March 2021

Results: Survey to gather comments on the first draft of the UNESCO Recommendation on Open Science

Notes and caveats

- The survey was carried out by ISC, ALLEA, IAP and WFEO to gather comments from their membership and was open from 25 November to 15 December 2020.

- **As such, the responses do not represent views of all scientists and engineers but rather a limited feedback from our combined membership gathered in a very short timeframe**.

- Respondents are spread across major regions of the globe however, Most responses are from Nigeria and South Africa. There were comparatively fewer responses from regions with the greatest research intensity, such as USA, Europe, Japan, China etc., where the complexities of open science are more apparent and there may be a perceived conflict with the processes of patenting and trade secrets.

- There were 54 **institutional responses**. Most respondents were reporting as **individuals** and not on policy positions of their own organizations

- WFEO highlighted that there were **only 48 responses for engineering** and noted that the survey was quite long and sent with a short response time frame in a busy time leading up to the Christmas holidays (due date for responses for the survey was 15 December). This may have affected the response rate.

- Some more detailed and important policy questions were **skipped** by many respondents. Several of the open-ended questions drew relatively few comments. Of the 425 total responses,

   - between 10-20 skipped questions Q2 to Q10

   - between 100 and 106 skipped questions Q11 to Q25

   - between 160 and 168 skipped questions Q16 to Q29 (excluding Q20)

   - Q 20 on ranking Key Objectives of Open Science, was skipped by 180 respondents. This is a vital question and may have been skipped because of the careful deliberation required and the short time-frame for the survey.

   - Between 178 and 169 respondents skipped questions Q30 to Q47

Section 1. Respondent information

The survey received **425 responses** of which 251 were complete responses (note no questions in the survey were compulsory except name and email).

Where were the responses from?

Respondents from **89 countries** answered the survey. The responses were distributed across the main regions of the world.

There were a large number of respondents from Nigeria (88 responses in total representing 21.3% of the responses) and South Africa (55 responses in total or 13.3% of responses). There were comparatively fewer responses from regions with the greatest research intensity, such as USA, Europe, Japan, China etc., where the complexities of open science are more apparent and there may be a perceived conflict with the processes of patenting and trade secrets.
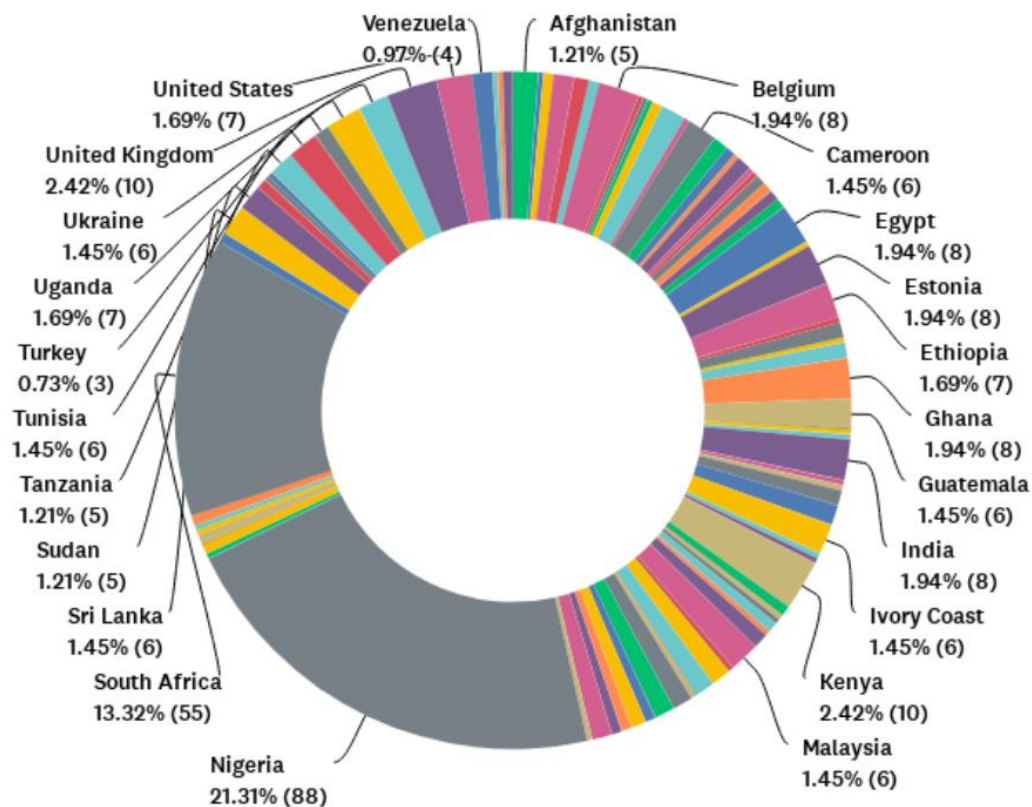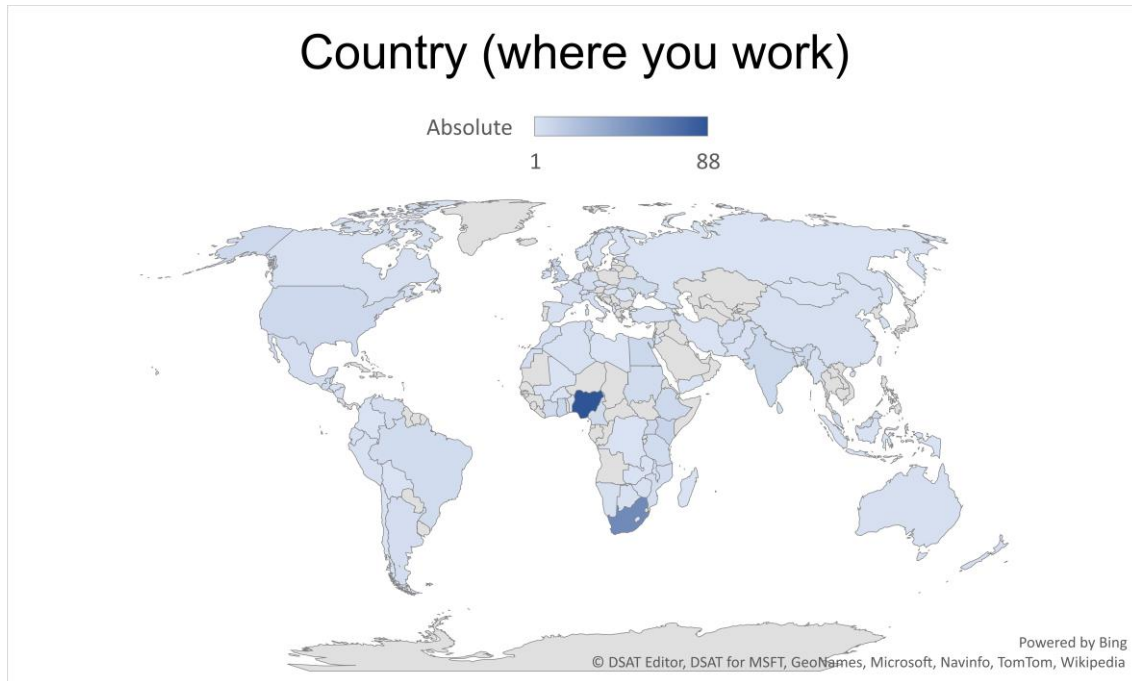
The top countries from which we had responses were:

|		
Nigeria	21.36%	88
South Africa	13.35%	55
Kenya		
United Kingdom	2.43%	10
Belgium		
Egypt		
Estonia		
Ghana		
India	1.94%	8
Ethiopia		
Uganda		
United States	1.70%	7

Gender representation

The responses were relatively **evenly distributed across men and women with a slight tilt towards male respondents** (52% as compared to 47% female). About 1% of the respondents indicated they would prefer not to state their gender and 1 responded identified as 'other'.

