OPENING DOORS

Opportunities and education in networked innovation for new graduates with PhDs using open online resources

Science with and for Society in Horizon 2020

H2020-SwafS-2020-1

Support Tool for Supervisors

Deliverable 4.2

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Contributors:

Title / Name	Organisation
Soren Bengsten	Aarhus University
Denise McGrath	University College Dublin
Nicola Mountford	Maynooth University
Christian Dalsgaard	Aarhus University
Eleni Makri	University College Dublin

Formal Reviewers:

Title / Name	Organisation
Nicola Mountford	Maynooth University

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Executive Summary

Doctoral supervisors are expected to be able to guide and support across a diverse set of contexts: discipline, career, legal issues, research ethics and integrity, academic freedom, transferrable skills and competences, new research practices involving a range of external partners and stakeholders. The open science concept is yet another context to which supervisors are now required to pay attention. Given that this is such a broad concept, it may be challenging for supervisors to understand what competencies are required in relation to Open Science. This document describes the design of an educational video for supervisors that breaks down the skills of Open Science into categories that they can consider. Other potential tools and interventions at a systems level are also explored.

1. Introduction

Recent literature speaks about the "Hidden Curriculum in Doctoral Education" (Elliot et al 2020)(Dely L. Elliot, 2020) or the "twin doctoral journey" where the doctoral researcher has to learn how to navigate both "the research landscape and the doctoral development landscape" (Elliot, 2021). This doctoral development landscape can be comprised of many learning contexts, experiences and desires, depending on, for example, a person's academic discipline, career ambitions, personal circumstances, values and needs. Additionally, new ways of doing research such as interdisciplinary, transdisciplinary and intersectoral research requires new competencies for the next generation of doctoral research. In order for this generation of researchers to acquire these competencies, to be prepared for the likelihood of a career in a non-academic setting and to avoid the "culture shock" that can be associated with this transition(Skakni et al., 2022), doctoral supervisors are now expected to provide much more mentorship beyond what is required to undertake a high-quality research project. In this deliverable we consider what supports might be useful to supervisors to help them to navigate these complexities, particularly through the lens of the Open Science concept.

2. Aims and Objectives

The aim of this deliverable is to support supervisors in their efforts to establish a more in-depth understanding of Open Science for themselves and for the doctoral researchers they work with. This was done by:

a) asking a sample of supervisors about what the understand by Open Science

b) asking doctoral researchers recently educated in open science, what they think supervisors should know/teach about open science

c) integrating the learning from these two groups

d) creating a 5-minute video accompanied by an annotated bibliography

3. Design of the Tool

2.1 Supervisors' knowledge of and attitudes to Open Science

Four individual consultations were undertaken with research supervisors including one Associate Dean of Graduate Studies, two Assistant Professors and one full Professor. The aim of the work was shared with the participants. The focus of the consultations ranged from what they understood by the terms open science and open innovation, how much they valued these kinds of approaches to research, how important they felt training in this area was for early career researchers, how they were guiding the students in this regard and finally how they judged their own knowledge and skills in these areas.

A further four research supervisors were invited to fill in and discuss the Orion Open Science self-assessment tool, as outlined in D2.3, which was administered through Qualtrics and over Zoom. All respondents had more than 4 years' service at their current institution. No respondent opposed open science as a practice, but there were varying levels of experience across the group, with most familiarity with open access publishing. There was awareness and a level of trepidation about the fact that Horizon Europe funding applications now ask for plans around Open Science, due to perceived gaps in their expertise, particularly around data sharing and reuse and what specific non-academic and academic audiences should be targeted for Open Science. Additionally, supervisors in this sample were not prioritising or transferring Open Science know-how to students in any systematic way.

