing assets to break out of the internal innovation process (Inside Out). Taking this one step further, academics have coined the term Open Innovation 2.0, reflecting that open innovation is underpinned by two main elements:

The users are in the spotlight: an invention becomes an innovation only if users become a part of the value creation process.

Creating a well-functioning eco-system that allows co-creation becomes essential for Open Innovation.

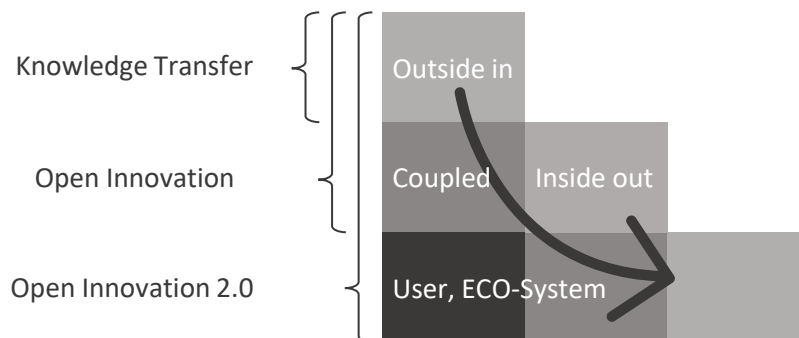


Figure 1 From Knowledge Transfer to Open Innovation 2.0 (Source: European Commission, 2016)

The European Commission has multiple policies in place to support open innovation, such as the [innovation principle](#), that makes sure that the impact on innovation is taken into account when a policy is developed.

### Suggested readings

#### Open innovation resources – [link](#) (webpage)

*Here you can find policy initiatives, funding schemes and support services related to open innovation by the European Commission.*

#### Open innovation, Open Science, open to the world. A vision for Europe – [link](#) (book)

*This book published by the DG Research and Innovation brings together some of the key conceptual insights behind Open Innovation, Open Science and Open to the World and highlights actions that are already taking place or are being prepared.*

#### Operationalising the Concept of Open Innovation with Open Innovation Platforms - [link](#) (webpage)

*Read about open innovation, different open innovation platforms and good practice examples which have inspired policy change in Europe.*

### Tools

#### Open Innovation Lombardia – [link](#) (webpage)

*Open Innovation Lombardia was developed so government, industry, academia and civil can work collaborate to drive innovation for the future. The platform aims to address growth and competitiveness, and support valorisation of R&D&I projects.*

#### Open innovation & crowdsourcing resources – [link](#) ([webpage](#))

*The Board of Innovation provides resources for open innovation, including platforms for R&D, marketing and design and collective intelligence*

### Open Science

Open Science is a movement and also a set of norms that seek to increase openness, integrity, and reproducibility of academic research. As such, it is closely related to the notion of Citizen Science in aspect of its openness, as the main objective of Open Science is to make scientific information, data and outputs more widely visible and accessible. Other aspects of the Open Science norms are to make research more rigorous by applying reproducibility as one of its standards in an open manner. Finally, integrity and ethical aspects of scientific research should be carefully taken into consideration. Open Science standards have to be taken into consideration from the outset of research, during its design, since standards apply to each research phase, from defining research hypotheses to dissemination and reuse of research outputs. The European Commission in its funding is largely building its funding requirements on the Open Science norms. These aspects are of interest to HEIs and SMEs as they would like to improve their joint research and dissemination in this regard (Demir & Davey, 2022).

Open Science is the standard way of working within the research and innovation funding programmes of the European Commission (European Commission, n.d.). Through the Open Science policy, the European Commission (2019) aims to allow “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.”

The Open Science policy is continuously developing. A few aims and next steps have already been defined for the Open Science policy under Horizon Europe (European Commission, n.d.).