Prefer not to state 0.98% (4)
Other 0.25% (1)
Female 46.81% (191)
Male 51.96% (212)
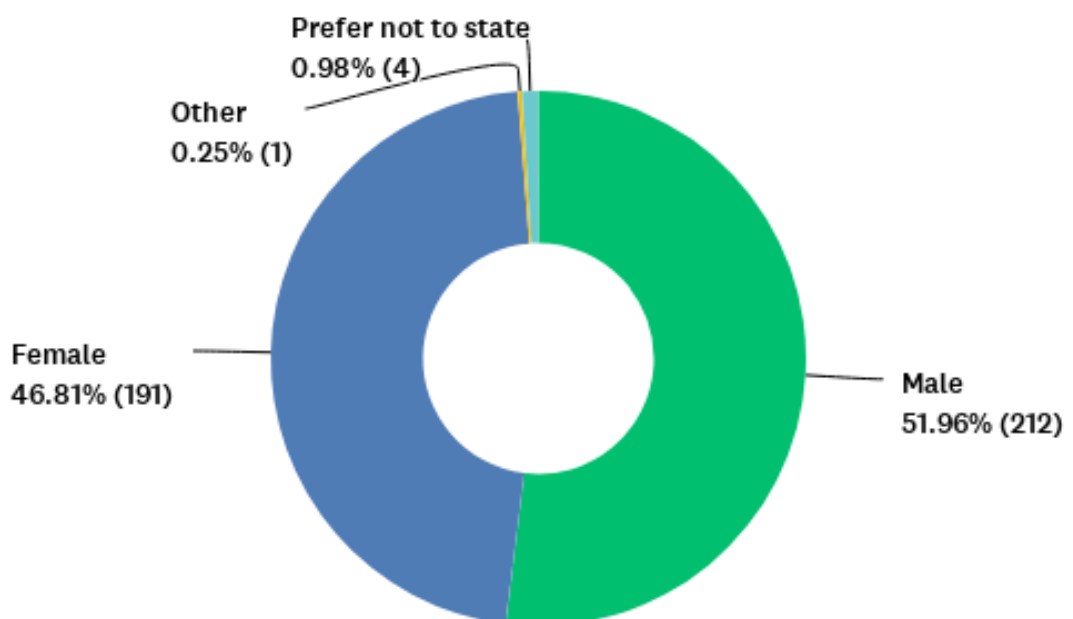
Career Stage and positions

Senior respondents comprised 44.5 percent of the respondents (181 responses) whereas early stage and established respondents comprised 31 percent (127 responses) and 24 percent (98 responses) respectively.
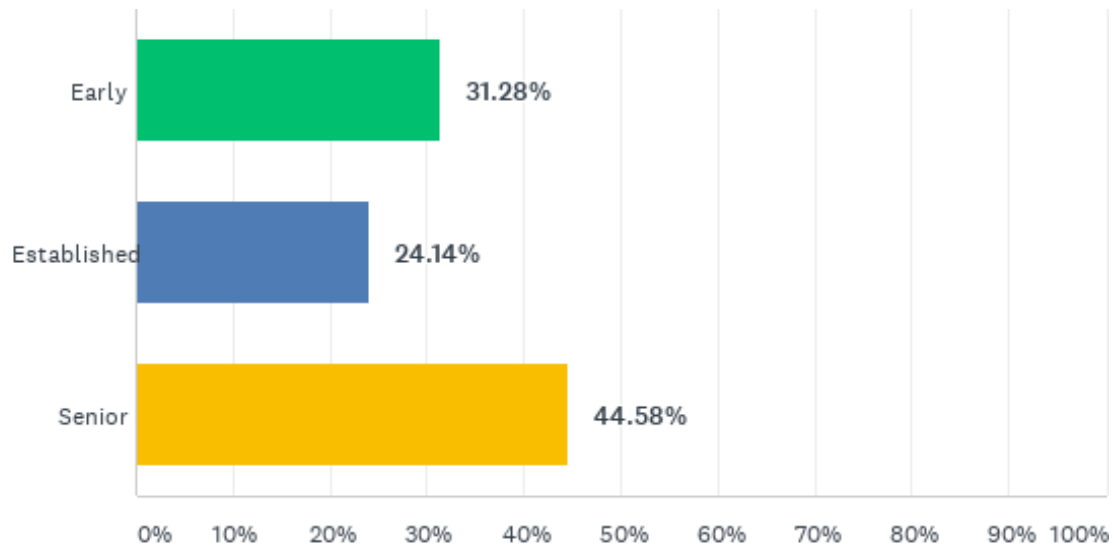
The following were the most recurrent positions listed (the size of the word corresponds with the number of times it appears in the responses)

Individual and organisational responses

We received **54 responses on behalf of organisations** while the other 359 responded as individual, not representing the policy positions of their organisations.
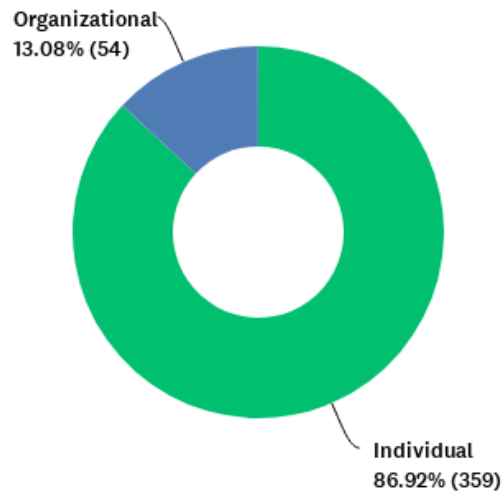
Disciplinary distribution

Of the categories provided, most responses came from participants representing natural sciences (44.8 percent).

In the 'other' category, most respondents specified either natural science (such as physics and chemistry) or social and human sciences (economics, education etc.), save 3 respondents who identifies as being multidisciplinary or interdisciplinary.
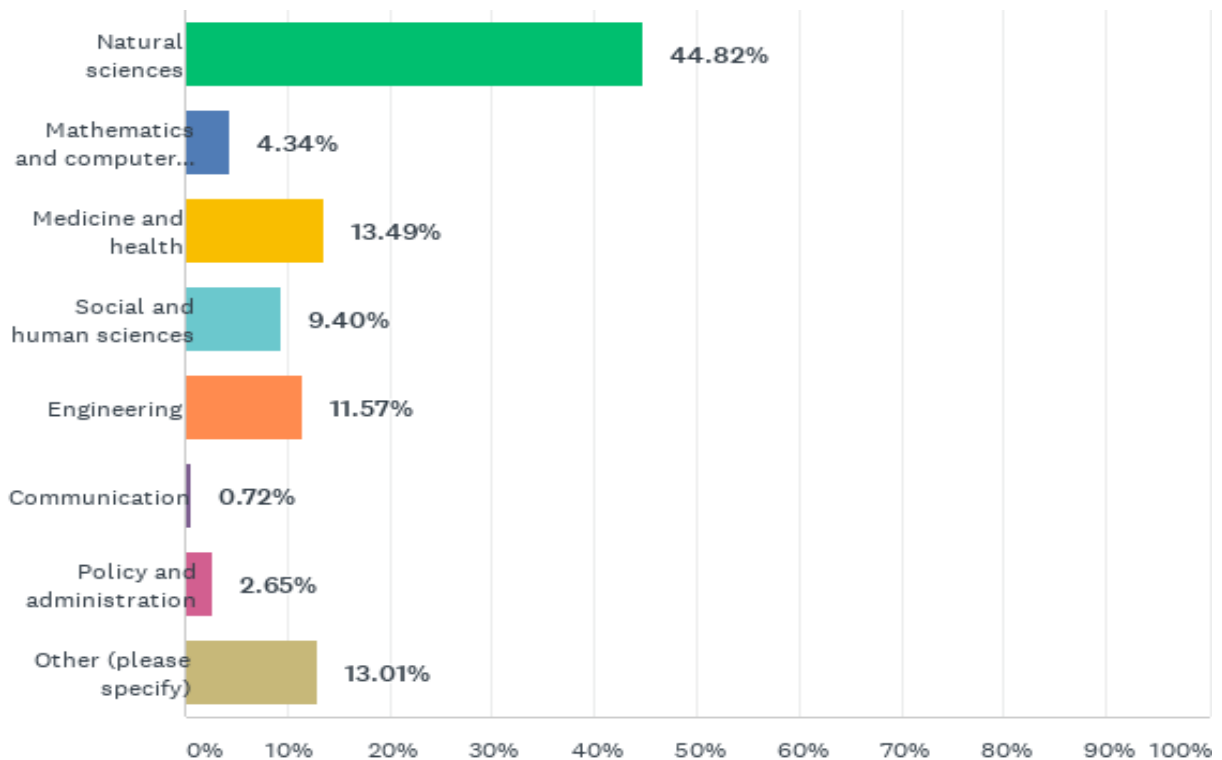
Section 2. Aims and objectives of the Recommendation

Q10 Do you agree with the following statement? "This is the adequate aim for an international standard setting instrument on Open Science."