2.2 Perspectives of "Open Your Research to Collaborative Futures" course participants on what supervisors should know

As part of the exit process from the "Opening Your Research to Collaborative Futures" course, there was an end-of-course group discussion with course participants led by the project coordinator. There were also individual exit interviews carried out by the research scientist, for which 13 course participants volunteered to take part. In both fora, participants were asked "What would you like supervisors to know about open science so that they can sufficiently supervise PhD researchers in this regard?". In the group discussion, live shared notes were taken as the discussion unfolded, and the following ideas were generated by the group:

- How to share science early in process (including hypotheses, protocols, preliminary data) – highlighting the need for strong data management plans

- Openness / Curiosity Mindset; Awareness of the field of Open Science

- The importance of transversal skills (especially communication / collaboration) and creating opportunities to learn these skills

The individual exit interviews were undertaken via Zoom at a time convenient for the participant, and the data were analysed using Braun and Clarke's thematic analysis approach where three researchers separately coded the data and created preliminary themes. These were then integrated into higher order themes (Figure 1) and explored further in relation to potential interventions (Table 1). All of the learnings from the supervisors, students' group discussion and individual interview data were then combined to create the general dimensions through which supervisors can view open science (Figure 2).

**2.3 Findings that informed the support tool for supervisors**

The findings were combined with other information (e.g. the Open Science Skills Working Group Report "Providing researchers with the skills and competencies they need to practise Open Science") to create an introductory educational video (see screenshot below) for supervisors on open science that now sits on the "Opening Your Research to Collaborative Futures" website, along with an annotated bibliography (https://open-tdm.au.dk/blogs/openingdoors/) .
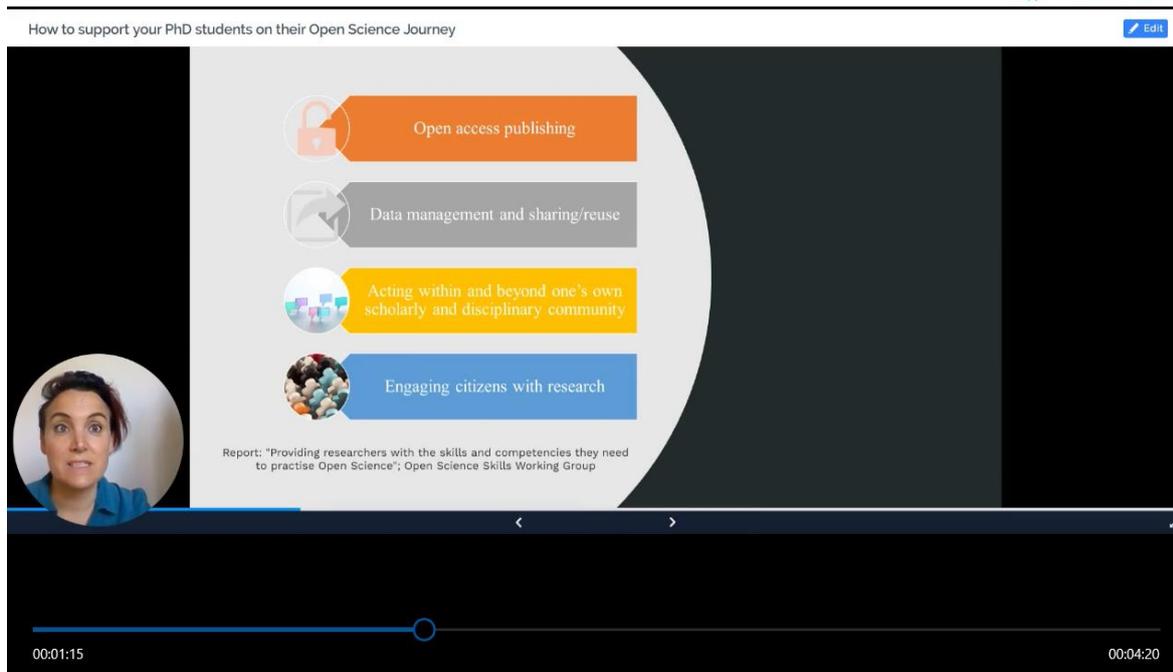
Figure 1: Screen shot of Educational Video for Research Supervisors

