PROVISION OF OPEN SCIENCE TRAINING MATERIALS WITH EMPHASIS ON "GREEN DEAL/CLIMATE CHANGE" AND "AI/DIGITAL TRANSFORMATION"

December 2023

Work Package: 5 – Open Science Agenda

Arqus Research & Innovation Project
(Grant agreement No 101017448)

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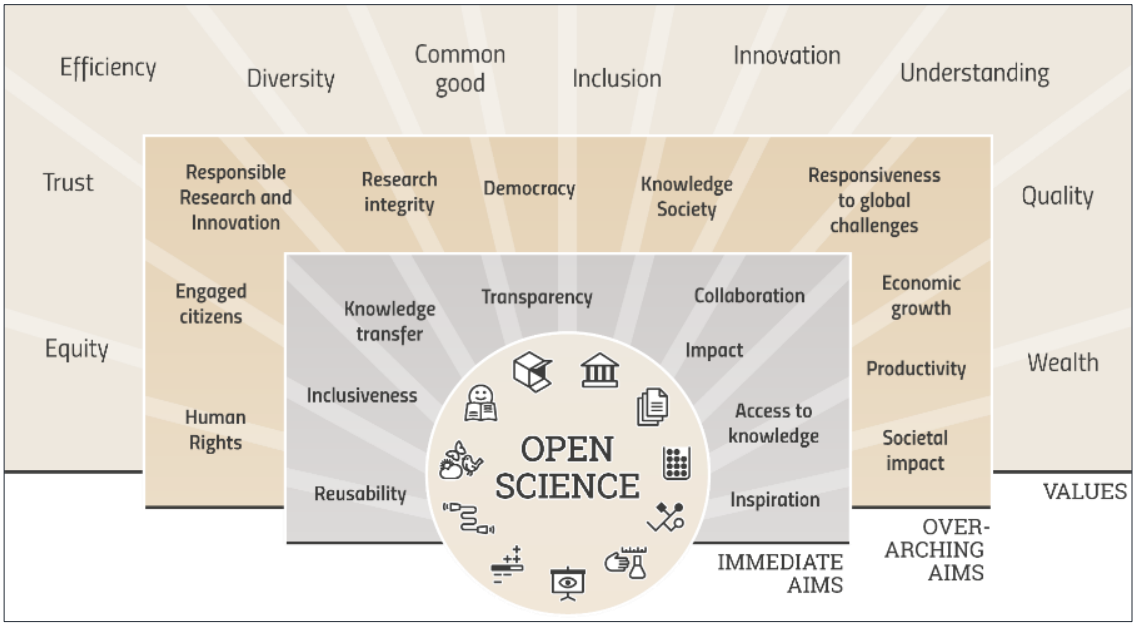
Contents

The Arqus Research and Innovation project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under grant agreement No 101017448.

1. Task and Goal according to the Grant Agreement

This document contains the third of the three deliverables from Work Package 5 (WP5), "Open Science Agenda", of the Arqus Research and Innovation (R.I.) project. Arqus committed to coordinate efforts in order to enhance openness in a strategic way, which aims to foster transparency, cooperation and sustainability as well as equity, inclusion and the notion of research as a common good. The deliverable is in line with Goal 5.4: "Developing shared materials for open science training to foster open innovation targeting the topic areas 'Climate Change' and 'AI/digitization'."



Graphic 1: The Open Science Cosmos as shown in the Arqus Openness Position Paper (Kaier et al., 2022)

Task 5.4 of the Arqus R.I. Grant Agreement is described by developing best practice tools and tutorials with emphasis on the topics "Green Deal/Climate Change" and "AI/Digital Transformation". Open Science training courses (with a focus on online/virtual materials) should be developed in English targeting the described discipline specific focus. It was planned to cover a wide range of topics concerning the "how to" of Open Science practices focussing on early stage researchers (doctoral students and postdocs). Based on the recommendations of the network of 'Arqus Open Science Ambassadors' online materials were jointly generated with all partners.

In the following it is described how WP5 has realised these goals in accordance with the needs of researchers (s. results of the Open Science survey among Arqus researchers and report D5.1), the experience of the Arqus Open Science Ambassadors and taking into account the large amount of already existing Open Science training materials.