Respondents were asked to express their agreement on a scale of 1 to 10 (0 being strongly disagree, 5 being neither agree nor disagree and 10 being agree).

The average response was above 8, indicating a high level of agreement with the adequacy of the stated aim of the UNESCO recommendation.

291 respondents agreed with the statement (responded with a rating between 6-10) out of which 114 respondents strongly agreed with the statement (rating of 10 points).
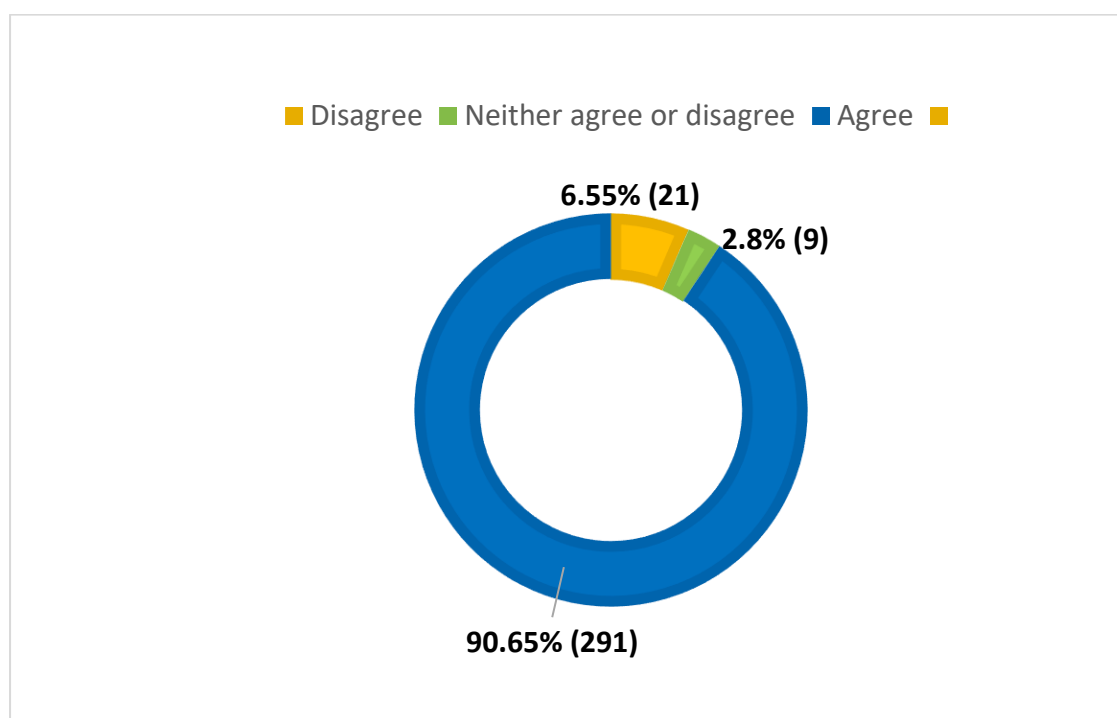
Q 11 If you disagree with the statement under 10., please indicate why
31 respondents answered this question.

The following were the common themes in the responses:

- Several of those who disagreed mentioned that the document is **too long, complicated or unclear**.
- Some respondents believed that the Recommendation is **not practical** and does not address the **difference in context between different disciplines**.
- Some pointed out that the Recommendation does not adequately address different contexts and realities including those between **developed and developing countries**. The **digital divide** is not acknowledged. There is also a concern that in practice this will lead to **exploitation of indigenous knowledge** and science produced in developing countries if
-

- countries in the Global North keep paywalls while openly accessing knowledge produced in the Global South.
- Other concerns about issues not addressed include **financial models** (who will pay for open access journals?), functional **peer review process** for open science and the question of **patents**.
- One respondent pointed out that **predatory journals** are not expected to abide by any agreement.

Q 12 Please indicate the importance of each of the key objectives and areas of action identified in the first draft of the Recommendation.

Most of the respondents agreed that the key objectives and areas of action identified in the draft are very important with first (promoting a common understanding of Open Science and diverse paths to Open Science) being most often identified as 'very important'.

Indicate the importance of key objectives and areas of action identified in the draft Recomendation

Key objective / area of action	Very important
g) Promoting international cooperation on Open Science	86.56%
f) Promoting innovative approaches for Open Science at different stages of thee scientific process	75.39%
e) Transforming scientific culture and aligning incentives for Open Science	77.74%
d) Investing in capacity building for Open Science	83.49%
c) Investing in Open Science infrastructures	79.69%
b) Developing an enabling policy environment for Open Science	80.00%
a) Promoting a common understanding of Open Science and diverse paths to Open Science	80.37%

Legend: ■ Very important ■ Moderately important ■ Unimportant

Q 13 Please select the <u>top three</u> priorities in your opinion from the list of objectives
Mirroring the response to the question on the importance of the objectives, **votes for the top three priorities among the objectives were also relatively evenly divided** with a slight preference towards objectives a), b) and g).

% of times objective selected in top 3 priorities

	48%	48%	43%	45%	35%	33%	50%

a) Promoting a common understanding of Open Science and diverse paths to Open Science

b) Developing an enabling policy environment for Open Science

c) Investing in Open Science infrastructures

d) investing in capacity building for Open Science

e) Transforming scientific culture and aligning incentives for Open Science

f) Promoting innovative approaches for Open Science at different stages of thee scientific process

g) Promoting international cooperation on Open Science

Q 14 Do you agree with the following statement? "The draft UNESCO Recommendation is convincing about the importance of supporting open science, and adequately captures the benefits for science and society of doing so."

Most respondents agreed with the statement with 86 % respondents rating the statement between 6 and 10 out of which 92 respondents (29%) strongly agreed with a rating of 10.

THE DRAFT UNESCO RECOMMENDATION IS CONVINCING ABOUT THE IMPORTANCE OF SUPPORTING OPEN SCIENCE, AND ADEQUATELY CAPTURES THE BENEFITS FOR SCIENCE AND SOCIETY OF DOING SO.

