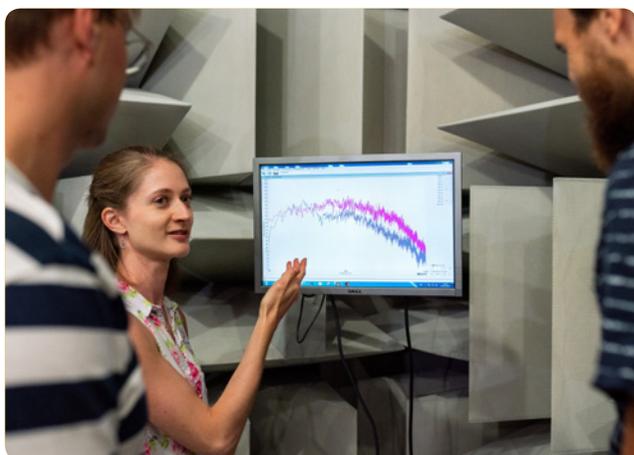




OPEN SCIENCE TRAINING METHODS AND PRACTICES

across European Research Libraries



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WHAT IS OPEN SCIENCE?

Conducting science in the digital age is a huge opportunity to develop not only open access to scientific publications and research data, but also Open Science. We can first define Open Science by its goals. According to the OECD, Open Science aims at making research more efficient by making *“the primary outputs of publicly funded research results – publications and the research data – publicly accessible in digital format with no or minimal restriction”*.

Open science is about opening each step of the research process, from data collection, processing, storage, long-term preservation (through open source standards, metadata, software, interfaces and through persistent identifiers) to publication, distribution and reuse (through open metadata, open evaluation, open citations and credits, and through the use of institutional open access repositories).

The ecosystem built by these practices makes science more cumulative, robust, transparent and universal. Therefore, Open Science boosts innovation and breakthroughs all around the world.

Useful references:

- [What is Open Science? Introduction](#)
- [Innovations in Scholarly Communication | Changing Research Workflows](#)
- [OPEN SCIENCE](#) European Commission factsheet
- See also LIBER's report [here](#).

The advance of Open Science has meant a reinvention of models, ways of working and techniques in a rapidly changing digital world. Open Science skills for both research librarians and researchers are at the center of all evolutions towards transparency. Digital skill sets and training programmes are needed to support a more open and transparent research life cycle.

LIBER's [Digital Skills for Library Staff and Researchers Working Group](#) (2018-2020) aimed to spread a more open culture and to position libraries as key partners in skills training for the complex and forward-thinking concept of Open Science.

“Open science policy has developed progressively in the EU. It concerns all aspects of the research cycle, from scientific discovery and scientific review to research assessment, publishing and outreach... All scientists in Europe should have the necessary skills and support to apply open science research routines and practices.”

13.12.2019, European Commission's [OPEN SCIENCE factsheet](#)





OPEN SCIENCE SKILLS

What are Digital skills?

Digital skills are nowadays critical in the academic world, and go far beyond the simple use of digital devices and media. The term implies an autonomous, sensible and responsible use of digital technologies in various situations. Digital skills vary depending on your digital culture, your awareness about the rights and duties of each actor of the digital world, your knowledge about the ways to build your digital identity properly, your digital information literacy, your networking skills and your ability to work with digital tools in a professional context.

Useful references

- General: [What is digital capability?](#)
- Academic field: [Digital competencies – urgently needed! October 2019](#)
- See also LIBER's report [here](#).

What are Open Science skills?

The European Commission defines several Open Science skills in its [July 2017 report](#) on the subject. In broad terms we can sum up these skills in the following way:

- Open access scholarly publishing skills.
- Skills linked with open research data (production, management, processing, analysis, use, reuse, dissemination).
- Legal skills (respecting legal constraints).
- Awareness of issues concerning research integrity.
- Ability to act “beyond one’s own scholarly and disciplinary community”.
- Ability to “manage and broaden” citizen science.

At a more detailed level the array of knowledge, skills and competencies needed to practice Open Science can be daunting for many librarians and researchers, particularly those who are new to Open Science concepts and practices. Identifying which skills are needed is the first step for anyone wishing to upskill themselves or others. In 2019 the LIBER Digital Skills for Library Staff and Researchers Working Group embarked on a project to define the skills needed to practice Open Science effectively.