The learning from supervisors and course participants fell into three categories:
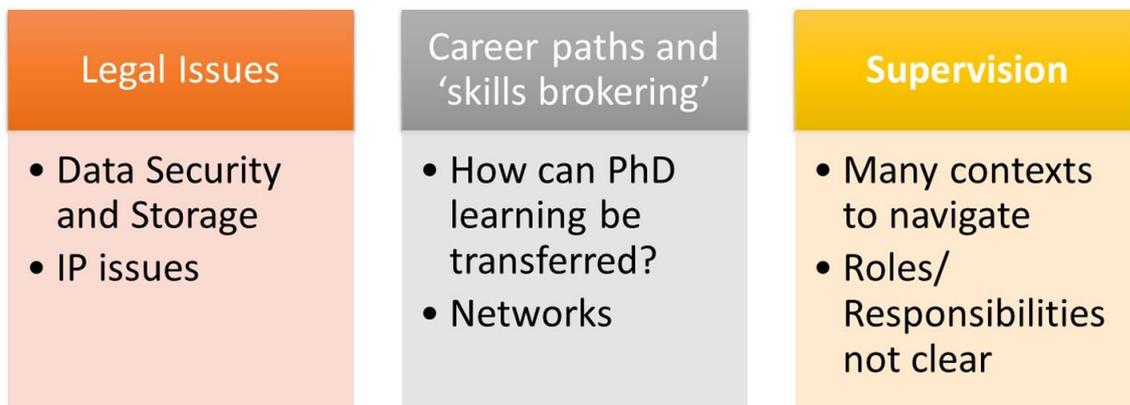
Figure 2: Three categories of learning needs in doctoral education represented in the data

1. **Legal issues**

   Students highlighted concerns about legal issues relating to data management, data security and storage, IP-issues and research ethics and research integrity. Interestingly, research ethics and integrity were spoken about within a legal framework (what is allowed?) more than an ethical one (what is the right thing to do?). Here, students seem to lack guidelines and support concerning institutional rules and

regulations and the security practices they should adhere to. Whether they expect their supervisors to provide the answers, or someone else in the system (Graduate School, doctoral programme) is unclear.

2. **Career paths and 'skills brokering'**

Here, there was an uncertainty about how and what research skills, competences, and knowledge are relevant not only for the immediate research projects undertaken but also for future career paths. Students felt it important to seek support on how to transition from the institutional context into professional contexts or external organizations after the PhD/postdoc has been completed. The career path category also links to challenges around peer-mentoring (e.g. through alumni-network), career guidance, and practices around transitions between institutional and professional contexts. Interventions might involve doctoral student internships, collaborative research projects (with external partners), and open sharing of resources across different contexts.

3. **Supervision**

Traditional supervision approaches with an internal focus within the discipline, university-milieu, and classical academic dissertation genre seem contested and perhaps even challenged. Supervisors are expected to be able to guide and support across a multiple set of contexts: Discipline, career, legal issues, research ethics and integrity, academic freedom, transferrable skills and competences, new research practices involving a range of external partners and stakeholders. Supervisors are challenged by the expectations about regulations on the one hand (data protection, dissertation requirements) and creativity and experimentation in the research on the other hand. These issues are often themselves unresolved in institutions, whereby both supervisors and students feel unsure of how to navigate – and unsure of each other's roles and responsibilities.

The three categories can be considered as follows in relation to (1) aims and goals; (2) responsibilities; (3) actions required, and (4) possible interventions:

Table 1: Possible interventions to address learning needs

	Legal Issue (Data Management)	Career Paths (Networks, Transitions)	Supervision (Dissertation, Mentoring)
Aims and Goals	Clear rules and regulations Knowing who to contact about what Develop ownership and agency	Develop networks early on Connect with alumni-groups Enable transitions	Completion *and* originality Facilitate research-society-nexus Allow room for new research practices
Responsibilities	Data protection and security Research ethics and integrity Navigating institutional system	Career guidance Peer-mentoring Interships / collaboration	Ensuring quality of research Encourage ownership and agency Align expectations between actors
Actions required	Clarify institutional infrastructure Clarify roles and responsibilities Provide accessible guidelines	'Context-brokering', mediation Merging, not blurring, contexts Clarify PhD curriculum	Mediating between system, student, and external partners / contexts Enabling new practices / genres
Possible interventions	Courses for students and supervisors 'Pixie-book' tutorial videos Individual coaching by TTO	Assign curricular credit units Internship models (PhD courses) Inspirational videos with 'role-model examples'	Support system for *supervisors* Peer-mentoring between *supervisors* Clear rules, accessible guidelines Inspirational videos with role-model examples