- Agree
- Disagree
- Niether agree nor disagree

11%

3%

86%
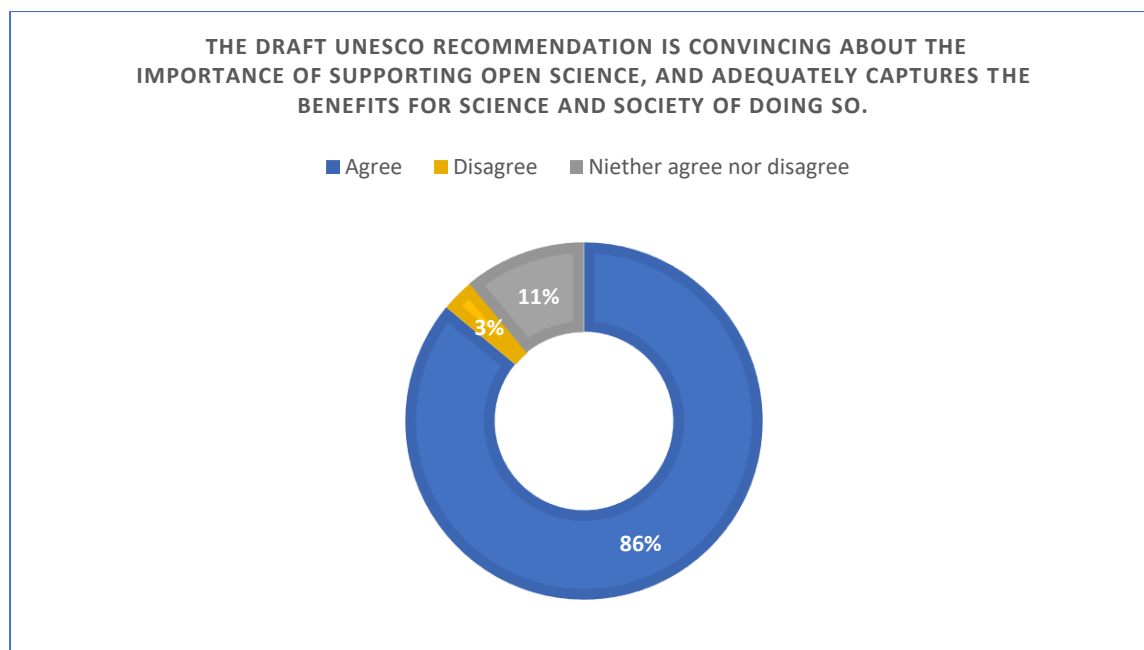
Q 15 If you disagree with the statement under 14., please indicate why.

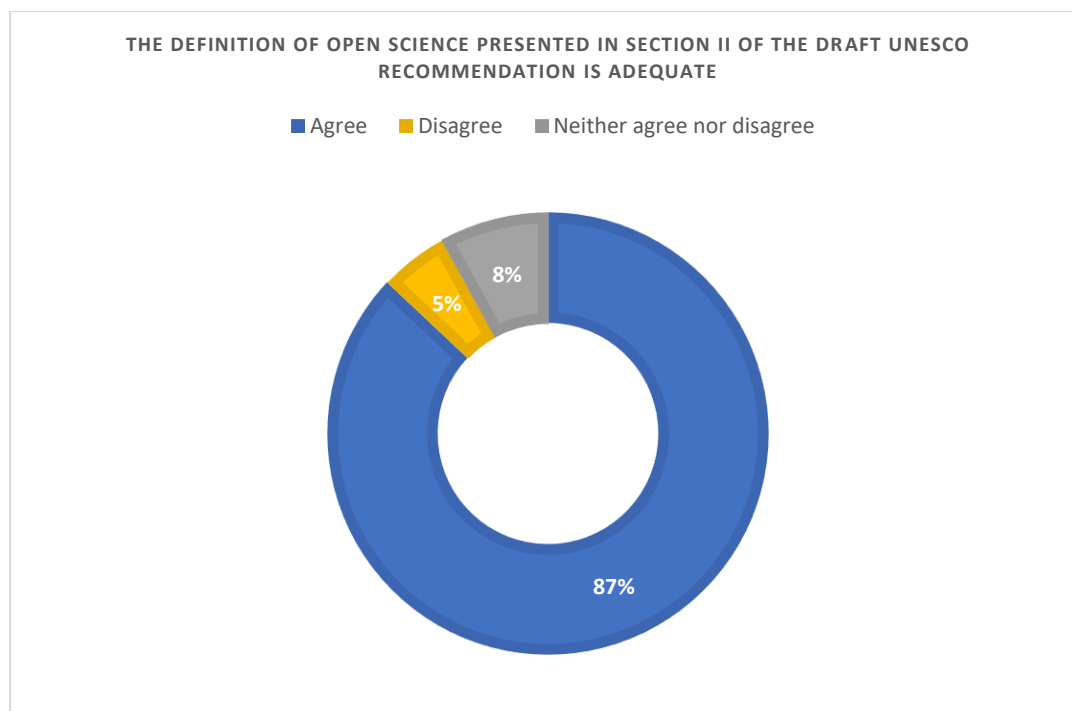*29 respondents answered this question.*

Open-ended responses to this question included the following points:

- Several respondents felt that the Recommendation is not **practical, lacks real world context** and is too 'political' in the sense that it remains superficial in order to garner support.
- Some respondents felt that questions of **equity and inclusiveness are not adequately considered**. The issue of protecting developing countries and indigenous people from ill effects is not covered.
- The issue of **funding models** is raised again. It is pointed out that most of the money is made by the publishers and scientists find it difficult to pay for open access publishing.
- On the other hand, respondents also raised the point that the document ignores the **competitive nature of scientific progress** and the **driving role of commercial interests** in scientific innovation. In general, none of the **possible negative outcomes of Open Science** are considered in the document.

Section 3. Definition of Open Science

Q 16 Do you agree with the following statement? "The definition of open science presented in section II of the draft UNESCO Recommendation is adequate."

Most respondents agreed the adequacy of the definition of Open Science in the Recommendation being adequate with an **average rating of 8** on the scale and **87% of respondents agreeing** with the statement (rating of 6-10).

THE DEFINITION OF OPEN SCIENCE PRESENTED IN SECTION II OF THE DRAFT UNESCO RECOMMENDATION IS ADEQUATE

■ Agree ■ Disagree ■ Neither agree nor disagree

8%

5%

87%

Q 17 If you disagree with the statement under 16., please indicate why.
25 respondents answered this question.

The following points were noted by respodednts who disagreed

- Some respondents felt that the **definition needs detail, clarification** and pointed out **missing elements** (including lack of recognition to some drivers of Open Science, technical know how not included, intelectual property rights, privacy rights, transperency and accesibility not mentioned).
- Some repondents found the definition **too long and lacking clarity and succinctness**.
- The lack of acknowledgement of the **potential misuse of Open Science and need for mitigation of malpractices** that it could enable were mentioned by some respondents.
- One respondent pointed out that in its current form, reference to Open Science Infrastructures refers only to repositories and platforms providing research products such as data or publications but **does not include infrastructures critical for the production of knowledge** (such as big telescopes, research vessels, accelerators, heritage collections etc.) which are equally important and must be openly available

Q 18 Do you think that the scope of open science, as presented in the draft Recommendation, applies to the following?
Most respondents believe that the scope of Open Science as presented in the draft applies completely across disciplines. Very few respondents felt that the scope applied hardly or not at all to the disciplines mentioned.
Natural science had a small advantage over the other disciplines where respondents felt the scope of Open Science applied completely.

Do you think that the scope of open science, as presented in the draft Recommendation applies to the following disciplines
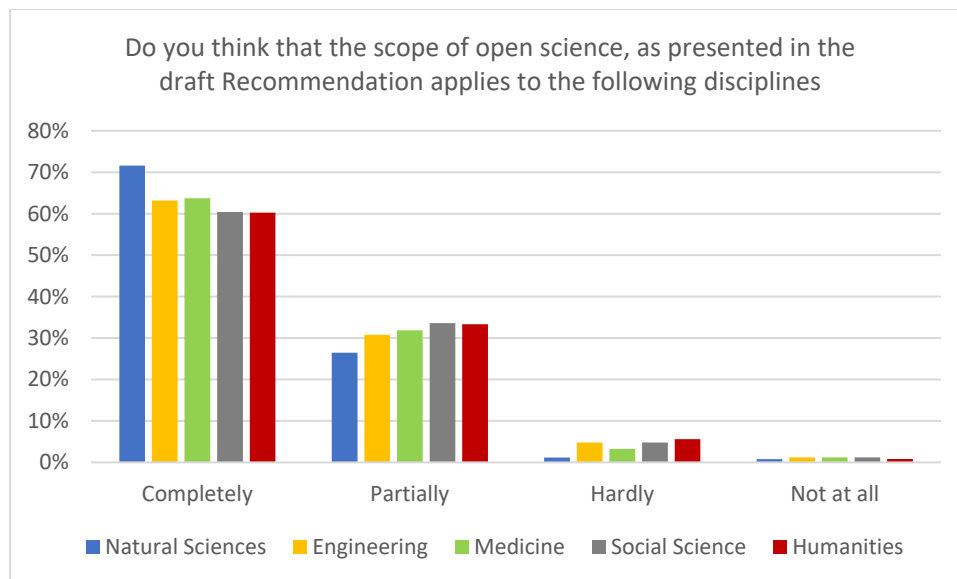
Q 19 If you think it does not cover some or all of the areas mentioned above, please explain why.