The working group developed a long list of skills by reviewing the literature, going through competency frameworks and exploring available learning resources that focused on Open Science, including [DigComp 2.0](#), the [FOSTER+ learning resources](#) and the [LIBER Open Science Roadmap focus areas](#). This visualisation provides structure and context by categorising the skills, and was created and launched as part of a poster by the working group at the [Open Science Conference, Berlin, 11-12 March 2020](#). The visualisation is licensed CC BY for reuse, and can be downloaded from [Zenodo](#).

Useful references

- [Open Science Training Handbook | FOSTER](#)
- [Providing researchers with the skills and competencies they need to practise Open Science](#)
- See also Liber's report [here](#).



Open Science Skills visualisation

The array of knowledge, skills and competencies needed to practice Open Science (OS) effectively can be daunting for many librarians and researchers, particularly those who are new to OS concepts and practices. Identifying which skills are needed is the first step for anyone wishing to upskill themselves or others in OS.

To learn more about how the visualisation was created, please see the [LIBER website](#).

The visualisation is licensed CC BY for reuse, and can be [downloaded from Zenodo](#).



a. Produced by LIBER's Digital Skills for Library Staff & Researchers Working Group, with input from other LIBER Working Groups (2020)
 b. Reflects discipline-specific skills needed to practice Open Science (does not include generic computer skills, wider librarianship skills and personal competencies)
 c. Mapped to the focus areas in LIBER's Open Science Roadmap, to the Digcomp 2.0 framework and FOSTER learning resources

OPEN SCIENCE SKILL DEVELOPMENT INITIATIVES IN EUROPE

LIBER Survey Analysis

In order to display the richness and diversity of European approaches towards Open Science upskilling and training, addressing both researchers and the research library community, LIBER's Digital Skills for Library Staff and Researchers Working Group (2018-2020) identified Open Science training programmes in 28 countries.

Methodology

One relevant programme in each country was identified, plus a second one in both Spain and The Netherlands. A questionnaire (see appendix) was sent and interviews were conducted. The selected programmes include institutional cases, national initiatives as well as European Open Access/Open Science networks. Their approaches rely on skills identification, in both libraries and researchers' communities, from mature programmes to emerging initiatives.

The 21 case reviews covering 19 countries are openly accessible on Zenodo to enable everyone to discover a range of Open Science training programmes and inspiring methods and practices across Europe, gain ideas and inspiration, and discover some challenges.



Open Science Training Case Studies



- | | | |
|---------|------------|-----------------|
| Austria | Hungary | Romania |
| Belgium | Ireland | Spain |
| Denmark | Italy | The Netherlands |
| Estonia | Latvia | Switzerland |
| Finland | Luxembourg | United Kingdom |
| France | Norway | |
| Germany | Poland | |

IMPACT OF OPEN SCIENCE TRAINING PROGRAMMES



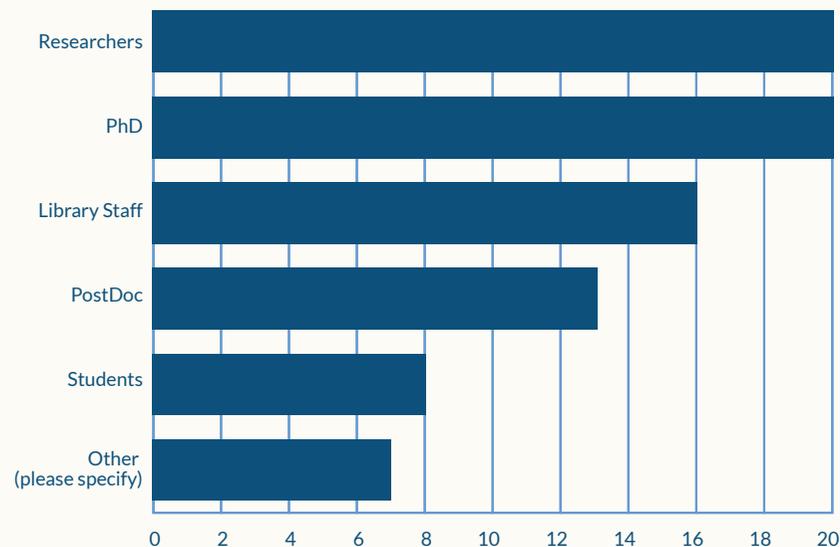
Here follows an analysis of the case studies to identify themes, patterns, commonalities and differences.

