



► Research & Innovation

Survey and Recommendations: How to enhance Open Science?

Workpackage 5 – Open Science Agenda



Université Claude Bernard  Lyon 1



UNIVERSIDAD
DE GRANADA



UNIVERSITÄT
LEIPZIG



UNIVERSITÀ
DEGLI STUDI
DI PADOVA



Vilnius
University

Survey and Recommendations: How to enhance Open Science?

Content

- What is Open Science?
 - What is Arqus Research and Innovation – Workpackage 5?
 - **Open Science Survey among Researchers**
 - Survey Results
 - Open Science knowledge and experience
 - Open Science obstacles
 - Open science support and needs
 - **Recommendations on Open Science**
-

What is Open Science?



Open Science Definition in Arqus:

Open Science (OS) is a set of good practices, principles and goals that **aims to reduce barriers in all aspects of the research process for the benefit of research and society.**

It encompasses transparency, accessibility, reproducibility, comprehensibility, trustworthiness, participation and inclusiveness in all parts of the research process.

OS increases the efficiency of research by making **scientific knowledge findable, accessible, interoperable and reusable**, thereby accelerating progress and discoveries for the common good.

Arqus Openness Position Paper (2022, p.7-8)

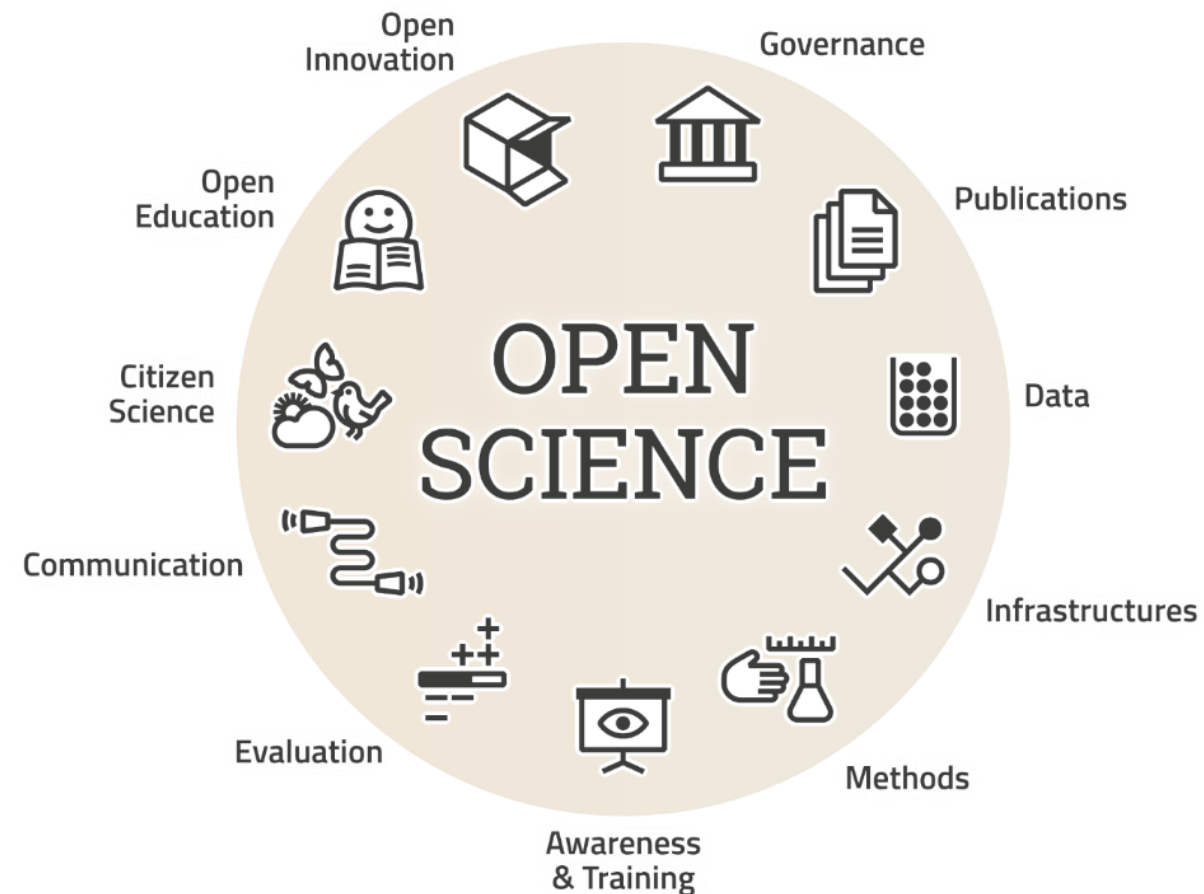
Open Science Definition in Arqus:

Open Science (OS) is a set of good practices, principles and goals that **aims to reduce barriers in all aspects of the research process for the benefit of research and society.**

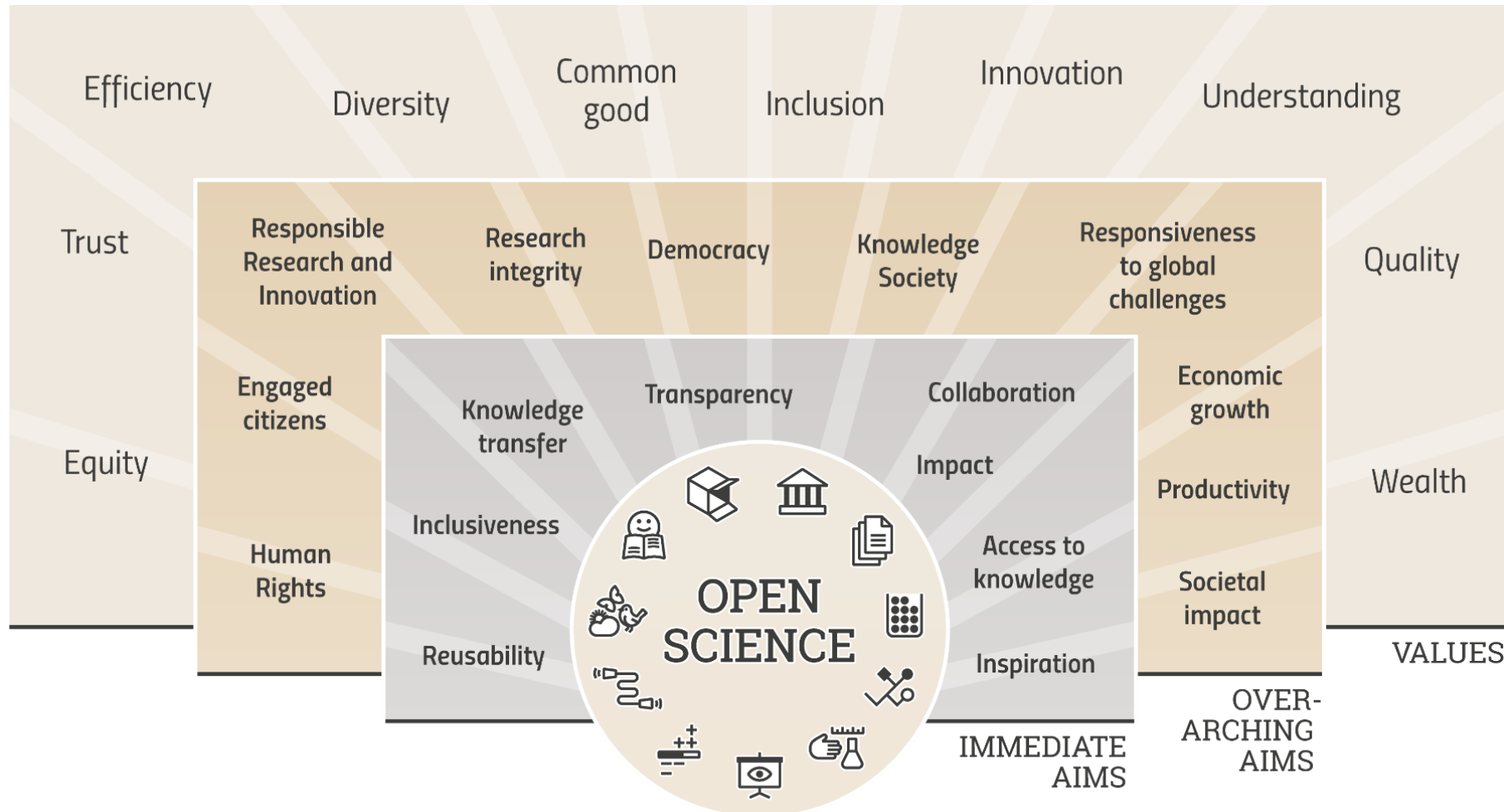
It encompasses transparency, accessibility, reproducibility, comprehensibility, trustworthiness, participation and inclusiveness in all parts of the research process.

OS increases the efficiency of research by making **scientific knowledge findable, accessible, interoperable and reusable**, thereby accelerating progress and discoveries for the common good.

Arqus Openness Position Paper (2022, p.7-8)



Open Science – Aims and Values



Arqus Openness Position Paper (2022, p.4)

What is Arqus Research and Innovation Workpackage 5?