When put into a spectrum, the issues could be said to range between the dimensions of (1) system, (2) supervision (pedagogy), and (3) society.
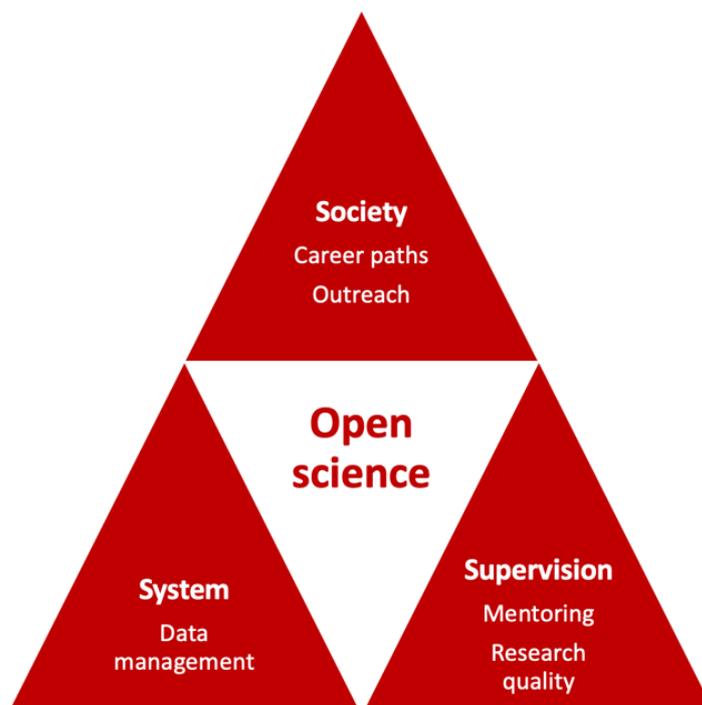
Figure 3: Dimensions of Open Science learning for the doctoral journey

While Opening Doors provides an introductory educational video that signposts supervisors towards the existing open education resource, we had other ideas for further tools that may be more appropriately developed with institution-specific information, for example:

1. **Video-material:** Inspirational videos (and video-tutorials) with local practice examples of how to supervise PhD students in the intersections between (inter-) disciplinary research, dissertation requirements, career paths, and institutional legal systems.

2. **Mapping the institutional infrastructure (creating a map):** Mapping out on a website the institutional infrastructure concerning various supporters to contact for what purpose: TTO, data management, GDPR, dissertation guidelines, PhD regulations, etc.

3. **Creating a living library:** A joint online library with former dissertations exploring the intersections between science and society, and examples of how data agreements were set up between researchers and external partners.

4. **Alignment tools:** Examples of how roles and responsibilities were divided between the doctoral students, their supervisors, the Graduate School, the legal units, and external partners (and publics). Templates to be used for aligning expectations between students and supervisors and partners.

4. Conclusion

This deliverable provides a starting point for supervisors to understand the concept of Open Science at a high level, and signposts further opportunities for more in-depth learning. It was designed with "time-poor" doctoral supervisors in mind, who cannot be expected to be experts in all aspects of the complex doctoral journey. While institutional specific support tools are required for the most relevant and useful information, the 5 minute video set a scene and hopefully will encourage supervisors to open their minds to open science, if that is not already the case.

5. References

Dely L. Elliot, S.S.E.B., Kay Guccione, Sofie Kobayashi, 2020. The Hidden Curriculum in Doctoral Education. Palgrave Pivot Cham.

Elliot, D.L., 2021. A 'doctoral compass': strategic reflection, self-assessment and recalibration for navigating the 'twin' doctoral journey. Studies in Higher Education, 1-14.

Skakni, I., Inouye, K., McAlpine, L., 2022. PhD holders entering non-academic workplaces: organisational culture shock. Studies in Higher Education 47, 1271-1283.