- Ensure that beneficiaries retain the intellectual property rights they need to comply with their open access obligations
- Require research data to be FAIR and open by default (with exceptions notably for commercial purposes)
- Promote the adoption of open science practices, from sharing research outputs as early and widely as possible, to citizen science, and developing new indicators for evaluation research and rewarding researchers
- Engage and involve citizens, civil society organisations and end-users in co-design and co-creation processes and promote responsible research and innovation
- European Open Science Cloud (EOSC) will enter its next stage of development in 2021
- Fund the development of an open-access publishing platform to host Horizon 2020 (and later Horizon Europe) beneficiaries' publications

### Suggested readings

#### The EU's Open Science policy – [link](#) (webpage)

*Information on Open Science by the European Commission.*

#### Open Science Monitor – [link](#) (webpage)

*Information on the Open Science Monitor through which the European Commission gets quantitative and qualitative insights on the developments within Open Science practices.*

#### Open Science Monitor Final Report – [link](#) (report)

*Study on Open Science: monitoring trends and drivers as part of the Open Science Monitor.*

### Tools

#### European Open Science Cloud – [link](#) (webpage)

*Provides resources, updates on funding opportunities, relevant European and national policies, and recent developments on Open Science.*

#### Responsible Research and Innovation Tools Community – [link](#) (webpage)

*A community for networking, sharing resources, promoting your own projects and finding relevant tools.*

Open Science in Horizon Europe

Open Science plays an important role within the Horizon Europe Framework and is embedded throughout Horizon Europe. Both in the work programs, as in all the project lifecycles stage. Through legal provisions in the grant agreements, some of the main consequences are the following (European Commission, 2021):

- Immediate open access requirements for beneficiaries.
- Data should be Findable, Accessible, Interoperable and Re-usable (FAIR).
- Data as open as possible, however: data is allowed to stay closed as necessary

Open Science also plays an important role in the evaluation of the research proposals, as the quality and appropriateness of the Open Sciences practices in the proposals will be evaluated.

In figure 2 below you see the expected results and impacts of Open Science in Horizon Europe.

Suggested readings

**The FAIR Guiding Principles for scientific data management and stewardship** – link (scientific paper)

*This article gives an outline of FAIR data principles and the rationale behind them, and some implementations of the principles.*

**Open Science in Europe** – link (webpage)

*Read how Open Science Europe is a means to improve research quality and how it can be used to benefit society.*

Tools

**Horizon 2020 FAIR Data Management Plan (DMP) Template** – link (template)

*This template is applicable to any Horizon 2020 project that produces, collects or processes research data.*

**National Open Science Policies in Europe** - link (webpage)

*Find and compare information on national Open Science policies in Europe*

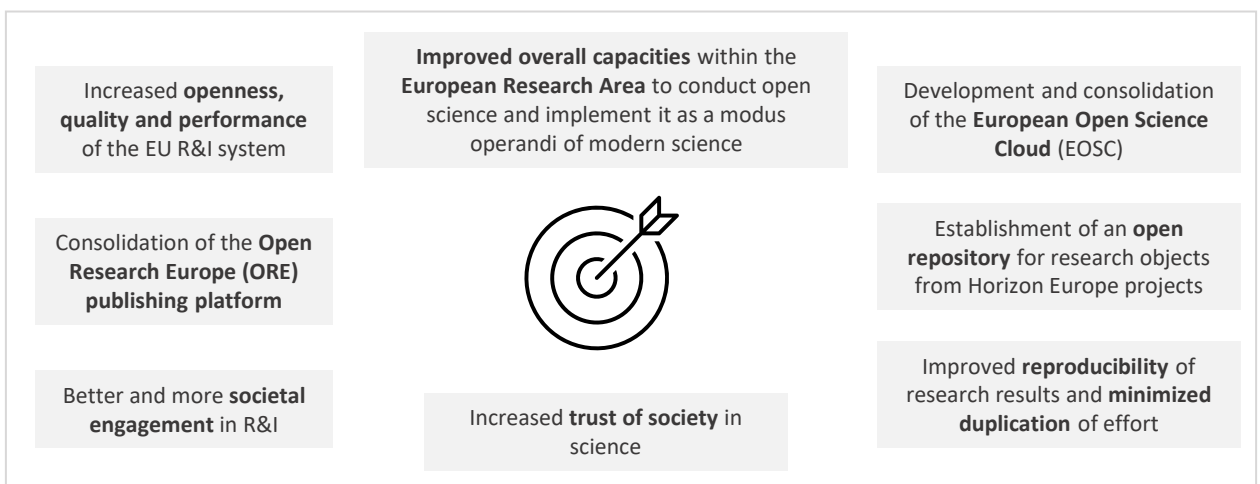


Figure 2 Results and Impact of Open Science in Horizon Europe (source: European Commission, 2021)