Arqus Research and Innovation (R.I.) aims to enhance the research and innovation dimension of the Arqus Alliance's activities and to address current global societal challenges through intensified joint research, characterised by the pursuit of excellence, openness, transparency and effective engagement with society. (*Arqus R&I - Arqus (arqus-alliance.eu)*)

Arqus Research and Innovation (R.I.) aims to enhance the research and innovation dimension of the Arqus Alliance's activities and to address current global societal challenges through intensified joint research, characterised by the pursuit of excellence, openness, transparency and effective engagement with society. (*Arqus R&I - Arqus (arqus-alliance.eu)*)

Possible transformation modules suggested in the call



Developing a common science agenda



Strengthening human capital ("incl. alternative reward mechanisms & balanced brain circulation)



Mainstreaming Open Science practices



Engaging citizens & society



Reinforcing academia-business collaboration & knowledge transfer



Exploring joint structures for common barriers and best practices



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.



Work Package 5 (WP5) strives for enhancing Open Science within the Arqus Alliance:

- Strives for a **joint approach** concerning values, criteria and open source infrastructure
- Analyses **Open Science skills implications** for alternative assessment approaches
- Maintains a joint **Open Science Ambassador Network**
- Develops shared materials for **Open Science training**

Work Package 5 (WP5) strives for enhancing Open Science within the Arqus Alliance:

- Strives for a **joint approach** concerning values, criteria and open source infrastructure
 - Analyses **Open Science skills implications** for alternative assessment approaches
 - Maintains a joint **Open Science Ambassador Network**
 - Develops shared materials for **Open Science training**
-

Outcomes (*Status March 2023*):

- ✓ **Recommendations to enhance Open Science** within the Arqus Alliance
 - **Open Science skills** implications for alternative assessment approaches
 - Open Science **Ambassador Network**
 - Open Science **training materials**

Open Science Survey among Researcher



The aim of the survey of researchers in the Alliance was to **gather experiences, hurdles, wishes and suggestions regarding practising Open Science activities**. On this basis, and including relevant scientific literature on the topic, recommendations were developed for the Alliance, the universities and the researchers in order to enhance Open Science.

The aim of the survey of researchers in the Alliance was to **gather experiences, hurdles, wishes and suggestions regarding practising Open Science activities**. On this basis, and including relevant scientific literature on the topic, recommendations were developed for the Alliance, the universities and the researchers in order to enhance Open Science.

Conduct of the survey:

- Digital questionnaire via Limesurvey
- July and August 2022
- Researchers at PhD level and above
- Arqus R.I. Universities: Granada, Graz, Leipzig, Lyon 1, Padua, Vilnius
- 602 researcher completed the questionnaire

The aim of the survey of researchers in the Alliance was to **gather experiences, hurdles, wishes and suggestions regarding practising Open Science activities**. On this basis, and including relevant scientific literature on the topic, recommendations were developed for the Alliance, the universities and the researchers in order to enhance Open Science.

Sections of the questionnaire:

Conduct of the survey:

- Digital questionnaire via Limesurvey
 - July and August 2022
 - Researchers at PhD level and above
 - Arqus R.I. Universities: Granada, Graz, Leipzig, Lyon 1, Padua, Vilnius
 - 602 researcher completed the questionnaire
- Open Science **knowledge and experience**
 - Open Science **obstacles**
 - Open Science **support**
 - Open Science **needs**

Open Science **Activities** Researchers can do:

- **Publishing Open Access** and/or sharing preprints
- **Pre-register** research projects and data collection
- Practicing and using forms of **Open Peer Review**

Open Science **Activities** Researchers can do:

- **Publishing Open Access** and/or sharing preprints
- **Pre-register** research projects and data collection
- Practicing and using forms of **Open Peer Review**
- **Sharing research data** whenever legally permissible, if not: sharing rich metadata
- Sharing methodologies, protocols and workflows on **open platforms**
- Releasing with **Open Licences** (e.g. presentation material, software, source code)

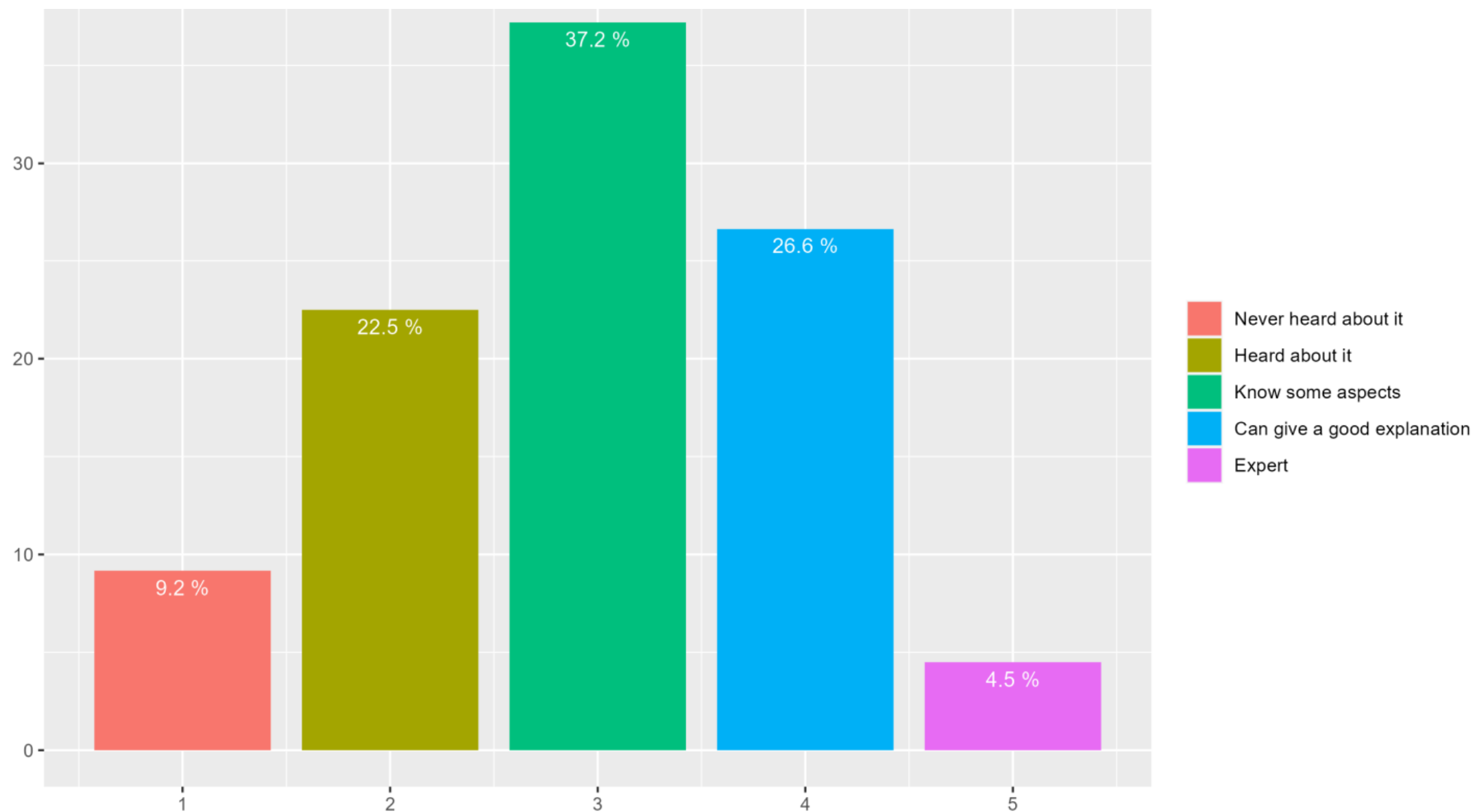
Open Science **Activities** Researchers can do:

- **Publishing Open Access** and/or sharing preprints
- **Pre-register** research projects and data collection
- Practicing and using forms of **Open Peer Review**
- **Sharing research data** whenever legally permissible, if not: sharing rich metadata
- Sharing methodologies, protocols and workflows on **open platforms**
- Releasing with **Open Licences** (e.g. presentation material, software, source code)
- **Communicating research** and results to the public on popular platforms (e.g. social media, newspaper)
- Inviting collaboration with stakeholders outside academia (**Citizen Science**)
- Incorporating societal needs and challenges into research design (**Open Research Agenda Setting**)
- Conducting **Science Education** projects (e.g. in schools)