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2. Open Science Training Materials

To develop the Open Science training materials, we started from the fact that already a wealth of information and training sources exist for different Open Science topics and with generic or discipline specific focus. The advantage of our WP is that people with different backgrounds are participating, like researchers, library staff and research consultants, who have experience in teaching Open Science aspects as well as provide consulting on how to practice Open Science and get funding. Additionally, we implemented the Arqus Open Science ambassador network in summer 2023 and could count on the extensive, multi-year experience of those involved. So, we had a very good basis for developing Open Science training materials in different formats.

The challenge was to bundle all information and make it available in a structured way. Therefore, we have orientated ourselves on the Open Science Cosmos Graphic (s. Arqus Openness Position Paper (2022): https://doi.org/10.5281/zenodo.5881903, p. 8) and decided to go beyond the topics of "Green Deal/Climate Change" and "AI/Digital Transformation". As the transition to Open Science is an demanding, long-term and profound transformation process for researchers, which also leads to heterogeneous and increasing requirements, information and training resources should be provided in a transparent and accessible way for all interested people, especially for early career researchers. The aim should be to build up profound competencies and to provide orientation in a highly complex field. Besides that, the Arqus universities cover a wide range of disciplines and research topics. Thus, we want to reach as many researchers as we can by providing basic information on training, support facilities and share best practices.

To make all collected information accessible, we created an Open Science webpage together with the Arqus Communication Team, which is embedded in the Arqus homepage. All training materials, Open Science related documents as well as information on the Open Science Ambassador Network are accessible there. The research interests of the network members cover the research focus topics of the Arqus Alliance: Green Deal/Climate Change, Artificial Intelligence/Digital Transformation and European Cultural Heritage. They provide discipline specific advice and share best practices. Thus, the network members act as intermediaries between general Open Science and discipline specific support.

Aims and values

Open Science activities are very effortful for researchers and can be a challenge especially for early career researchers. It is also strongly related to the current reforming research assessment process. The Arqus Open Science Training Materials mainly focus on the benefits of openness but also address common obstacles and provide opportunities on how to overcome these. Therefore, we aim to engage researchers in practicing Open Science and provide curated information on different aspects, support at Arqus universities and share best practices. Our goal is to enable self-learning opportunities and support competence building for preparing them in fulfilling the requirements of the current and future research assessment system.

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Researchers should be able to decide, which Open Science activity fits for their purpose and their available resources and just start, no matter what activity. Sharing best practices and providing structured information is therefore a good basis and can be accompanied by suitable on site workshops and training offers.

2.1 Collection of existing training materials at Arqus universities

There is already a wealth of training materials on Open Science and researchers run the risk of being overwhelmed by the quantity. Our approach was therefore not to reinvent the wheel, but to use what already exists and provide it in a targeted way. Our goal was to collect relevant training materials, e.g. videos, presentations and/or text publications, and make them available on one platform for all Arqus researchers and staff. The first step was to collect the training materials available at the Arqus universities and beyond, which was done by the WP5 members and the Open Science ambassador network. This information was supplemented by an overview on support facilities at the Arqus universities. This collection can be expanded further and any gaps can be filled.

2.2 Open Science Ambassador videos

The researchers of the Open Science Ambassador Network (see Report D5.2) were involved in the creation of the training materials. As they act as lighthouses for Open Science in the Arqus alliance, we could draw on their experiences. For this purpose, some of the Ambassadors created videos on their own at the request of the WP5 leaders, in which they briefly talk about their motivation and first steps in Open Science. The aim is to motivate others, especially young researchers, to practice Open Science by sharing personal experiences.