Key impact

Skilling and training initiatives directed towards researchers, library staff and research support staff enable institutions to engage staff and researchers with the Open Science movement by:

- Creating an Open Science culture in the institution / in the country, fostering new opportunities for progress in science and launching massive Open Access publishing plans.
- Helping researchers and library staff discover the first steps necessary for meeting Open Access requirements.
- Building new skilling programmes, including complex or very broad subjects such as ethics and citizen science.
- Increasing data sharing.
- Writing and sharing Open Science guidelines (from institutional to European level).
- Contributing to building a pan-European Open Science community.
- Increasing a general awareness of Openness in European countries.

Audience

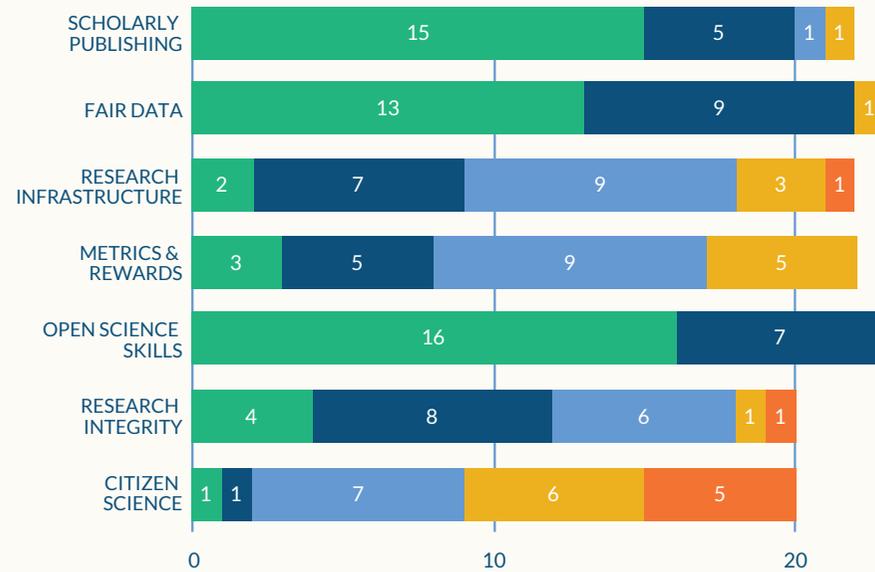


Researchers, early-career researchers / PhD students and Librarians are the three main audiences targeted by training initiatives. They are generally trained separately, but in some cases all public are attending mixed workshops and conferences.

The category "other" can include IT and data management experts such as data scientists, bioinformaticians and data stewards.

Topics and priorities

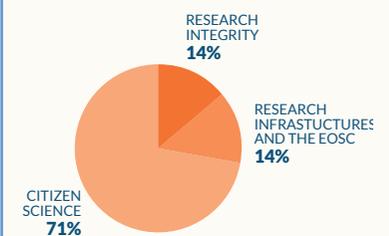
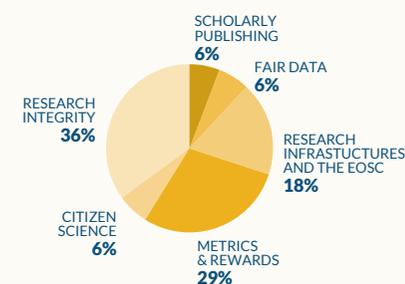
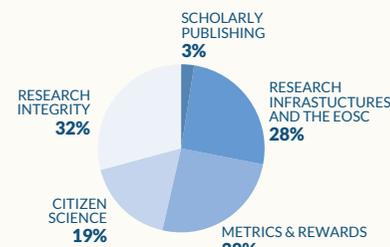
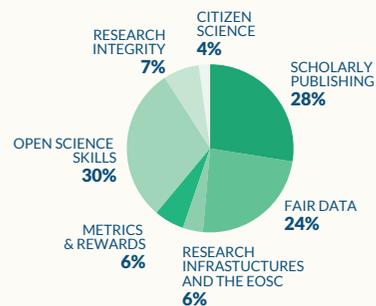
The topic, goal and level of training activities is quite varied. Many training efforts focus on Open Science skills in general, while topics such as scholarly publishing skills and FAIR data are also popular. Each respondent was able to provide several choices.



The lowest priorities are generally linked to the training calendar and a progressive skilling programme (Citizen Science, ethics). Some other skills are excluded when handled by other services than the library (data visualisation) or because of the lack of specialised trainers in the country.