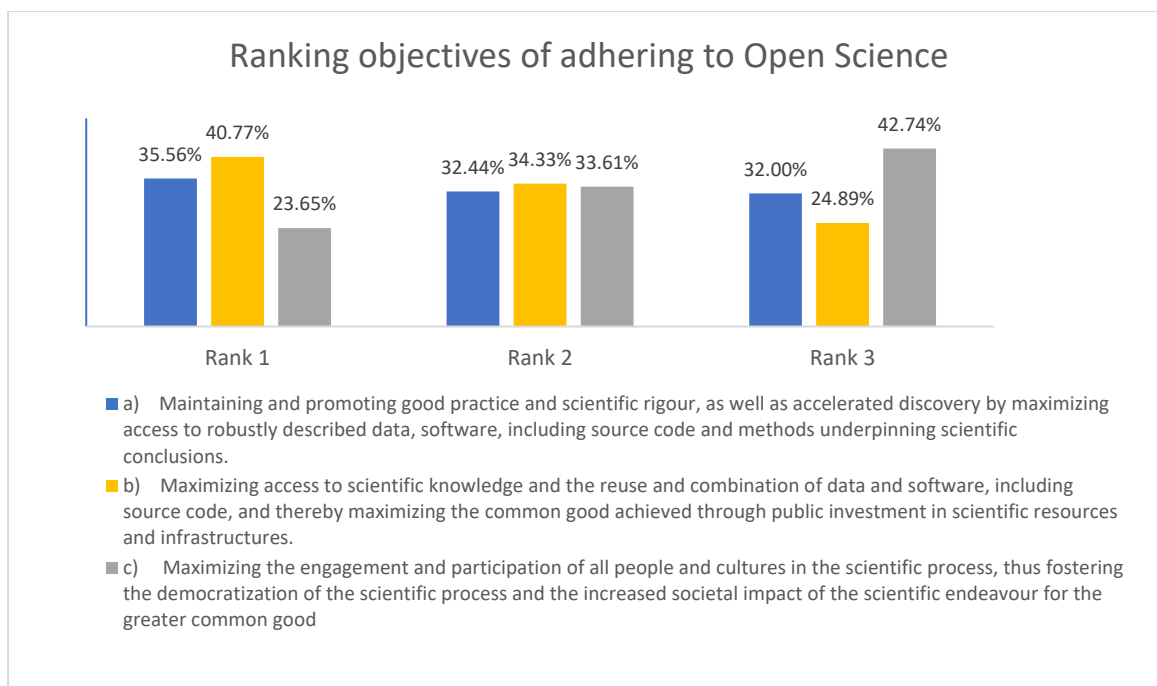*41 respondents answered this question.*

Respondents who did not agree with the scope of Open Science as depicted in the Recommendation applying to one or more of the disciplines noted that:

- Attention needs to be paid to the **difference in data type between natural and social sciences**.
- Several respondents stressed the need for the Recommendation to focus on **ethical frameworks and shared values** rather than just scientific knowledge.
- Several respondents noted that **many of these disciplines are not emphasized** in the document including arts, humanities and engineering.
- Issues related to **patentable knowledge**, the role of innovation in Open Science and **confidentiality** of information related to security or work on human subjects etc., needs further deliberation within the science community.
- For **engineering in particular**, respondents pointed out that the economic **interests of industry and patents** are a driving factor that needs to be considered. Both Medicine and engineering fields have protocols and standards and the interaction of these with the ideas of Open Science need to be clarified.

Q 20 The key objectives of adhering to open science as presented in the draft Recommendation (page 7, paragraph 11) are listed below. Please rank these objectives in order of priority.

Of the objectives of adhering to Open Science in the Recommendations **objective a) was raked first most often** followed by objective b). Objective c) was ranked last by most respondents.

This vital question was skipped by 180 respondents. This may have been because of the careful deliberation required and the short time-frame for the survey.

Ranking objectives of adhering to Open Science

- ■ a) Maintaining and promoting good practice and scientific rigour, as well as accelerated discovery by maximizing access to robustly described data, software, including source code and methods underpinning scientific conclusions.
- ■ b) Maximizing access to scientific knowledge and the reuse and combination of data and software, including source code, and thereby maximizing the common good achieved through public investment in scientific resources and infrastructures.
- ■ c) Maximizing the engagement and participation of all people and cultures in the scientific process, thus fostering the democratization of the scientific process and the increased societal impact of the scientific endeavour for the greater common good

Q 21. Do you agree with the following statement? 'This an adequate description of the objectives of open science."

Most respondents were in agreement that the description of the objectives of open science provided in the draft Recommendation is adequate. The average rating on a scale of 0-10 to indicate agreement was 8.

Of the 86.5% of respondent who agreed with the statement, 25% of them strongly agreed with the statement (with a rating of 10).
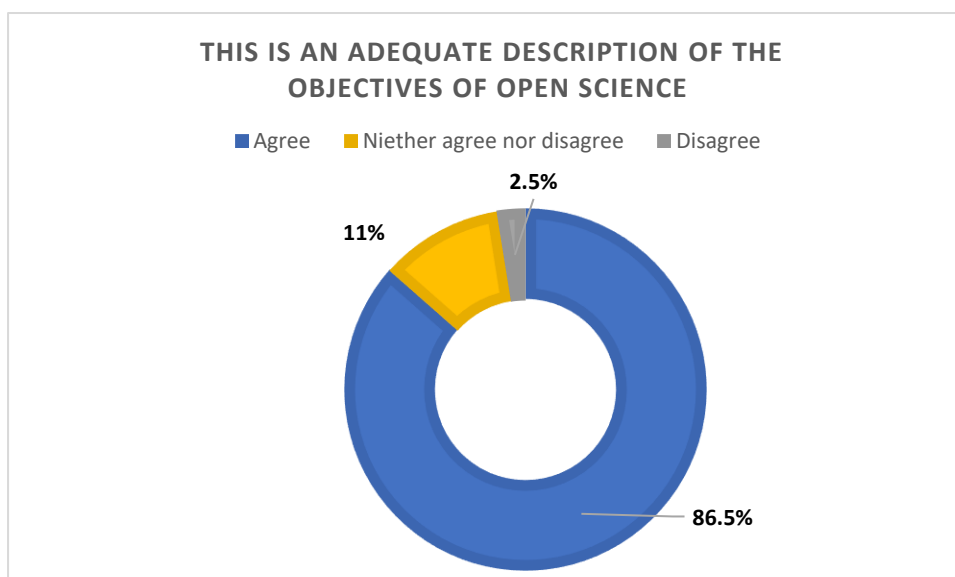
Q 22. Are there any other high priority objectives that should be noted?

55 respondents answered this question.