2.3 Arqus Open Science Skills Matrix

Since it could be overwhelming to practice Open Science, we wanted to give researchers orientation and make it easier to decide, which activities fit for their purpose. To this end, we have linked research assessment criteria and Open Science activities with specific skills, that researchers need to acquire in order to successfully perform those activities. Since the reforming research assessment process is still ongoing, we refer to both, qualitative and quantitative based criteria, and offer a broad variety of research practices in the Open Science framework. Our aim is to support researchers with an easy-to-handle overview on customised Open Science skills for their specific purposes in research and teaching and in preparation of research assessment criteria. To this end, we developed the Arqus Open Science Skills Matrix (see annex to this report), drawing on the findings of the Arqus Openness Position Paper, the reports of WP 3 (see deliverable 3.3) and WP 6 (see deliverable 6.3) as well as on the report on recommendations to enhance SwafS (Science with and for Society) and Open Science (see deliverable 5.1). In addition, we based the Skills Matrix on findings of NOR-CAM, which is a toolbox for recognising and

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rewarding efforts in academic career and was published by a working group appointed by the Universities Norway in May 2021.[1]

2.4. Open Science Webinar Series

Open Science is one of the guiding principles in research to strive for cooperation, reusability and transparency across disciplines and borders. While many researchers are already actively engaged in Open Science, there are also individuals who encounter difficulties and may be uncertain about how to start. Within this framework, the ENLIGHT RISE[2] and Arqus Alliance Ambassador Network decided to work together and conduct a cross-alliance online Open Science Webinar Series. The aim is to offer researchers community-based solutions and share best practices on how to overcome obstacles regarding Open Science. In this context, needs, challenges and expectations of implementing and developing Open Science activities in research will be discussed. The webinar topics are based on a survey that was conducted among the OS Ambassadors of both alliances in November 2023. The first webinar took place at December, 13 2023 with approximately 30 participants from both alliances. In a 20 minutes input Pia Voigt (Leipzig University, leader of WP5 in the Arqus R.I. project) presented insights on Open Science practices and challenges in a European university alliance, which based on the Open Science survey results among researchers in the Arqus Alliance in 2022. In the next webinar Richèl Bilderbeek from Uppsala University will talk about the pros and cons of Open Science and the local Open Science community. It is intended to continue the webinar series in a bi-monthly rhythm. The Arqus Open Science Ambassador Network will take over the organisation of the webinar series from spring 2024, in case they become an Arqus Community of Practice[3].

3. Open Science Webpage

The Arqus Open Science webpage will bundle all Open Science related documents, information, materials and contact details. The aim is to provide interested people, especially researchers, a low-threshold introduction to the topic. There will be 4 sections:

1. Open Science – What is it (for)?
    - Introduction to Open Science
    - Description of the several Open Science aspects according to the Open Science Cosmos Graphic:
        - The graphic is interactive. A separate page opens by clicking on the icons.

[1] NOR-CAM: A toolbox for recognition and rewards in academic careers (2021): https://www.uhr.no/en/news-from-uhr/nor-cam-a-toolbox-for-recognition-and-rewards-in-academic-careers.5780.aspx

[2] ENLIGHT RISE Open Science Ambassador Network: https://enlight-eu.org/landing-research-and-innovation/open-science/ambassadors

[3] Arqus Communities of Practice: https://arqus-alliance.eu/our-communities/communities-of-practice/

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    - Information will be provided on: a short definition on the specific Open Science topic, aims and benefits, skills and competencies, training materials, best practice video recorded by the Open Science Ambassadors

2. Arqus Open Science Ambassador Network
    - Information on the network
    - Contact details of the ambassadors
3. Open Science support at Arqus Universities
    - Contact details
    - Open Science related policies and further information
4. Open Science news and events
    - Dates and abstracts of planned events
    - News on Open Science related developments within the Arqus Alliance
5. Arqus Open Science key documents
    - Arqus Openness Position Paper
    - Open Science Skills Matrix
    - Reports of WP5 (D5.1, D5.3)
    - Reports of WP3 (D3.1, D3.3)

All Open Science related documents and materials will be anchored at the webpage. This will also require the maintenance of the webpage, especially by editing the content and updating insights, services, facilities, news and materials. Since Open Science is strongly related to the ongoing reforming research assessment process all content will be developed with regard on this developments to support researchers with suitable information and engage them in practicing Open Science. In this sense, the website focusses on providing researchers with information for the practical implementation of Open Science in their research procedures and preparing them in a suitable way for research assessment.