Partnerships with external instructors and networks such as Carpentries, FOSTER Plus, EOSC skills or SSHOC Open Marketplace, help widen the scope. Citizen Science skills training for example benefits from co-organised workshops or from participating in local or European projects.

Some cases divide the skilling programmes between basic / advanced / expert levels. "Basic" skills for all staff implies that all library staff and research support staff will be trained in at least the most common aspects of Openness knowledge and culture. This becomes harder with training all newcomers in the research field, but early-career researchers are trained mostly through the PhD training – delivered by or with the library staff training services in all cases. Training newcomers is, however, sometimes achieved and training is conducted systematically at some institutions.



■ Top priority

■ Strong priority

■ Moderate priority

■ Not a priority

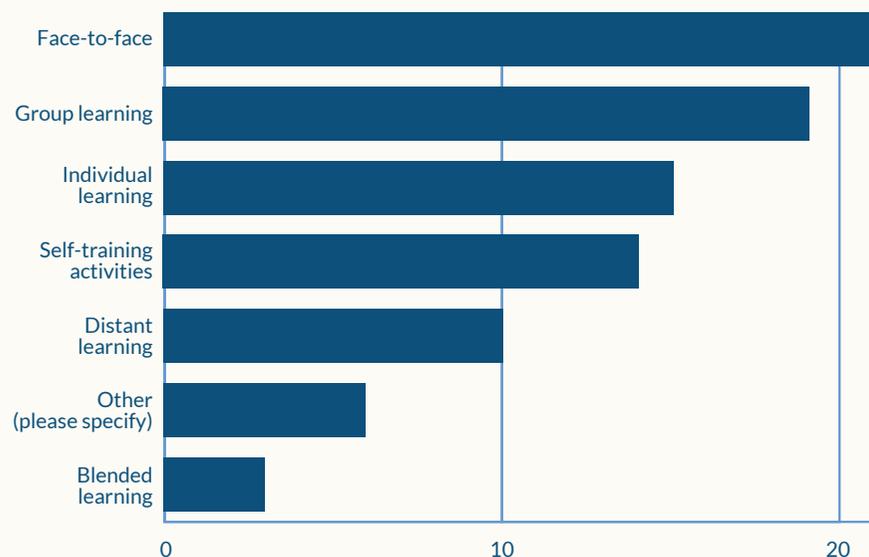
■ Excluded

Open Science training methods, formats, rewards and recognition

Training channels (face-to-face, blended learning, distance learning, self-training activities) and formats (slideshows, interactive platforms, MOOCs) vary a lot: the definition of clear learning objectives is nonetheless the most important thing. Agile approaches and adaptive models are needed to cover all types of audience and situations, and engage the trainees in Open Science practices.

As before, each respondent could select several choices from among the following categories.

Training channels:



Formal recognition and rewards are variable. Except for cases where there is an institutional or national reward that significantly impacts the researchers' careers, incentives have no real effect. Only six cases included the training sessions into a curriculum, mainly PhD ECTS / skills recognition. The most common practice is to deliver certificates of attendance, external institute certificates, Carpentries certificates and recognition for trainers. Except for certificates of attendance, there is generally no formal skills recognition, no open nor alternative recognition - and no reward.

Certificates of attendance for training sessions are used to assess the numbers of library, IT and research support staff attending training and the levels of expertise, but these barely impact on their careers. Alternative recognition (open badges for example) are not a common way of certifying skill levels.

Training appears to be a means to what is further assessed in practice: Open Science outputs and benefits *per se*.

Trainers' background

Trainers come from a range of areas, including university research support staff, institutional staff and librarians. Trainers mostly belong to a dedicated team, generally managed by the library and possessing pedagogical skills. They are part of the institution's strategic infrastructure. Some respondents mention Carpentries Instructors, of which many are PhDs or postdocs with a high turnover but who bring very valuable experience. Networking with the Open Science community across Europe enables recruiting new trainers and updating the training programmes.

Trainers also have to be skilled, and trained. Several train-the-trainer programmes are available, such as FOSTER Plus or Carpentry Instructor training. Online self-learning with OpenAIRE materials, FOSTER Plus materials, SSHOC Open Marketplace – or by following European projects and library networks, MOOCs, conferences and webinars – is a strong pathway for training-the-trainers and keeping them skilled as trainers. Participating in hackathons also gives trainers some practice, as well as providing them with examples that engage them through shared experiences. Trainers currently partner with other trainers, librarians, researchers and experts. They learn from them, and then transform this knowledge into training programmes.