APPENDIX 1

Supervisory Support for Open Science in PhD Research

Annotated Bibliography

Report

O'Carroll, C., Kamerlin, C. L., Brennan, N., Hyllseth, B., Kohl, U., O'Neill, G., & Van Den Berg, R. (2017) *Providing researchers with the skills and competencies they need to practise Open Science: Open Science Skills Working Group Report*. Luxembourg: Publications Office of the European Union: European Commission.

The overarching goal of this report is to provide recommendations to ensure that researchers in Europe have sufficient skills and competencies to practice Open Science (OS). There are several useful sections in this report for those in supervisory roles of early career researchers. Section 3.1 categorises OS skills into 4 groups of skills and expertise for: 1. Open access publishing; 2. Data management and sharing/reuse, respecting legal and other constraints; 3. Acting within and beyond one's own scholarly and disciplinary community; 4. Engaging citizens with research. Supervisors can think of OS skills in these categories and throughout the report e.g. in sections 2.3. Professional Development for Open Science and 2.4. Supporting Open Science--there are excellent recommendations of resources that provide high quality information across these categories. Early career researchers can be signposted towards this material. This report was published in 2017 and at the time of writing this annotated bibliography (June 2022), the majority of the resources referenced are still very relevant and have even evolved.

DOI 10.2777/121253

Blogs

Guccione, K. (Ed.). Retrieved from https://supervisingphds.wordpress.com/. This blog is aimed predominantly at supervisors and covers a range of topics and research findings in PhD supervision e.g. PhD career development strategies; Pedagogies for PhD supervision. There are many contributors to this blog, mostly PhD supervisors and researchers in this field. A key

value that is highlighted several times is openness and transparency in the supervisor-postgraduate researcher relationship, which can also be seen as a key element in open science. This relationship can thus be faciliatory to an early career researcher's journey in open science.

Bengtsen, S. S. E., Lazarte Elliot, D., Guccione, K., & Kobayashi , S. (Eds.). Retrieved from https://drhiddencurriculum.wordpress.com/. This is a blog for supervisors, early career researchers and researcher developers. The "hidden curriculum in doctoral education" refers to learning that takes place outside of the formal curriculum during one's doctoral studies that leads to academic, personal, and psycho-social growth. This learning can take place in diverse spaces and in diverse ways. Often, this learning can develop skills in open science such as engaging outside of your discipline and engaging citizens with research. While these may be seen as "extracurricular" activities and thus less important than the development of more fundamental, cognitive research skills, various articles contained on this blog attest to the importance of such activities in the wellbeing of early career researchers and in their ability to build an identity that enables them to make more informed career decisions.

University of Warwick. Retrieved from https://phdlife.warwick.ac.uk/. This blog is aimed at PhD researchers, and those transitioning to post-PhD careers. There are many posts that refer to open science skills such as digital networking, science communication and career transitioning. Supervisors are not expected to be all things to their supervisee. Peer learning and community interaction is an excellent way to leverage the "hidden curriculum" and this blog contains many opportunities for such learning through sharing experiences and collective challenges.

Articles

Meyer, M. N. (2018). Practical tips for ethical data sharing. *Advances in Methods and Practices in Psychological Science*, *1*(1), 131–144. https://doi.org/10.1177/2515245917747656
This is a tutorial-type article about data sharing that should be read by researchers new to this practice. It describes the dos and don'ts of sharing research data ethically. While it is based upon the U.S jurisdiction, the ethical practices described are applicable in general. Data

repositories are discussed and presented in easily understood tables so researchers can quickly learn the basics in this regard.

Santoro, H. (2021, November 1). Incorporating open science practices into your lab. *Monitor on Psychology; American Psychological Association*, *52*(8), 71.

This short article presents manageable ways to start the process of incorporating Open Science into your scientific practice. It focuses on using open platforms to organise and publish new project plans, workflows, and protocols using multimedia. Examples of these platforms include Open Science Framework and Github. The article also suggests registering protocols and preprints, sharing data and code, and lists three references and podcasts that are worth exploring if you are interested in learning more about the basics of open science, or indeed signposting your PhD researchers.