Among other objectives listed were:
- Increase in **international cooperation** for science
- Using Open Science towards **solutions to global problems** such as pandemics, climate change and social justice issues.
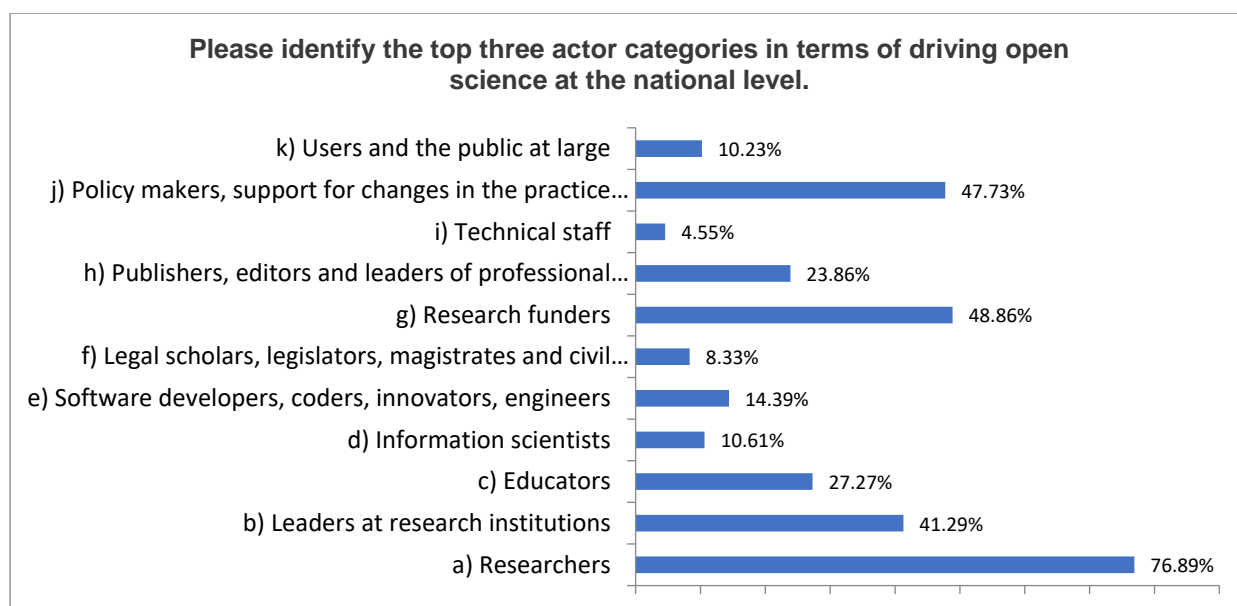- **Fighting misinformation** and informing better science journalism and communication
- Strengthening institutions and **capacities** in developing countries.
- **Mitigating research malpractices** and increasing transparency.
- **Minimising costs** of production and sharing of scientific knowledge
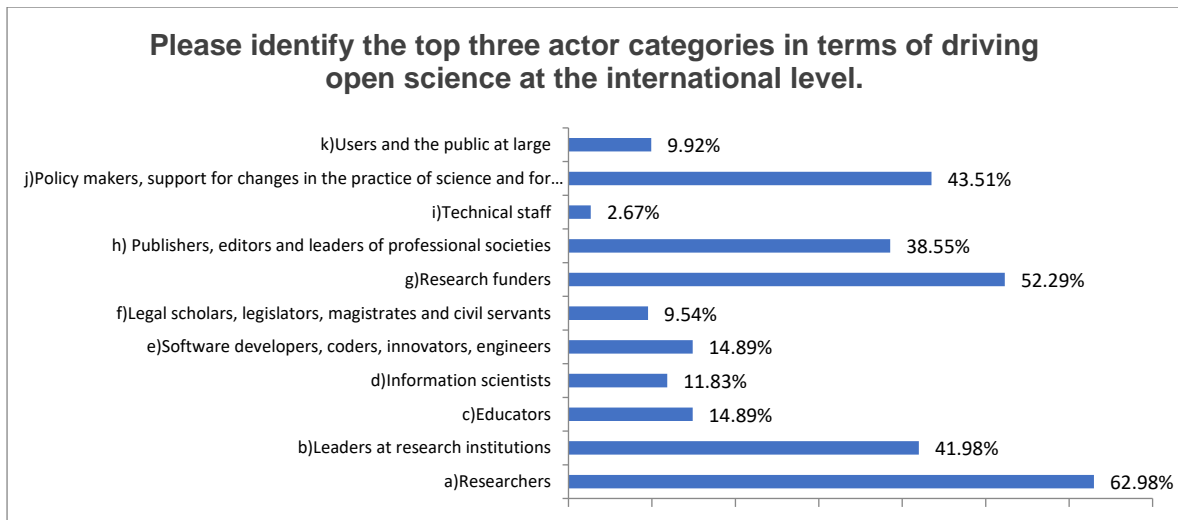- **Improving incentives** in science systems

Q 23 Please identify the top three actor categories in terms of driving open science at the national level.

Researchers were by far the most often selected in the top three actors for Open Science at the national level by respondents, followed by **research funders and policy makers.**

Please identify the top three actor categories in terms of driving open science at the national level.

Category	Percentage
k) Users and the public at large	10.23%
j) Policy makers, support for changes in the practice…	47.73%
i) Technical staff	4.55%
h) Publishers, editors and leaders of professional…	23.86%
g) Research funders	48.86%
f) Legal scholars, legislators, magistrates and civil…	8.33%
e) Software developers, coders, innovators, engineers	14.39%
d) Information scientists	10.61%
c) Educators	27.27%
b) Leaders at research institutions	41.29%
a) Researchers	76.89%

Q 24 Please identify the top three actor categories in terms of driving open science at the international level.

At the **international** level, while **researchers remained the most commonly selected** amongst the top three, this was slightly less so than in response to the same question at the national level. **Research funders, policy makers and in addition leaders of research institutions** were the other commonly selected options in the top three.

Please identify the top three actor categories in terms of driving open science at the international level.

Category	Percentage
k)Users and the public at large	9.92%
j)Policy makers, support for changes in the practice of science and for…	43.51%
i)Technical staff	2.67%
h) Publishers, editors and leaders of professional societies	38.55%
g)Research funders	52.29%
f)Legal scholars, legislators, magistrates and civil servants	9.54%
e)Software developers, coders, innovators, engineers	14.89%
d)Information scientists	11.83%
c)Educators	14.89%
b)Leaders at research institutions	41.98%
a)Researchers	62.98%

Q 25 Are there any key actors missing from the list above?
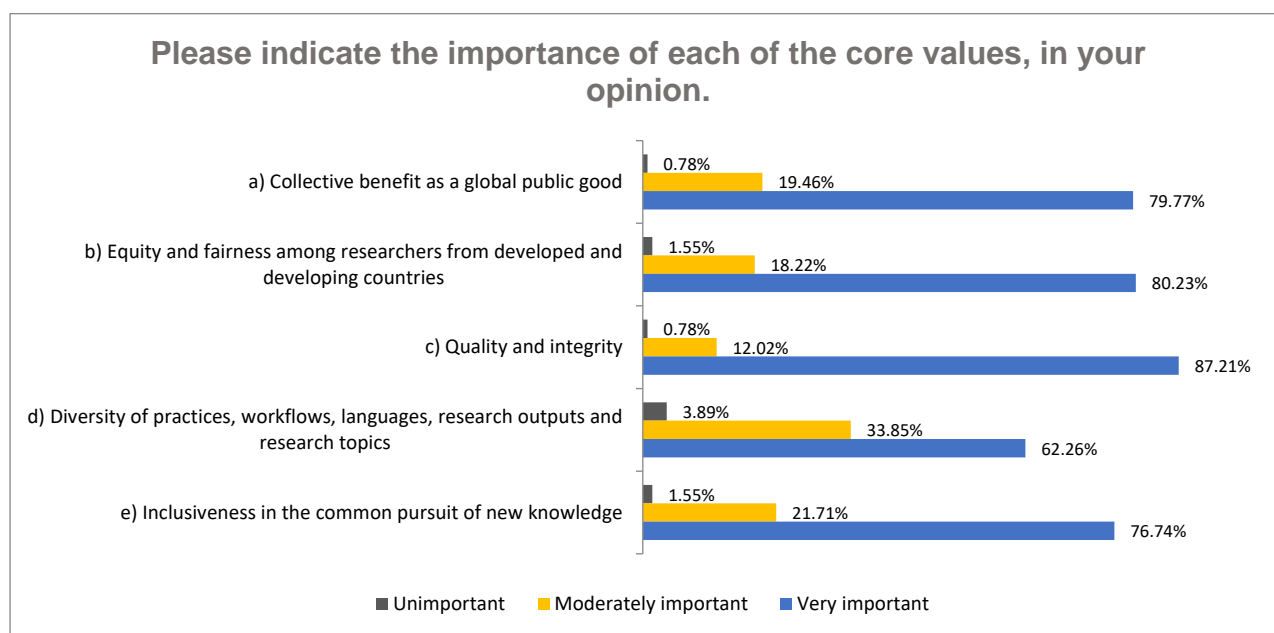
46 respondents answered this question.