LIBRARIES ARE OPEN SCIENCE TRAINING KEY PLAYERS

Analysis of the [21 case-reviews](#) shows that libraries are identified as Open Science skills training experts and/or coordinators.

They collaborate to form a “Knowledge Hub” with professionals (research support services, copyright services, IT services). Open Science and information skills and practices training is thus a clear role of libraries.

Open Science, library field of expertise

Librarians are considered experts as:

- Open Science skills trainers
- Open Access publication support services providers
- (FAIR) data managers
- Citizen Science facilitators

Open Science training services management and coordination

Open Science training is mainly managed and coordinated directly by libraries.

Fifteen of the selected case studies describe their initiative as being currently managed and coordinated by a library team, and that partnering with data specialists, research administration and the teaching team is the result of the library being in charge of the Open Science training service. Three indicate that Open Science skilling is led by a mixed structure that brings together librarians and researchers. When the training is coordinated by OpenAIRE NOADs (OpenAIRE’s National Open Access Desks), they are often part of the library team, whether they are librarians or not. Various respondents included NOADs into their training teams, as members or as coordinators.

As a key final note on the analysis, respondents reported that Open Science skills are efficiently developed when libraries are part of the institutional or national Open Science decision process, and when they play an active role in training and skilling staff and researchers.





ADVICE FROM THE RESPONDENTS

HOW TO GET STARTED

1. Identify the institution's Open Science priorities.
2. Identify your target audiences and their specific needs concerning digital skills and Open Science.
3. Reflect upon the needs you have identified to develop your strategy.
4. Keep in mind the following questions: how can you remove misconceptions and fears about Open Science and about the difficulties that can arise in the digital skill acquisition process? How can you make researchers use library services as an integral part of their research activities?
5. Prioritise the skills your audiences have to acquire when you build the training programmes: researchers, librarians, staff.
6. Don't work alone. You will have to establish a regular and constant dialogue with the board and the other central services of your institution (IT, vocational training); you will also have to build bridges between departments and disciplines.
7. Use various channels and learning types (face-to-face, self-training as group activities, gamification activities).
8. Set a budget that includes human resources, train-the-trainer, and events costs. Case reviews show that once the service is created, budgets vary from a few hundred euros to approximately €20,000. A specific and substantial budget is recommended for covering training fees and organising workshops with invited speakers or instructors but also covering staff costs, rooms, equipment, basic catering, travel fees, and time.