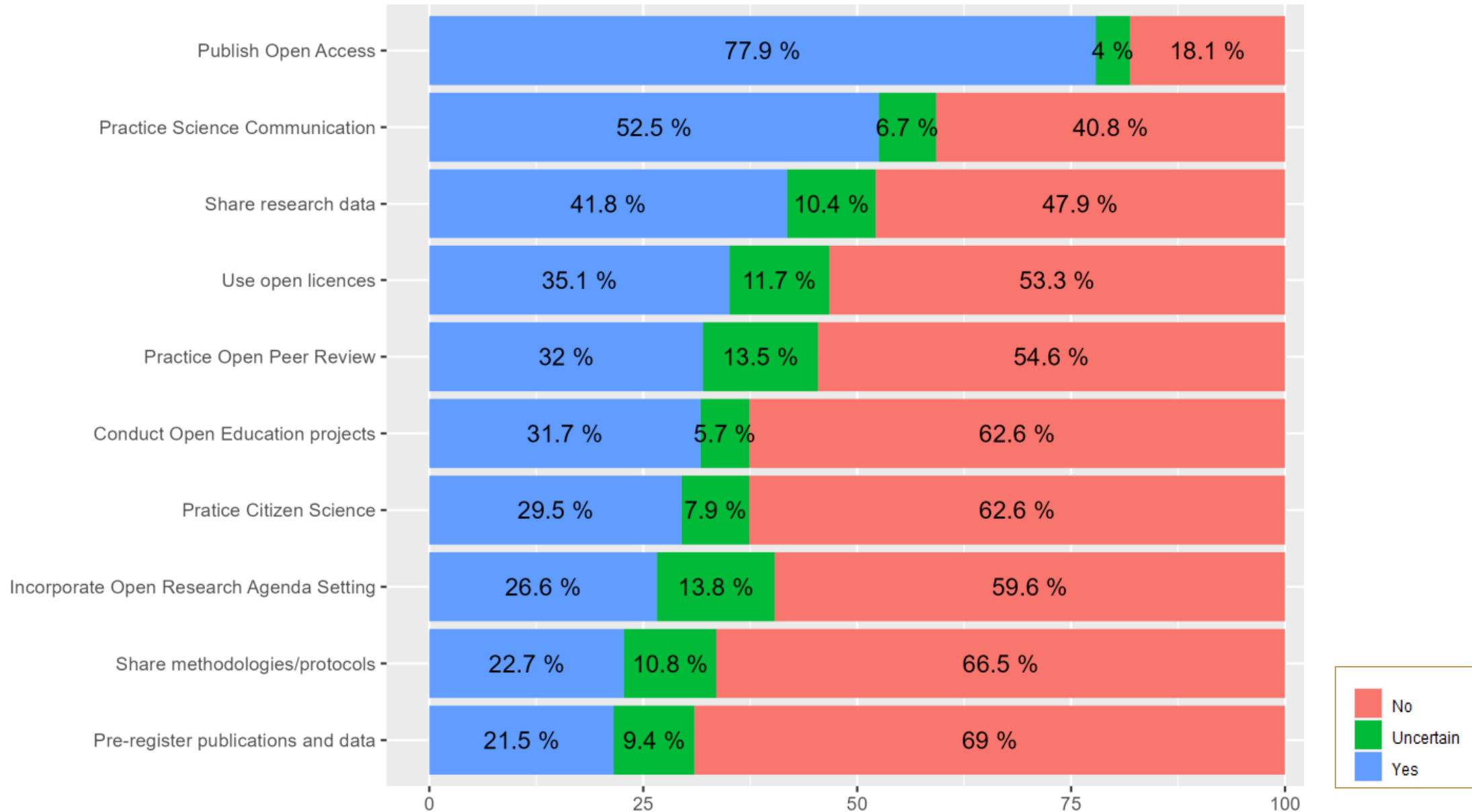
Survey Results



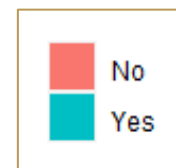
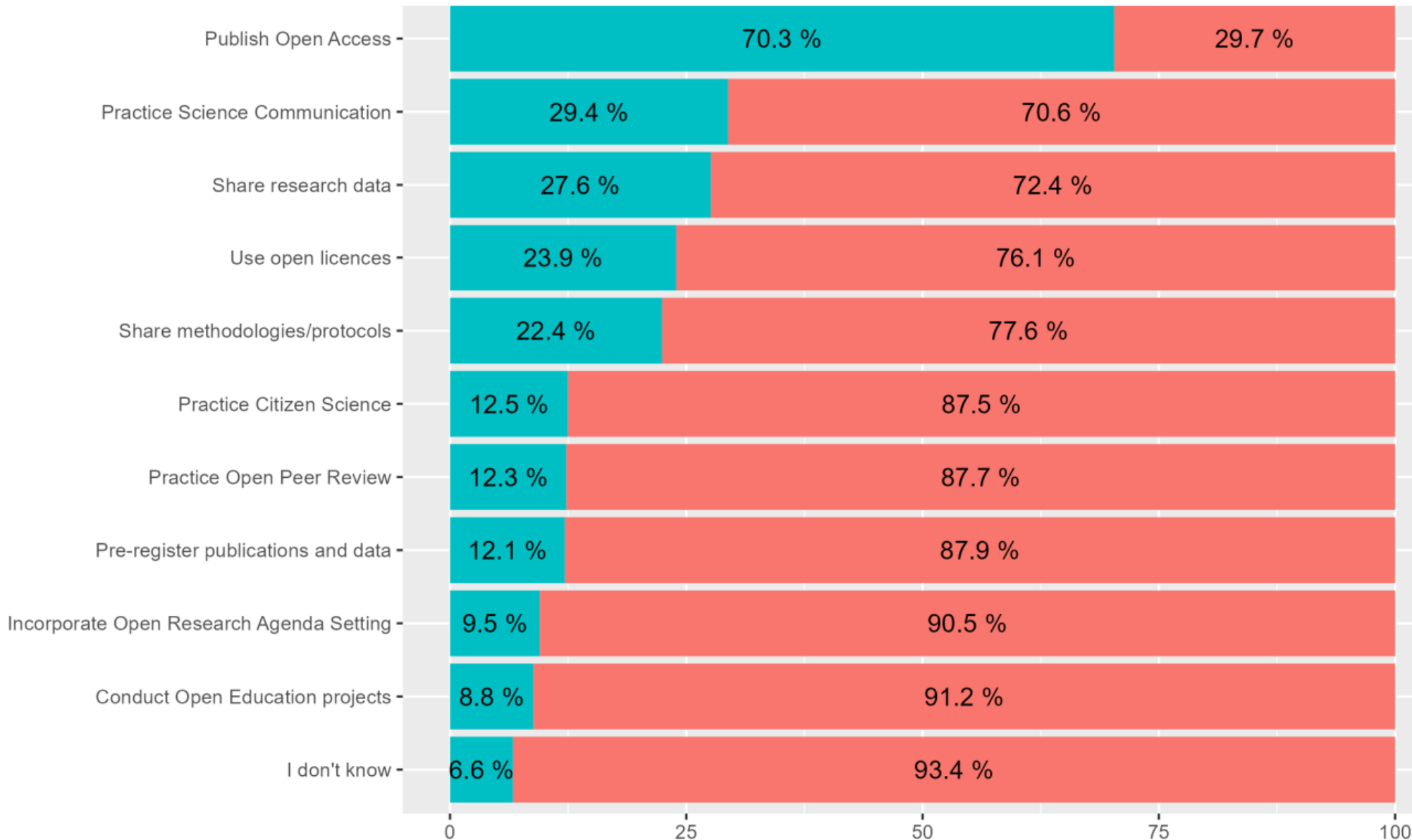
How would you **rate your knowledge** of Open Science so far? (All Universities, n=602)



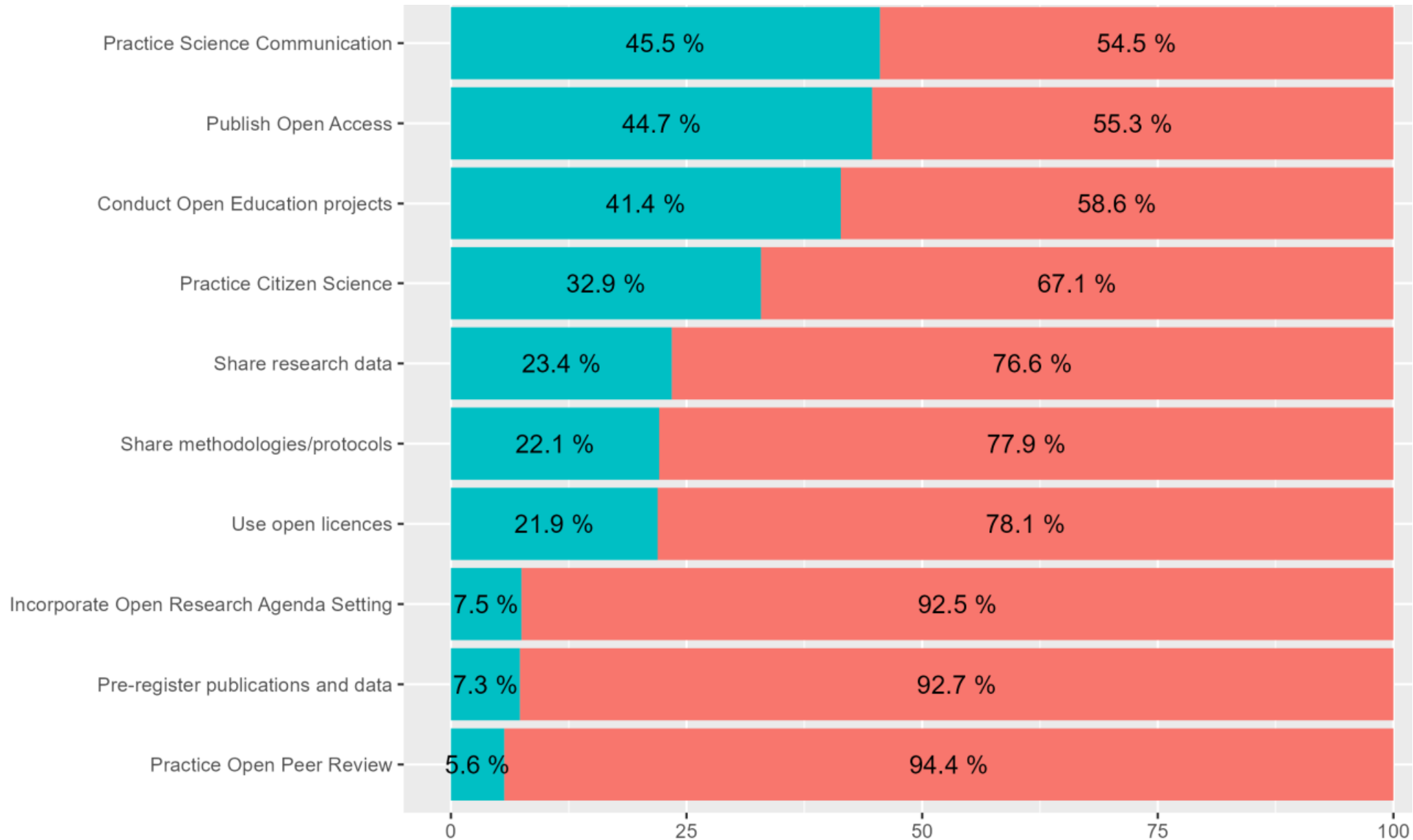
Have you **already practiced one or more** of the following Open Science activities?