## Citizen Science

Citizen science entails participation of citizens and the general public in scientific research. Such participation takes place through crowdsourcing and or direct involvement of citizens, businesses and other stakeholders in research. It invites these stakeholders to take part in scientific discoveries not solely as beneficiaries but as co-creators. The focus of citizen science is oftentimes on applied knowledge and finding solutions to real-world problems. Due to the increased amount of easily accessible knowledge and technologies nowadays, the knowledge production takes place outside academia too, oftentimes by practitioners themselves. For example, an agriculture ecosystem in France has been developed gathering lots of farmers, SMEs and citizens interested in these issues who perform research themselves and learn to apply technical solutions through YouTube videos. Other examples include the Citizen Observatory of Drought, a portal which facilitates public participation in data collection and thus helps improve decision-making processes in terms of water and drought management in Spain; or the SEEDS project in which adolescents use citizen science to create new experiments for healthy lifestyles.

Although it is true that knowledge and technologies are more accessible, at the same time, access to major research, technologies and information in general is limited to the public. In general, a movement exists that seeks to collect as much information as possible and share it openly. These initiatives can be described as even counterculture as they grow through social networks (Demir & Davey, 2022).

The fact that such initiatives have developed showcases also the remoteness of academic research from everyday industry and social needs. Our research informants find that lots of research produced in academic does not relate to the actual social or market needs or does not reach the actual beneficiaries. Like businesses, HEIs should be aware of the needs, interests and opinions of its customers, citizens. Development of projects that have strong citizen science component would generate greater social impact of its outputs, while incorporating UBC would ensure knowledge sharing and valorisation, as many SMEs acquire insights through the aforementioned citizen knowledge networks and/or follow market trends.

Both citizen science and citizen engagement are a vital aspect in Horizon Europe (as have they been in Horizon 2020). After the Council recognized citizen science as an Open Science priority in 2016, the Open Science Policy Platform (OSPP) also included citizen science within their eight Open Science ambitions in 2018 (European Commission, 2020).



### Tip for HEIs

*Lots of research produced in academic does not relate to the actual social or market needs or does not reach the actual beneficiaries. HEIs should be aware of the needs, interests and opinions of its customers, citizens.*

### Suggested readings

**Citizen Science and Citizen Engagement – [link](#)**  
(report)

*Achievements in Horizon 2020 and recommendations on the way forward.*

**Progress on Open Science: Towards a shared research knowledge system – [link](#)** (report)

*This final report of the EU Open Science Policy Platform (OSPP) provides a brief overview of its four-year mandate from 2016 to 2020*

European Commission. (2020). Progress on Open Science: Towards a shared research knowledge system. <https://op.europa.eu/nl/publication-detail/-/publication/d36f8071-99bd-11ea-aac4-01aa75ed71a1>

European Commission. (2021). Horizon Europe, Open Science. Early knowledge and data sharing, and open collaboration. <https://op.europa.eu/en/web/eu-law-and-publications/publication-detail/-/publication/9570017e-cd82-11eb-ac72-01aa75ed71a1>

### References

Chesbrough, H. (2006). “Open Innovation: A New Paradigm for Understanding Industrial Innovation,” in Henry Chesbrough, Wim Vanhaverbeke, and Joel West, eds. *Open Innovation: Researching a New Paradigm*. Oxford: Oxford University Press

Demir, E., Davey, T. (2022). *Towards Coalition Excellence. Report on University-SME collaboration in Europe.* <https://unite4horizon.eu/horizon-europe-engagement-programme-framework/>

European Commission. (n.d.). *Open Science.* [https://ec.europa.eu/info/research-and-innovation/strategy/strategy-2020-2024/our-digital-future/open-science\\_en](https://ec.europa.eu/info/research-and-innovation/strategy/strategy-2020-2024/our-digital-future/open-science_en)

European Commission. (2016). *Open innovation, Open Science, open to the world.* <https://op.europa.eu/en/publication-detail/-/publication/3213b335-1cbc-11e6-ba9a-01aa75ed71a1>

European Commission. (2019). *Factsheet Open Science.* [https://ec.europa.eu/info/research-and-innovation/strategy/strategy-2020-2024/our-digital-future/open-science\\_en](https://ec.europa.eu/info/research-and-innovation/strategy/strategy-2020-2024/our-digital-future/open-science_en)