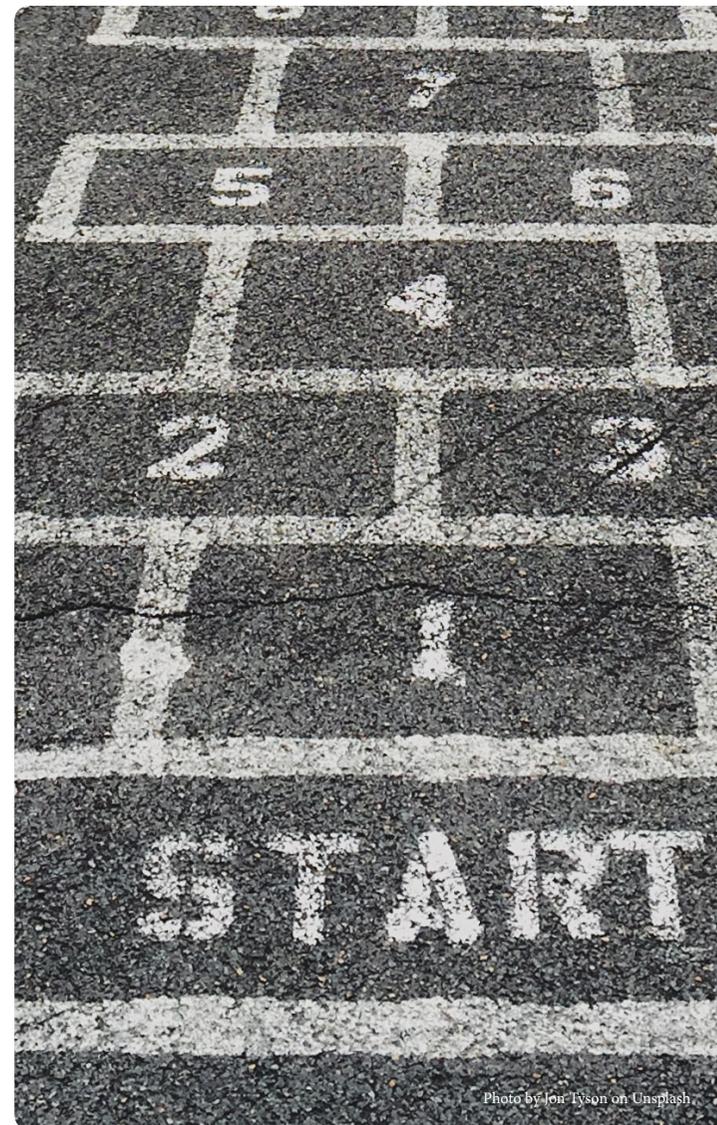


Photo by Jon Tyson on Unsplash



The challenges

Respondents encountered many challenges when deploying their Open Science training initiatives and programmes, and positioning the library and information services as a key player is a step you don't want to miss.

Here are six of the challenges to be considered when building an Open Science training project, together with pieces of advice provided by the respondents.

Including training programmes in the structure's overall Open Science implementation strategy

When launching an ambitious Open Science Programme, training researchers and staff in new scholarly communication models and FAIR data stewardship is critical. It has to be planned and progressive, in order to spread efficiently into the broad university community. A dedicated team (and time) is necessary to build the project, and then ensure a continuous training and upskilling activity.

Identifying the Open Science training programme key players

Libraries are sometimes not visible enough to influence policy-making when planning an Open Science roll-out. When underway, library services appear to be a major Open Science leverage for the institution since the library staff has developed Open Science skills, and has an expertise to value on the topic. Library Open Research support services should be integrated into the researchers' daily practices and routine, to ensure continuity with the Open Science training activity.

Recruiting well

Staffing is crucial for launching the project, and the first year is essential to set the dynamic. A project leader is needed, as well as an identified steering committee. It is hard to establish a long-lasting team, train everyone and recruit experts, but with the first results benefits grow quickly. Staff who are not taking a direct part in the Open Science implementation process can be kept informed about Open Science issues.

Cultural changes take time

Time management is always a challenge. However, allowing time is imperative for providing efficient training, aligned with the institution's overall Open Science strategic direction. Assessing training time is important for planning the process and its preparation. Training the trainers and support staff also takes time. There is a lot to learn – and to consolidate. Setting researchers and librarians up as partners when building training content is a key lever for identifying how to draw the audience's interest, understanding the disciplinary specifications, and adopting the best pedagogical approach towards raising the audience's awareness regarding Open Science.

Managing a large range of trainings

Being structured and systematic is the goal: ideally, everyone in the institution should have access to a training session (researchers, students, librarians, staff). Defining deliverables is a good way to manage a diversity of tracks. To simplify this and make people feel comfortable, try to offer a range of training at various levels, from basics for everyone to high expertise (Open Science beginner / intermediate / advanced learners, and even the opening of an expert discussion group. Personalising a training session helps to catch the audience's attention, and engage people: even with distance learning, a "face-to-face" effect and active training are very rewarding.

Reaching the audience

It is hard to reach the entire scientific community. Using various channels of communication is a challenge. The whole Open Science training offer must remain consistent, finding the right words to pursue an Open Science strategic aim. This implies the training programmes are integrated with the institution's overall Open Science implementation strategy (see first challenge). Career progression is always the best incentive but as this is not always possible, exploring communication and marketing channels can be influential. Finding Open Science "ambassadors" amongst senior researchers can work as a driver for encouraging university communities to attend the workshops and training sessions, and to commit to Open Science.



TAKEAWAYS: SEVEN KEY MESSAGES

Discover the key recommendations from the respondents:
put a library in your Open Science engine!



Skills are part of an overall Open Science implementation strategy
Link training with an existing concrete research support activity and tailor your events according to your university's already existing OA/RDM programmes: insert the training as a support for a practical daily routine.

Library teams are good at coordinating Open Science training for researchers and staff

Libraries are a powerful "skilling hub". They have been managing academic knowledge issues for centuries. They possess demonstrated technical competence as well as strong soft skills and pedagogical skills. Libraries know how to plan training programmes, and possess demonstrated leadership and management skills. They are skilled with Open Science, they lead and manage many Open Research support services and they easily partner with researchers and experts.