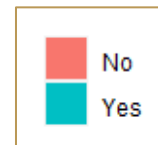
Which 3 Open Science activities would you describe as the most important for your career?



Which 3 Open Science activities would you describe as the most important for society?



The answer “Incorporate societal needs and challenges into your research design” was in this question not a given option



Interim conclusion:

Open Science (OS) knowledge and experience

Most participants rate their knowledge as intermediate. 4,5% have profound knowledge on different aspects, whereas 9,2% have never heard about Open Science before.

Interim conclusion:

Open Science (OS) knowledge and experience

Most participants rate their knowledge as intermediate. 4,5% have profound knowledge on different aspects, whereas 9,2% have never heard about Open Science before.

Most **common** OS practices are:

1. Publish Open Access and/or share preprints
2. Communicate research and results to the public
3. Share research data

Interim conclusion:

Open Science (OS) knowledge and experience

Most participants rate their knowledge as intermediate. 4,5% have profound knowledge on different aspects, whereas 9,2% have never heard about Open Science before.

Most **common** OS practices are:

1. Publish Open Access and/or share preprints
2. Communicate research and results to the public
3. Share research data

Most important for career are:

1. Publish Open Access and/or share preprints
2. Communicate research and results to the public
3. Share research data

Interim conclusion:

Open Science (OS) knowledge and experience

Most participants rate their knowledge as intermediate. 4,5% have profound knowledge on different aspects, whereas 9,2% have never heard about Open Science before.

Most **common** OS practices are:

1. Publish Open Access and/or share preprints
2. Communicate research and results to the public
3. Share research data

Most important for **career** are:

1. Publish Open Access and/or share preprints
2. Communicate research and results to the public
3. Share research data

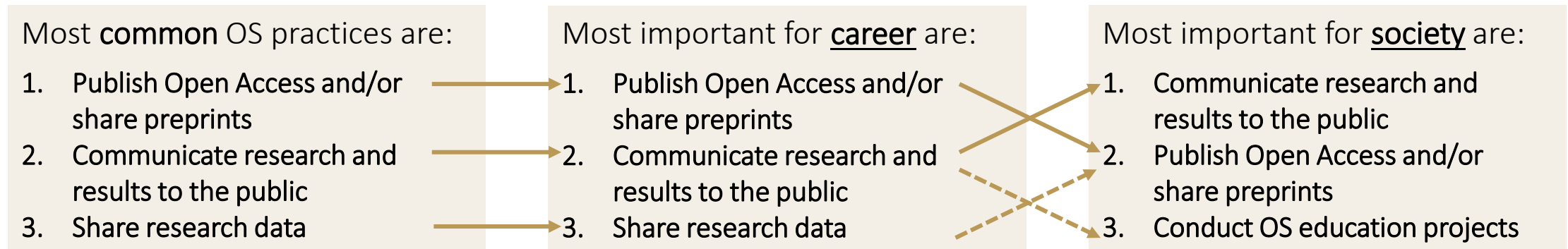
Most important for **society** are:

1. Communicate research and results to the public
2. Publish Open Access and/or share preprints
3. Conduct OS education projects

Interim conclusion:

Open Science (OS) knowledge and experience

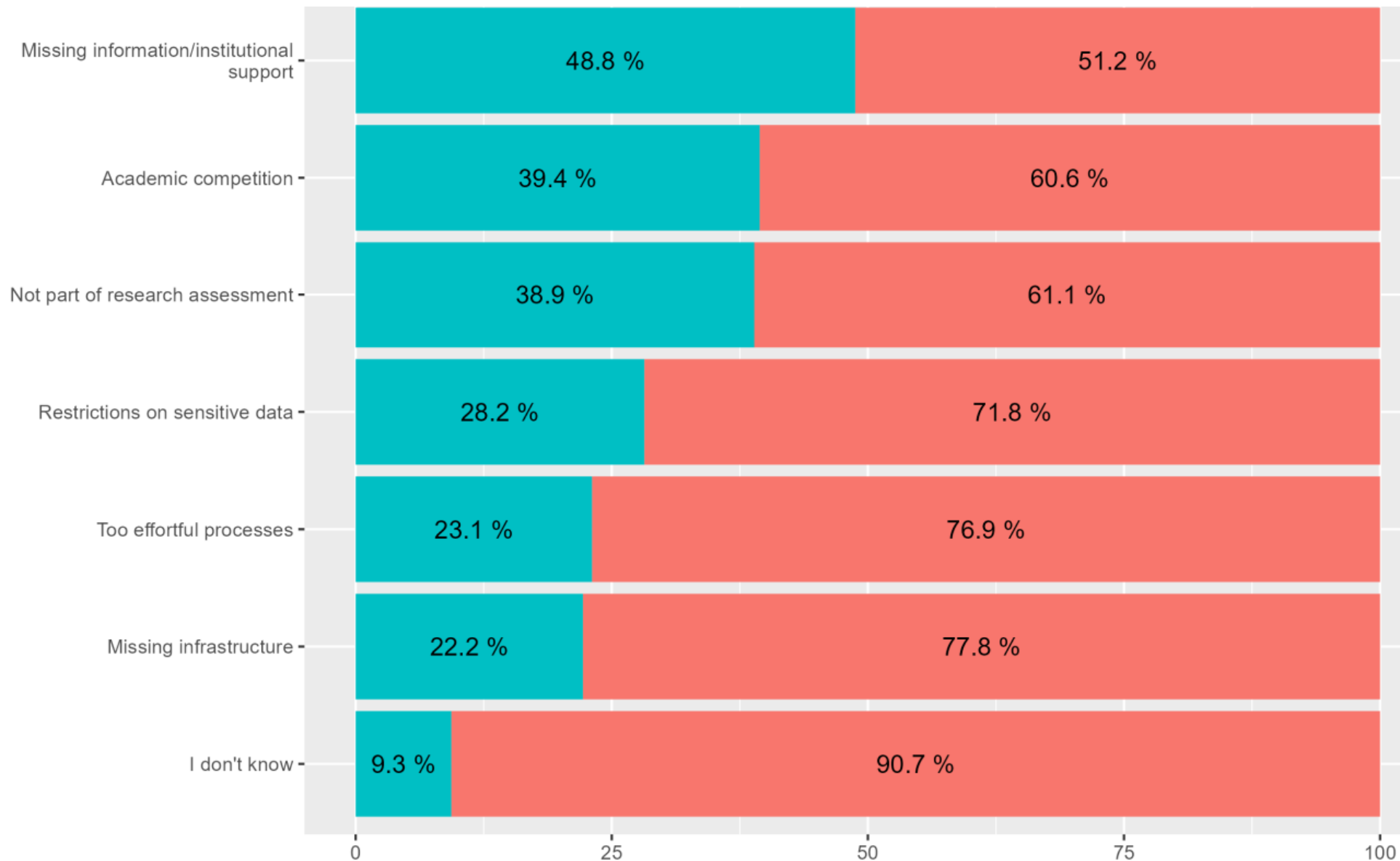
Most participants rate their knowledge as intermediate. 4,5% have profound knowledge on different aspects, whereas 9,2% have never heard about Open Science before.