The following were the **additional actors mentioned** in the responses to this question:

- Citizens (as in relation to citizen science)
- Media
- Students (a few respondents specified post-graduate students, the others mentioned students at all levels)
- Publishers
- Heads of state
- Communities and indigenous people
- Civil society
- Multinational institutions (such as the UNESCO, WHO, Vice Chancellors' Association, Rectors' Conferences etc.)
- Science societies
- Libraries
- Research labs
- Commercial businesses and industry (including pharmaceutical research)
- Engineers and designers (as a separate category)
- IT sector which will provide the infrastructure for Open Science

Section 4. Open science core values and guiding principles

Q 26 The draft Recommendation advocates the following as core values of open science. Please indicate the importance of each of the core values, in your opinion.

All the listed core values were rated as very important by respondents with 'quality and integrity' most often rated as very important followed by 'equity and fairness' and 'collective benefit as a global public good'.

Q 27 Are there any key values missing from this list?
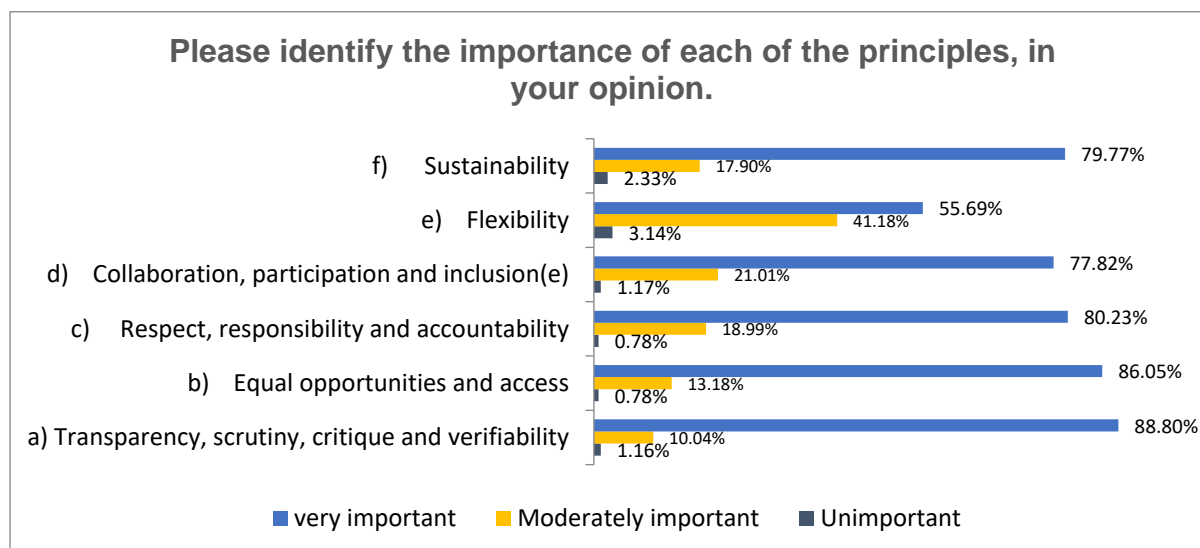
44 respondents answered this question.

The following were responses suggesting additional values

- Improved **social benefits** of science (including increased eveidence based policy, productivity)
- Availibility of **resources** for researchers and equity in acces to resources
- **Transperancy and accountability**.
- **Trust** building. Without investment in trusted repositories (code, data, semantic artefacts), significant open science investment will be lost over time - as implied in the closing statement of the paragraph.
- **Commercial interests** (important to disciplines like engineering)
- **Publically funded knowledge cannot be behind paywalls**
- One respondent pointed out that the second point in particular can be extended to include **"researchers at different career stages, coming from developing and developed countries"** to address both the power structures and vertical hierarchies (within organizations), as well the horizontal hierarchies (between countries).

Q 28 The draft Recommendation advocates the following guiding principles (page 9, paragraph 16). Please identify the importance of each of the principles, in your opinion.

Transparency, scrutiny, critique and verifiability were most often chosen as very important followed closely by equal opportunities.

Flexibility was least often indicated as very important but was not indicated as unimportant either with only 3% of respondents finding it unimportant.

Please identify the importance of each of the principles, in your opinion.

Principle	very important	Moderately important	Unimportant
f) Sustainability	79.77%	17.90%	2.33%
e) Flexibility	55.69%	41.18%	3.14%
d) Collaboration, participation and inclusion(e)	77.82%	21.01%	1.17%
c) Respect, responsibility and accountability	80.23%	18.99%	0.78%
b) Equal opportunities and access	86.05%	13.18%	0.78%
a) Transparency, scrutiny, critique and verifiability	88.80%	10.04%	1.16%

Q 29 Are there any key principles missing from this list?

*38 respondents answered this question.*

- **Social benefit**
- **Security of ideas, processes and data**
- It was suggested that the first principle should be expanded to include "**reproducibility**" (producing same results given the same data, methods and analyses) and "**replicability**" of science (producing consistent results given the similar conditions and research context), which are at the core Open Science practices.
- The second principle could be expanded to include "**decentralized and democratic arrangements**" to address vertical and horizontal hierarchies.

Section 5. Areas of action

Q 30 The draft Recommendation advocates the following priorities for action (page 9, section IV). Please rank these actions in order of priority.