Plan, plan plan

Systematic and inclusive programmes need to be planned years in advance to show results.

Train, train, train

Mix formats and channels, from massive online training to small target-groups, from discipline-focused to interdisciplinary approaches, from online to blended or face-to-face presentations, from general presentations to focused conferences, seminars and hands-on workshops. And share your material openly.

Build a network

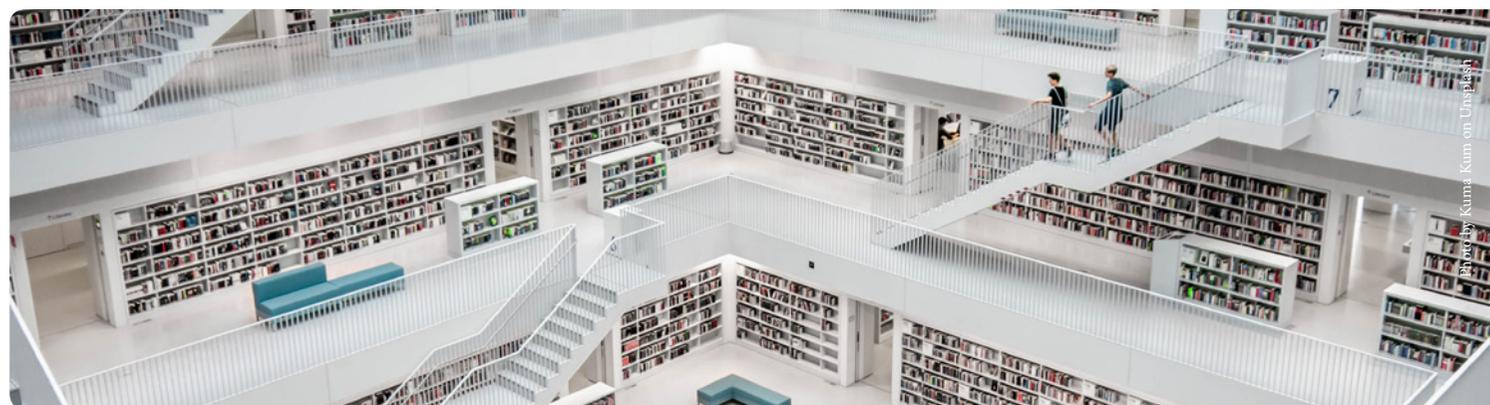
Build a network of ambitious people, grow your contact book and innovate with new training methods, course perspective and content. Train and reward the trainers.

Open a dialogue

Communicate towards your audience, generate leads, report key achievements and impact to policy makers. Open Science is a heated subject. It is good to open spaces for discussion amongst peers during the training sessions.

Help people enjoy working on Open Science

Let's offer people enjoyable moments and focus on the challenge to be "Open Science skilled", the benefits are amazing. Trusting people with sharing knowledge and skills is the path towards Open Science!





USEFUL REFERENCES

European Commission Open Science Factsheet (2019)
[OPEN SCIENCE](#)

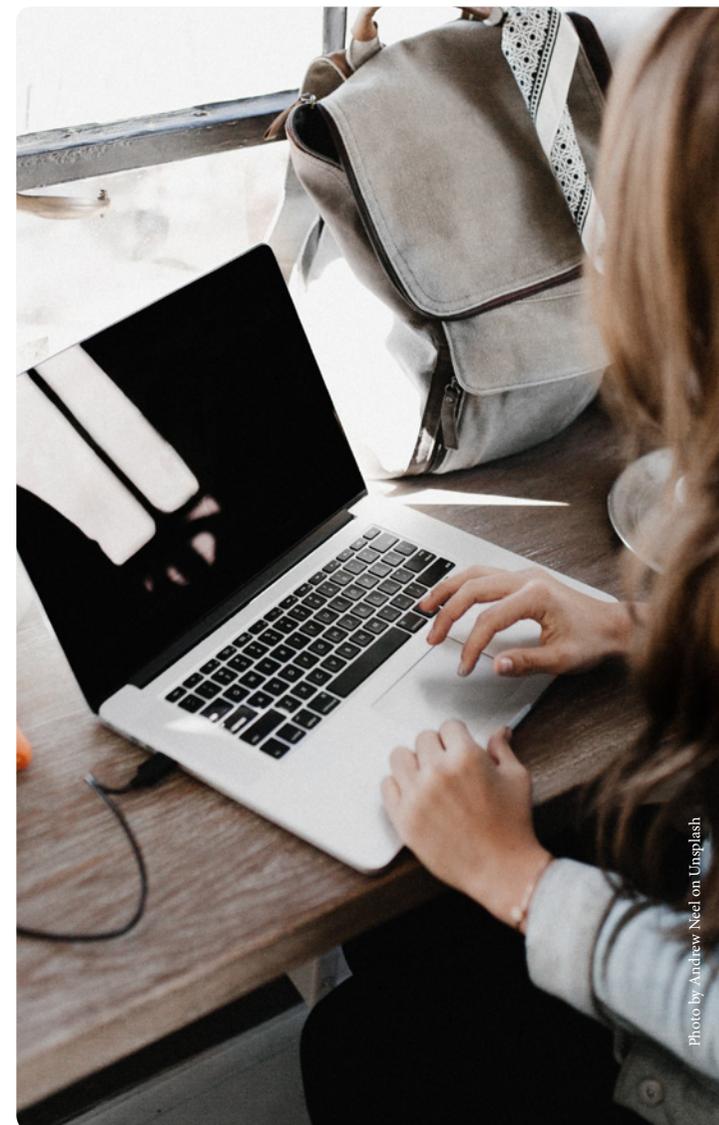
LIBER 2018-2022 Strategy (PDF)
[Research Libraries Powering Sustainable Knowledge in the Digital Age](#)