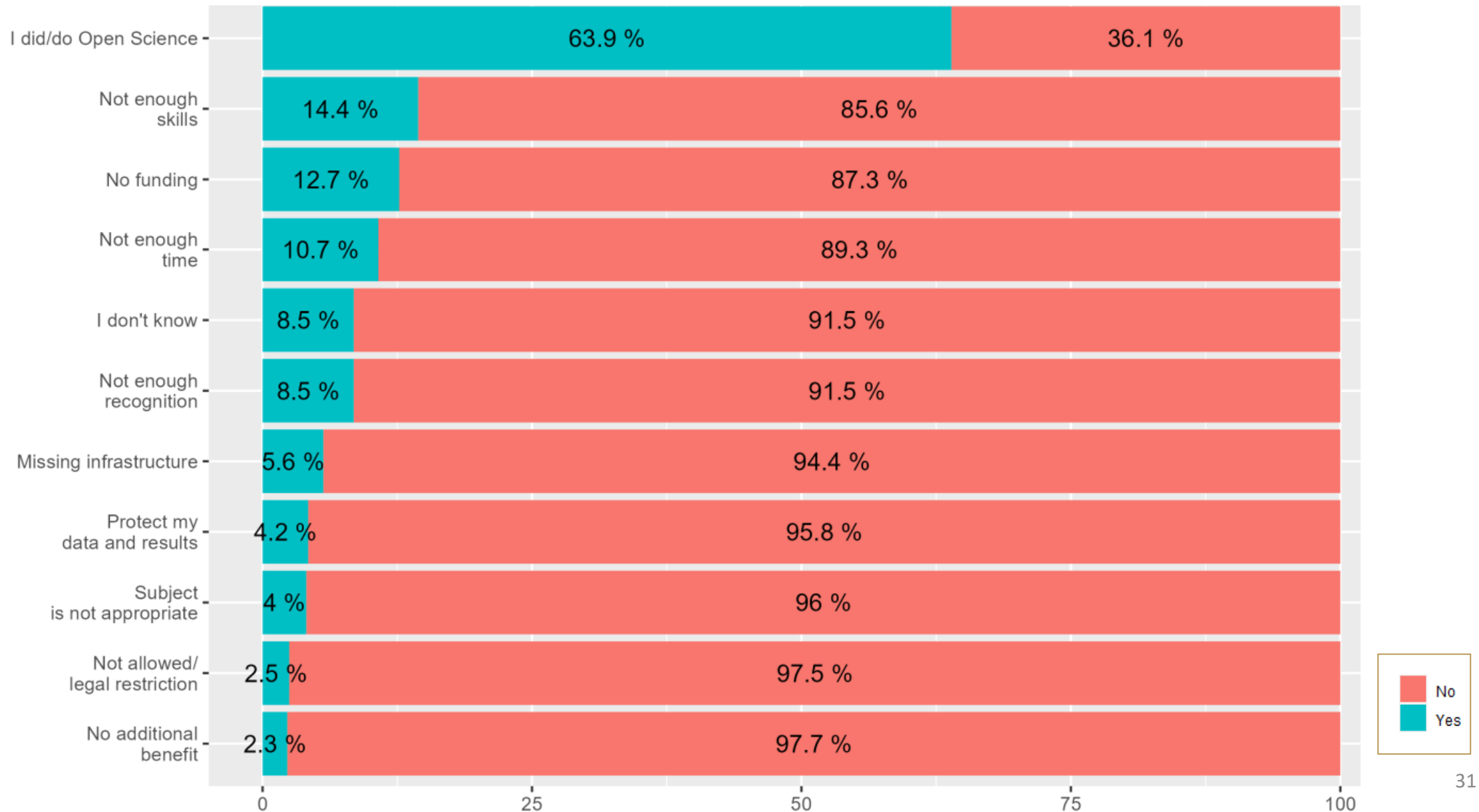
OS practices, that researchers claim to do, are presumably driven by:

- Increasing awareness on reusability and transparency
- Expectations of the target groups:
 - Current research assessment criteria (mostly based on quantitative criteria, e.g. h-index)
 - Funding requirements
 - Research as a common good

Where do you see the **main 3 obstacles** in opening science?



What would you say are the **main 3 reasons** for you, that you did not practice Open Science?



Interim conclusion:

Open Science obstacles

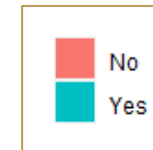
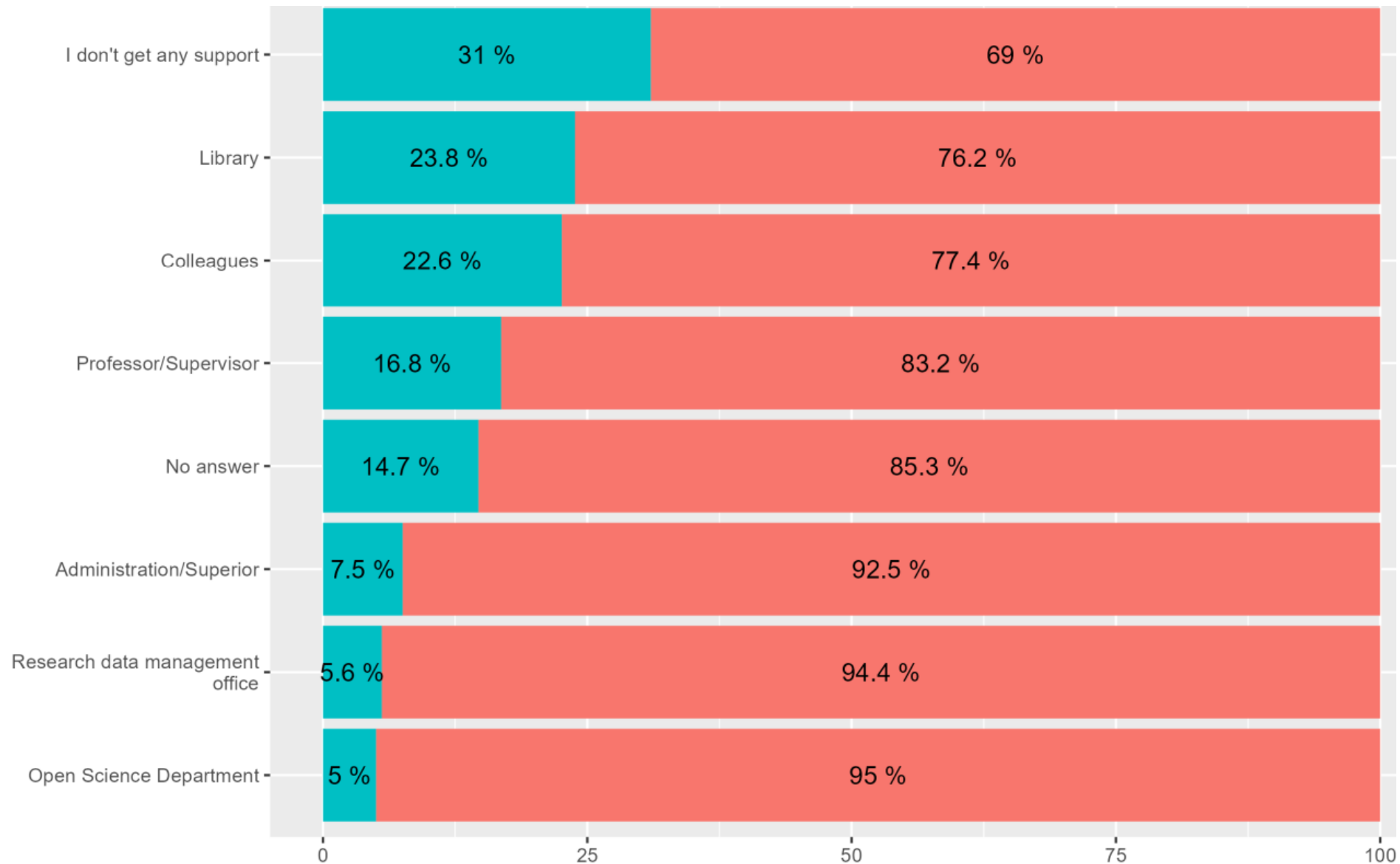
- 63,9% of the participants practice(d) Open Science
- In order to practice (more) Open Science, researcher need to:
 - Advance their knowledge on Open Science
 - Get appropriate recognition and being assessed by their Open Science practices
 - Have additional time and human resources for practicing Open Science
 - Receive support from their institutions and communities (training, consulting, infrastructures)
 - Protect their data to perform as best as they can in academic competition
 - Salary top-up for practicing Open Science

Interim conclusion:

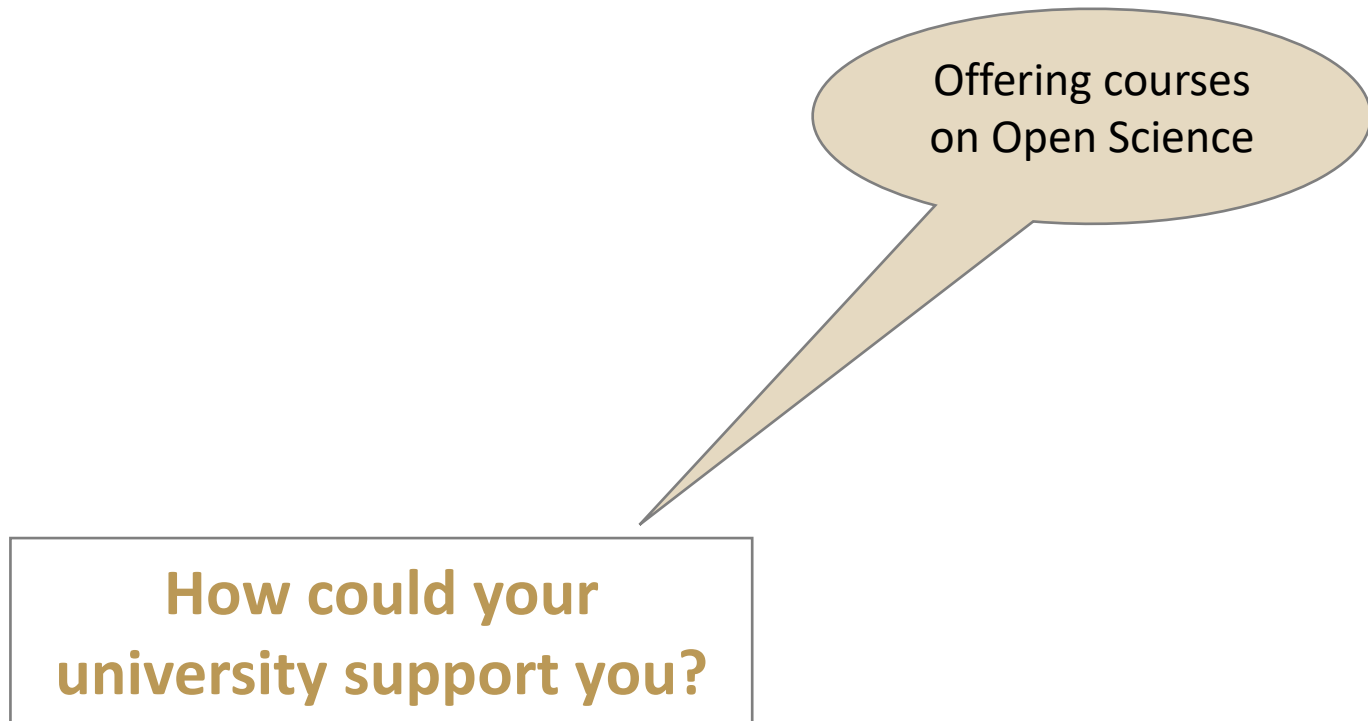
Open Science obstacles

- 63,9% of the participants practice(d) Open Science
- In order to practice (more) Open Science, researcher need to:
 - Advance their knowledge on Open Science
 - Get appropriate recognition and being assessed by their Open Science practices
 - Have additional time and human resources for practicing Open Science
 - Receive support from their institutions and communities (training, consulting, infrastructures)
 - Protect their data to perform as best as they can in academic competition
 - Salary top-up for practicing Open Science
- Researchers are under pressure, regarding:
 - Academic competition and research assessment (publish or perish)
 - Lack of time and financial resources
 - Additional effort for OS, besides research
 - Increasing effort without enough recognition

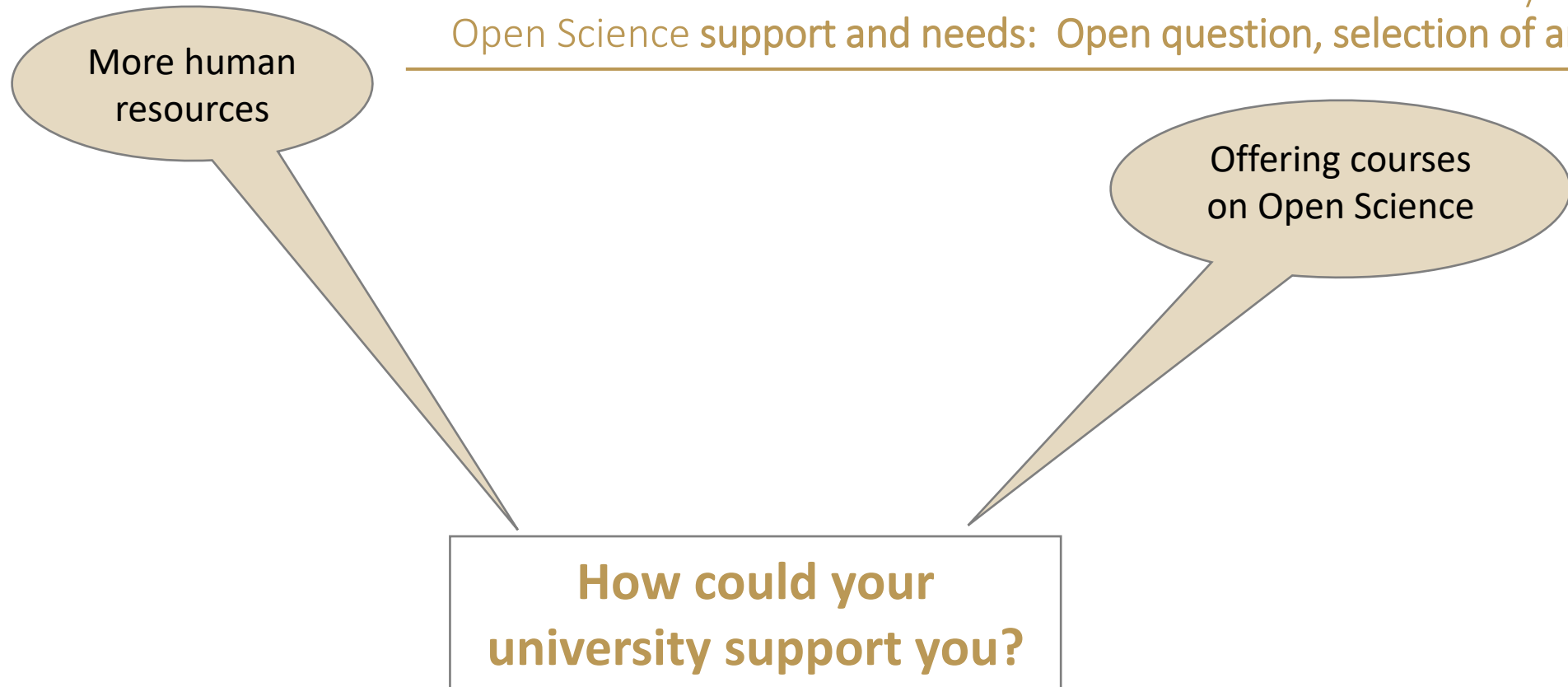
Who supports you at your University in practicing Open Science?



Open Science support and needs: Open question, selection of answers



Open Science support and needs: Open question, selection of answers



Open Science support and needs: Open question, selection of answers

More human
resources

Providing **training** in technical
skills related to data sharing,
processing, workflows,
reproducible codings, etc.

Offering courses
on Open Science

How could your
university support you?

Open Science support and needs: Open question, selection of answers

More human
resources

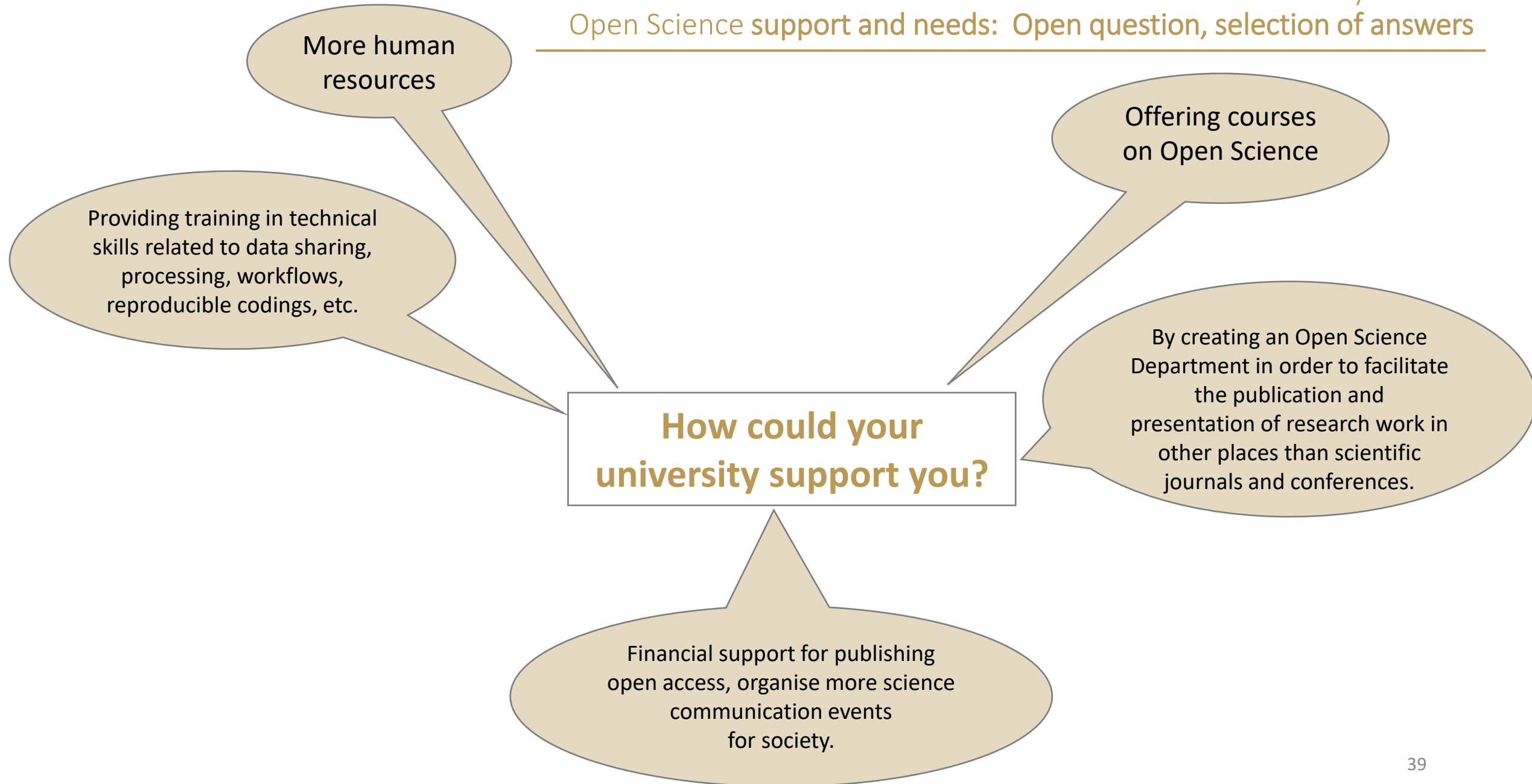
Providing training in technical
skills related to data sharing,
processing, workflows,
reproducible codings, etc.