4. Conclusion and outlook

WP5 strived to collect, develop and make available training materials for competency building in Open Science for all researchers and staff of the Arqus Alliance. All materials and information will be available on the Open Science webpage to ensure a low-threshold entry point to the topic. As Open Science is in some cases very complex and effortful and researchers need advice and training, it is logical to link Open Science activities with research evaluation criteria. Researchers need to know what is expected of them and what added value this will bring them. In addition, certain Open Science activities are necessary to obtain funding. The training materials, the information and the Open Science Skills Matrix therefore help researchers to perform well in the current system of research assessment. In addition, Open Science activities promote transparency, inclusiveness, reusability and collaboration in research. To emphasise the values and benefits for researchers, we provide materials that communicate best practices and show ways to make research more open, inclusive and transparent, in particular the Open Science Ambassador videos and the webinar series together with the ENLIGHT alliance.

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The ongoing cultural change in research goes along with practicing Open Science and reforming the research assessment system that needs to be supported by research institutions and the scientific community. The Arqus alliance brings together researchers, staff and university leaders and offers good conditions to support this ongoing process in a suitable way. Especially the exchange and sharing of best practices in research, teaching and training among researchers from the partner universities promise to be helpful and supportive. Besides the information basis at the Open Science webpage it needs more practical activities to implement Open Science as cross-cutting topic for the research actions within the Arqus alliance in a lively and supportive way.

The ongoing cultural change in research goes hand in hand with the practice of Open Science and the reform of the research assessment system and should be supported by research institutions and the scientific community. The Arqus Alliance brings together researchers, staff and university leaders and provides good conditions to support this ongoing process in an appropriate way. In particular, the exchange and sharing of best practice in research, teaching and training among researchers at the partner universities promises to be helpful and supportive. In addition to the information base on the Open Science website, further practical activities are needed to implement Open Science as a cross-cutting topic for joint research actions within the Arqus Alliance in a lively and supportive manner. This could be achieved by activities conducted by the Arqus Open Science Ambassador network, that will become a Community of Practice in 2024. Besides that, the cooperation with other European university alliances will foster this development, e.g by offering joint workshops, courses and exchange formats for researchers and staff.

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5. Annex: Arqus Open Science Skills Matrix

Area of competence *Evaluation dimension*	**Open Science Areas** *Conceptual dimension*	**Open Science Skills** *Practical dimension*
1. Publication	• Open publication (journal articles, monographs etc.) • Open data • Open source code • Open methodologies and procedures	• Follow the code of conduct on research integrity and safeguarding good scientific practice • Follow the FAIR principles • Get familiar with open licences • Know legal dimensions (data protection, copyright, usage rights) • Know publication models and practices (green, gold, diamond Open Access; preprint) • Know funding models for publication • Know the publication environment (repositories, scientific journals, predatory journals etc.) • Maintain your public research profile, e.g. ORCID
2. Communication	• Science communication events • Scientific communication • Non-scientific media • Social media • Advisory to government bodies	• Popularise research • Identify and address your target group (needs, interests, language level) • Community building and networking • Know the context and the mechanisms of offline/online media and target groups (e.g. digital platforms, social media channels, government bodies)

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3. Innovation	• Entrepreneurship • Productisation • Social Innovation (e.g. predict diseases) • Application of research in public administration and industry • Research reports and studies	• Make your research outputs reproducible • Know legal dimensions (IPR, contracts, data protection, licences, patenting) • Know about funding (public, private) • Make results reusable, applicable and available for society • Acquire multidisciplinarity and collaborate inter/transdisciplinary
4. Research Process	• Open Research Agenda Setting • Quality assurance • Peer reviewing • Editorial activity • Citizen Science • Research infrastructure • Evaluation	• Acquire/develop editorial experience • Being able to use ORAS and CitSci-methodologies • Apply research integrity and discipline specific standards • Document the research process and make it interpretable and transparent • Follow the FAIR principles • Cooperate inter-/transdisciplinarity • Operate within open research infrastructures
5. Teaching and education	• Open educational resources (OER) • Include Open Science in curricula • Training on Open Science	• Be an active part of relevant networks • Qualify yourself by attending OS trainings • Follow the FAIR principles • Know legal aspects (IPR, copyright licences) • Know and operate within the OER infrastructure • Train and advise colleagues and multipliers in OS