LIBER Digital Skills Working Group:
[Case Studies on Open Science Skilling and Training Initiatives in Europe](#)

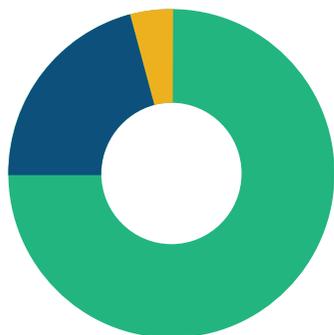
LIBER Digital Skills Working Group: [Open Science Skills Visualisation](#)

All useful references recommended by the LIBER Digital Skills for Library Staff and Researchers Working Group are available at [Groups > LIBER digital skills for Open Science](#)

[TENNANT John et MOUNCE Ross, Open Research Glossary, Figshare, 2015.](#)



SURVEY RESPONDENTS



■ An institution 75% (18)

■ A national initiative 21% (5)

Participant categories of survey respondents

AUSTRIA
OANA
<https://oana.at>

BELGIUM
University of Liège library
<https://orbi.uliege.be>

DENMARK
DEFF: Denmark's Electronic Research Library
<https://doi.org/10.5281/zenodo.1478552>

ESTONIA
University of Tartu library
<https://utlib.ut.ee>

FINLAND
University of Turku library
<https://www.utu.fi/en>

FRANCE
Committee for Open Science - France Ministry of Higher Education, Research and Innovation
<https://www.ouvri.lascience.fr/the-committee-for-open-science>

GERMANY
University of Göttingen, State and University library
<https://www.sub.uni-goettingen.de>

HUNGARY
University of Debrecen University and National library, OpenAIRE Hungary NOAD
<https://lib.unideb.hu>

IRELAND
National Library Network LIR
<https://lirgroup.heanet.ie>

ITALY
University of Turin
www.oa.unito.it

LATVIA
University of Latvia Library
<https://www.napd.lu.lv>

LUXEMBOURG
University of Luxembourg library, OpenAIRE Luxembourg NOAD
<https://www.en.uni.lu>

NORWAY
University of Oslo Library
<https://www.ub.uio.no/english>

POLAND
Open Science Platform / Platforma Otwartej Nauki (PON), OpenAIRE Polish NOAD
<http://pon.edu.pl>

ROMANIA
UEFISCDI - Executive Agency for Higher Education, Research, Development and Innovation Funding, OpenAIRE Romanian NOAD
<https://uefiscdi.gov.ro>

SPAIN
CRAI Universitat de Barcelona
<http://crai.ub.edu>
Universidad Carlos III de Madrid
<https://www.uc3m.es/library/home>

THE NETHERLANDS
TU Delft Library
<https://www.tudelft.nl>
Utrecht University Library
<https://www.uu.nl>

SWITZERLAND
EPFL Library
<https://www.epfl.ch/campus/library>

UNITED KINGDOM
UCL (University College London) Library
www.ucl.ac.uk/library/open-science
<https://www.knowledge.services/events>

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