**How could your
university support you?**

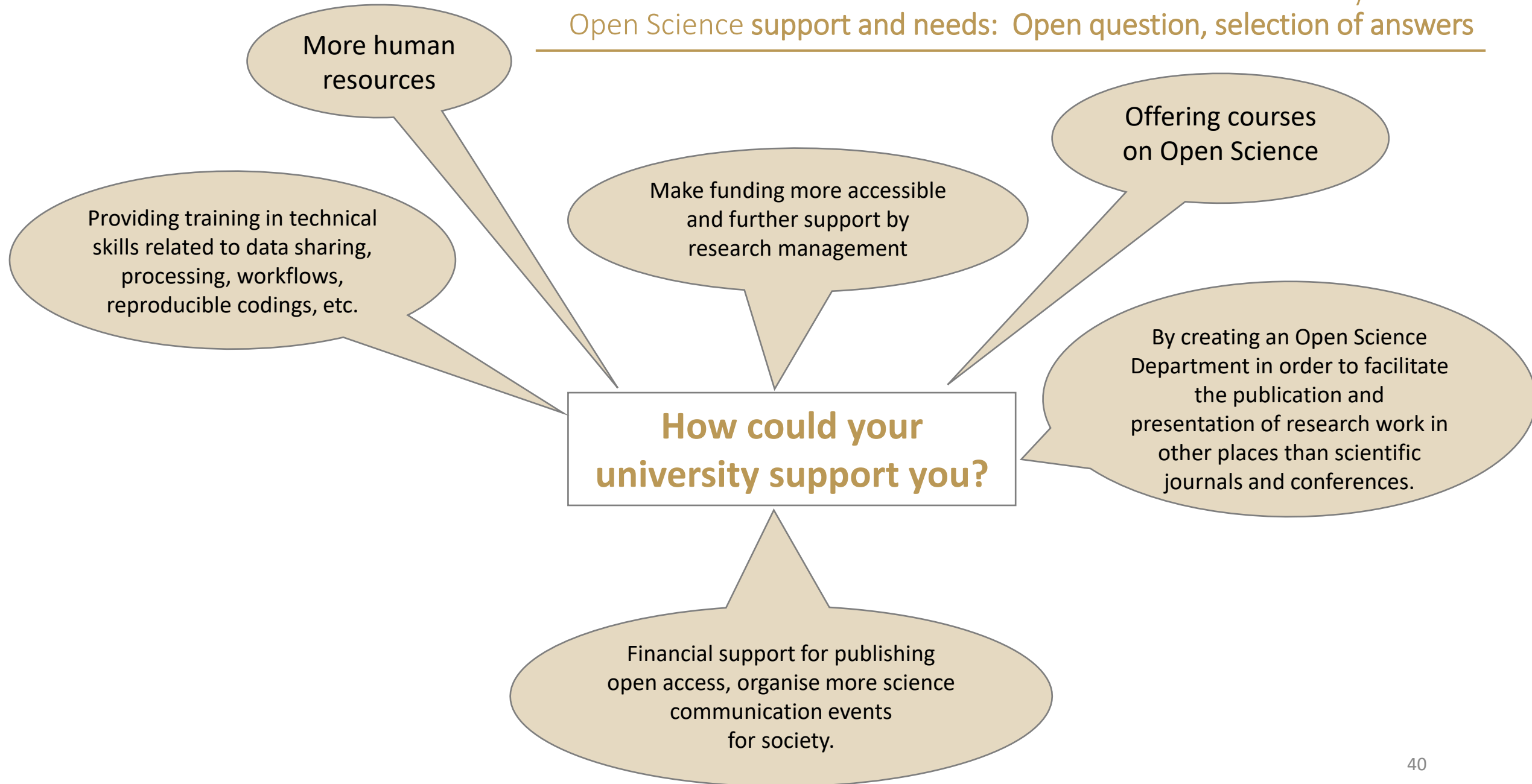
Offering courses
on Open Science

By creating an Open Science
Department in order to facilitate
the publication and
presentation of research work in
other places than scientific
journals and conferences.

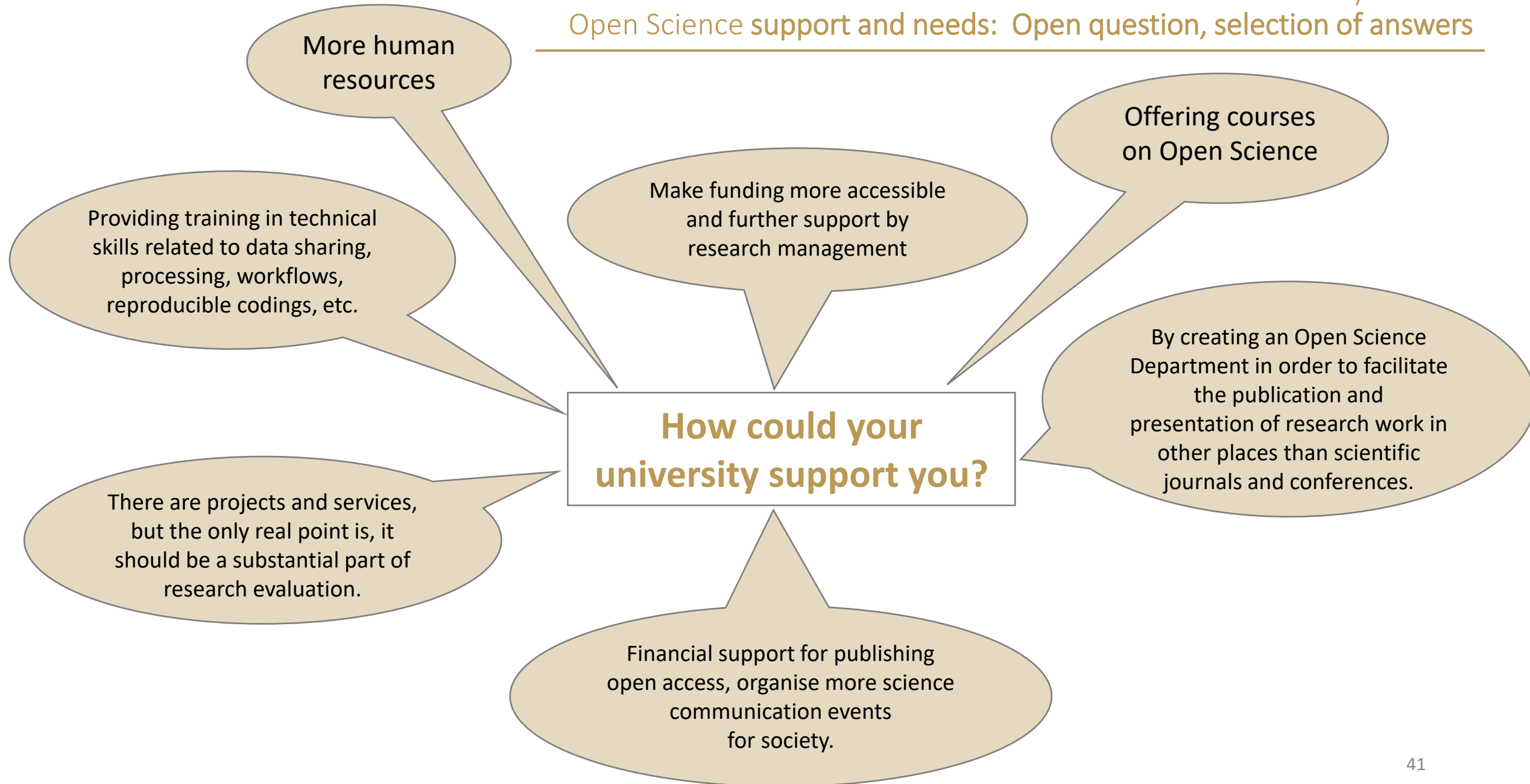
Open Science support and needs: Open question, selection of answers



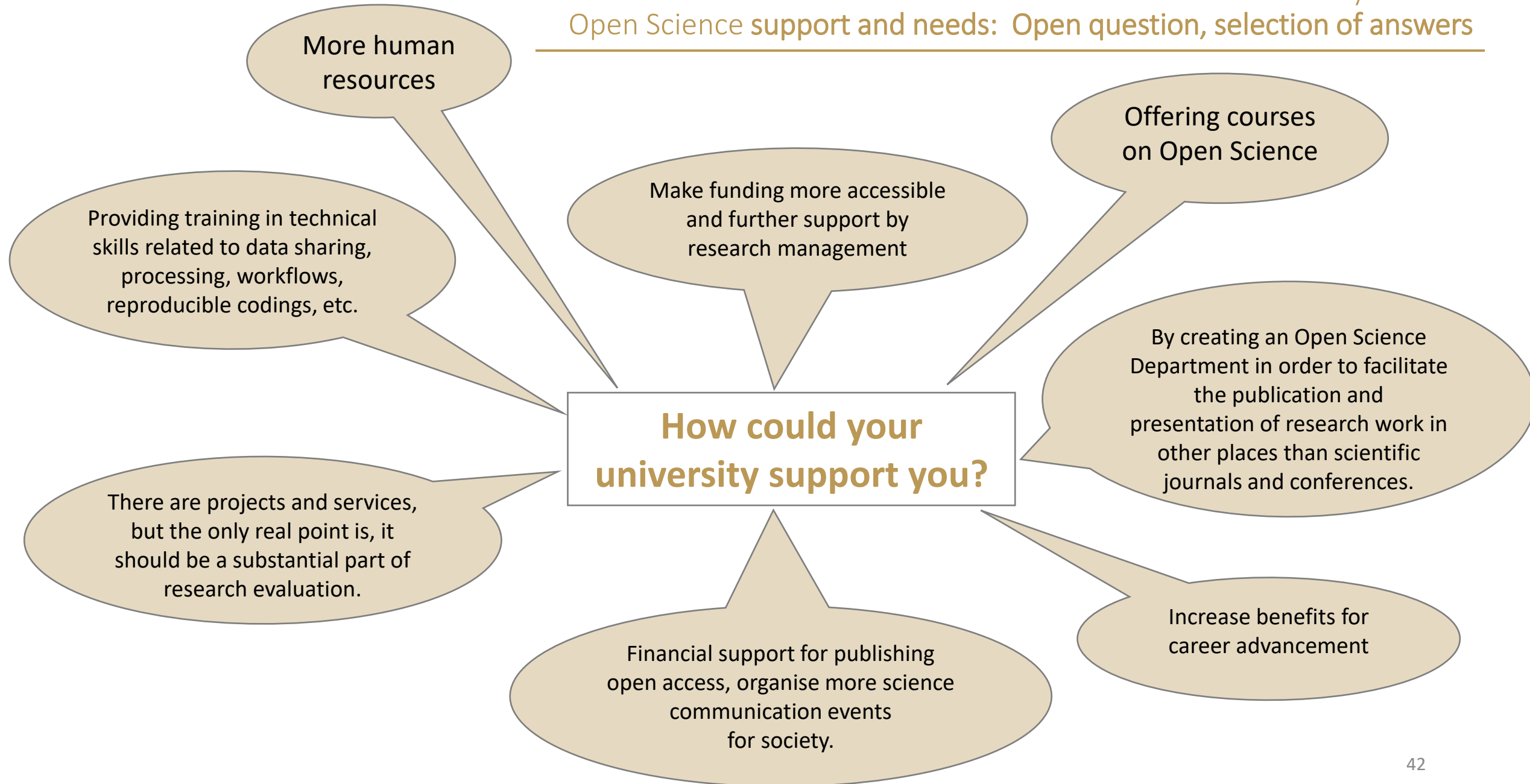
Open Science support and needs: Open question, selection of answers



Open Science support and needs: Open question, selection of answers



Open Science support and needs: Open question, selection of answers



Interim conclusion:

Open Science support and needs

- Main obstacle for not practicing Open Science is a **lack of institutional support (31%)**
 - ➔ If research institutions want to engage researchers to practice OS activities, they need to provide guidelines and support offers based on the needs of the target groups as well as on discipline specific requirements.

Interim conclusion:

Open Science support and needs

- Main obstacle for not practicing Open Science is a **lack of institutional support (31%)**
 - If research institutions want to engage researchers to practice OS activities, they need to provide guidelines and support offers based on the needs of the target groups as well as on discipline specific requirements.
- Participants are **supported mainly by research libraries and colleagues/supervisors**, other Open Science services are underrated:
 - Why? (Don't exist? Not known? Lack of visibility?)
 - Need to map and evaluate gaps in existing service offers

Open Science Survey – Notes on the evaluation

- Imbalance of answers from participating universities (*602 in total*)

Open Science Survey – Notes on the evaluation

- Imbalance of answers from participating universities *(602 in total)*
- Possible bias in the results: mainly researchers who are already interested in and/or practicing Open Science participated in the survey
(64% said, they already practice Open Science on the question „What would you say are the main 3 reasons for you to not practice Open Science?“)

Open Science Survey – Notes on the evaluation

- Imbalance of answers from participating universities *(602 in total)*
- Possible bias in the results: mainly researchers who are already interested in and/or practicing Open Science participated in the survey
(64% said, they already practice Open Science on the question „What would you say are the main 3 reasons for you to not practice Open Science?“)
- National, institutional and discipline specific requirements and priorities in the implementation of Open Science standards, support offers and infrastructures were not taken into account

Open Science Survey – Conclusions

- Participants are mostly aware of Open Science:
 - Most common activities within the framework of research:
Open Access Publishing, Data Sharing, Science Communication
 - Support is mostly provided by **libraries and colleagues**, but not sufficient; other institutional support is **rated low** in this survey
 - **Knowledge transfer and communication** are considered important to society

Open Science Survey – Conclusions

- Participants are mostly aware of Open Science:
 - Most common activities within the framework of research:
Open Access Publishing, Data Sharing, Science Communication
 - Support is mostly provided by **libraries and colleagues**, but not sufficient; other institutional support is **rated low** in this survey
 - **Knowledge transfer and communication** are considered important to society
- (Perceived) **obstacles** are mostly:
lack of financial support, missing rewards and incentives, missing skills and competencies, missing institutional support

Open Science Survey – Conclusions

- Participants are mostly aware of Open Science:
 - Most common activities within the framework of research:
Open Access Publishing, Data Sharing, Science Communication
 - Support is mostly provided by **libraries and colleagues**, but not sufficient; other institutional support is **rated low** in this survey
 - **Knowledge transfer and communication** are considered important to society
- (Perceived) **obstacles** are mostly:
lack of financial support, missing rewards and incentives, missing skills and competencies, missing institutional support
- Openness is **not an aim in itself**:
 - Open Science is mostly **effortful** and binds a lot of **ressources**
 - **Quality control mechanisms**, guidelines and standards are necessary
 - **Discipline and institutions' specific differences** should be taken into account
 - Close relation of Open Science and quality based **criteria for research assessment**
 - Institutions should be **transparent** about their strategic goals in implementing and incentivizing Open Science

Recommendations on Open Science



Recommendations to enhance Open Science in Arqus

- 1 Develop and share policies, guidance and training offers among Arqus researchers, provide consulting and increase visibility of Open Science support services.

Recommendations to enhance Open Science in Arqus

1 Develop and share policies, guidance and training offers among Arqus researchers, provide consulting and increase visibility of Open Science support services.

- *Develop specific training offers on various Open Science activities based on researchers requirements and ensure visibility of the offers*
- *Share training materials and online workshops*
- *Map local support units, make Open Science institutions more visible*
- *Promote skill building for researchers and research staff*
- *Provide Open Science policies and guidance according to research assessment criteria*

Recommendations to enhance Open Science in Arqus

- 2 Introduce rewards and incentives for Open Science practices in research(er) assessment respecting discipline and career stage specifications.

Recommendations to enhance Open Science in Arqus

2 Introduce rewards and incentives for Open Science practices in research(er) assessment respecting discipline and career stage specifications.

- *Consider Open Science activities in research evaluation and as inherent part of research integrity*
- *Acknowledge Open Science practices as scientific contributions*
- *Monitor and display Open Science activities in local infrastructures (CRIS)*
- *Start pilots and discursive formats (e.g. panels, working groups) including researchers as well as academic support staff for the development of quality based criteria and for the recognition of open science activities*
- *Respect discipline specific differences and include researchers in developing quality based criteria for research assessment*

Recommendations to enhance Open Science in Arqus

- 3 Provide resources, infrastructures and funding to enable Open Science activities regarding the discipline specific needs.

Recommendations to enhance Open Science in Arqus

3 Provide resources, infrastructures and funding to enable Open Science activities regarding the discipline specific needs.

- *Provide long-term financial support for quality-assured, preferably community-owned and open source infrastructures and tools*
- *Provide proper funding for Open Access publications and data sharing via publication funds*
- *Provide staff resources that support researchers in practising Open Science*
- *Establish and sustain open platforms for sharing research software and tools and infrastructures within the Arqus alliance*
- *Provide researchers with shared access to trustworthy Open Science infrastructures within the Arqus Alliance*

Open Questions

- Which **skills** do researchers need to be best prepared for Open Science and (new) research assessment?

Open Questions

- Which **skills** do researchers need to be best prepared for Open Science and (new) research assessment?
- Which **quality based criteria** should be considered when evaluating research and how do they relate to Open Science?

Open Questions

- Which **skills** do researchers need to be best prepared for Open Science and (new) research assessment?
- Which **quality based criteria** should be considered when evaluating research and how do they relate to Open Science?
- Which **incentives** are necessary to foster openness within Arqus?

Open Questions

- Which **skills** do researchers need to be best prepared for Open Science and (new) research assessment?
- Which **quality based criteria** should be considered when evaluating research and how do they relate to Open Science?
- Which **incentives** are necessary to foster openness within Arqus?
- What could **joint Open Science offers** look like in the Arqus Alliance, taking into account institutional and discipline specific requirements and needs as well as strategic goals in the action line research?

List of references

- All graphics generated and provided by Tommaso Canesso, Luigi Grossi, Nicoletta Parise, Maria Letizia Tanturri (University of Padua, 2022) and Sven Blanck (Leipzig University, 2023)
- Arqus Openness Position Paper (2022) - <https://doi.org/10.5281/zenodo.5881903>

How to enhance Open Science?

- ! Develop and share policies, guidance and training offers among Arqus researchers, provide consulting and increase visibility of Open Science support services.
- ! Introduce rewards and incentives for Open Science practices in research(er) assessment respecting discipline and career stage specifications.
- ! Provide resources, infrastructures and funding to enable Open Science activities regarding the discipline specific needs.