The first action mentioned in the recommendation, **promoting a common understanding of Open Science and diverse paths to Open Science was most often ranked no.1**.
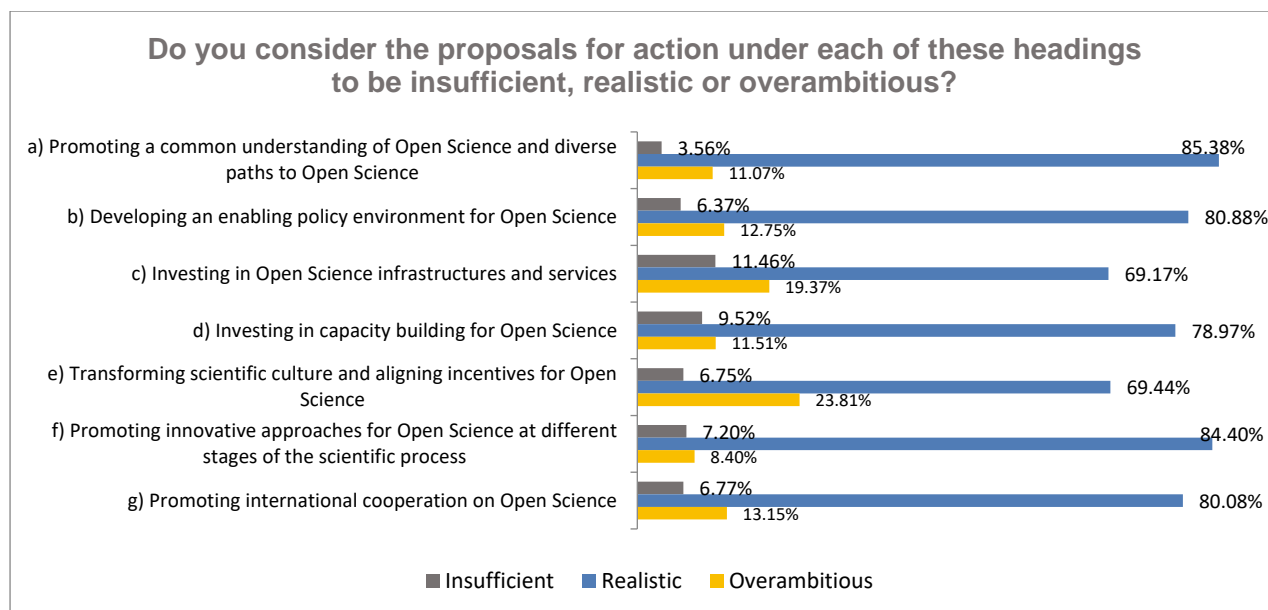
The most common ranking for each action seems to correspond with it's order of appearance in the draft Recommendation.
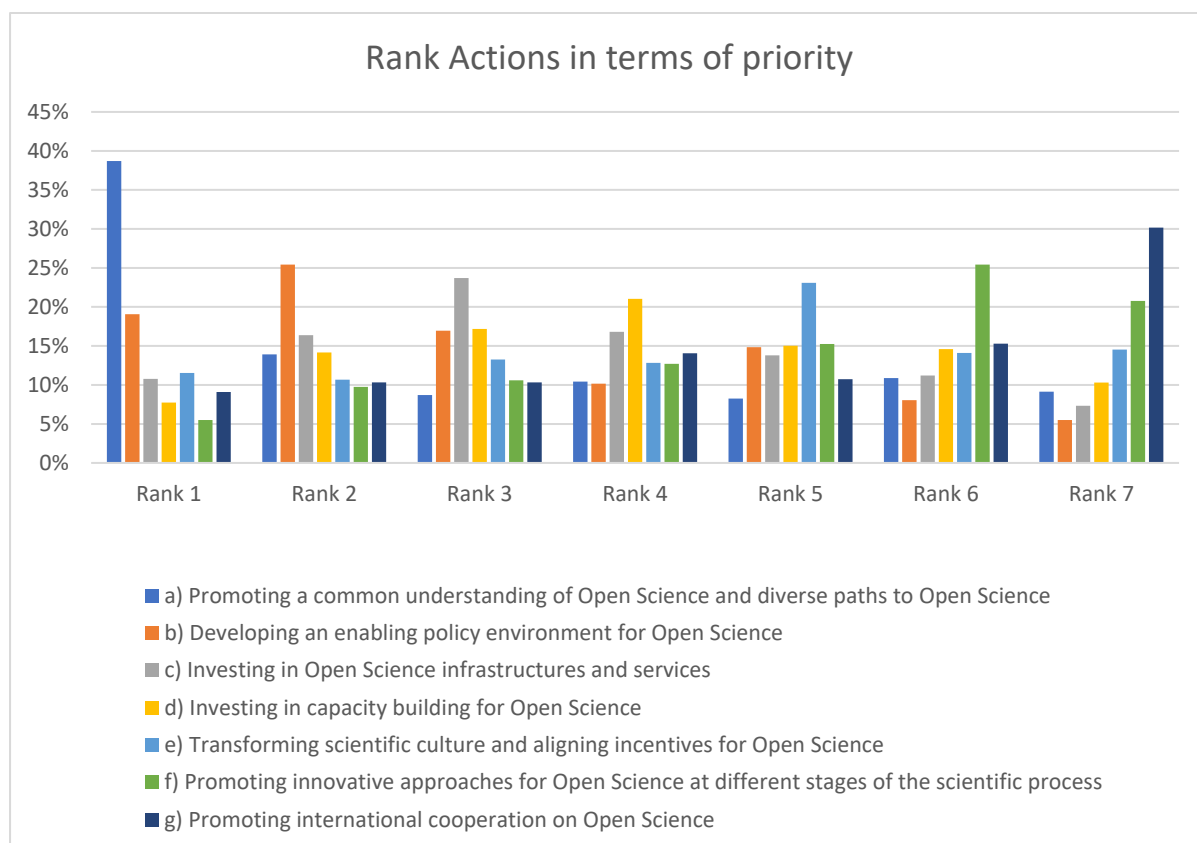
Q 31 Do you consider the proposals for action under each of these headings to be insufficient, realistic or overambitious?

All the listed areas for action had the highest votes indicating proposals under them as being realistic.

The actions under transforming research culture and aligning incentives had the highest votes for being overambitious (close to 24%). Most votes for insufficient actions (11.5%) went to the actions towards investing on Open Science infrastructures and services.

Do you consider the proposals for action under each of these headings to be insufficient, realistic or overambitious?

a) Promoting a common understanding of Open Science and diverse paths to Open Science
- 3.56%
- 85.38%
- 11.07%

b) Developing an enabling policy environment for Open Science
- 6.37%
- 80.88%
- 12.75%

c) Investing in Open Science infrastructures and services
- 11.46%
- 69.17%
- 19.37%

d) Investing in capacity building for Open Science
- 9.52%
- 78.97%
- 11.51%

e) Transforming scientific culture and aligning incentives for Open Science
- 6.75%
- 69.44%
- 23.81%

f) Promoting innovative approaches for Open Science at different stages of the scientific process
- 7.20%
- 84.40%
- 8.40%

g) Promoting international cooperation on Open Science
- 6.77%
- 80.08%
- 13.15%

■ Insufficient   ■ Realistic   ■ Overambitious

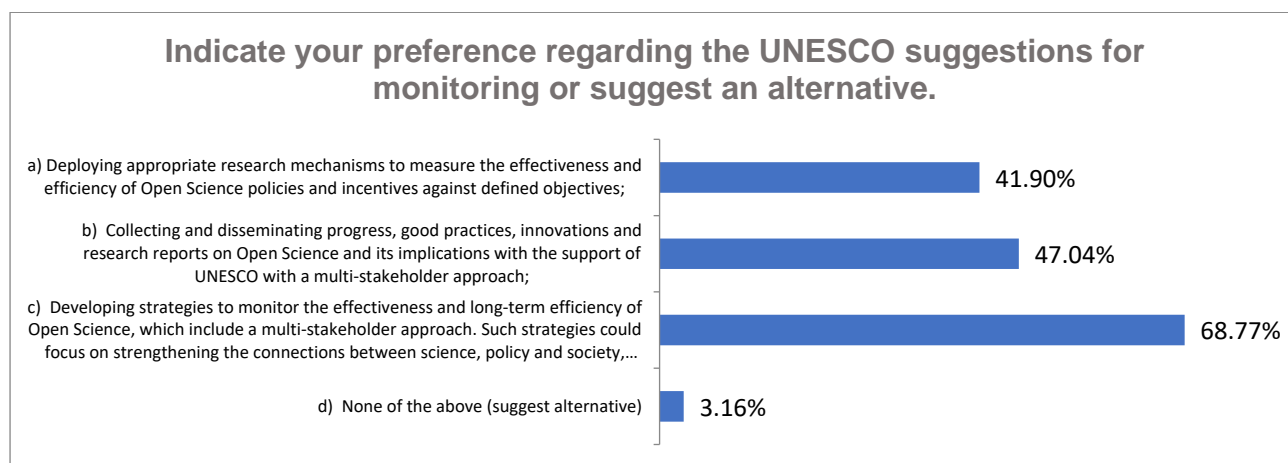## Q 32 Are there any key required actions missing from this list?

30 respondents answered this question.

- **Capacity building** at all educational levels
- Working out a deal with **publishers**
- Promoting **social impact** of knowledge
- In addition to promoting **participatory and citizen science**, an action should be taken to promote **collaborative science** (understood as a method involving a relatively large number of collaborators who may be dispersed across labs, institutions, disciplines, cultures, and continents) and **multi-disciplinary approaches**.

Section 6. Monitoring

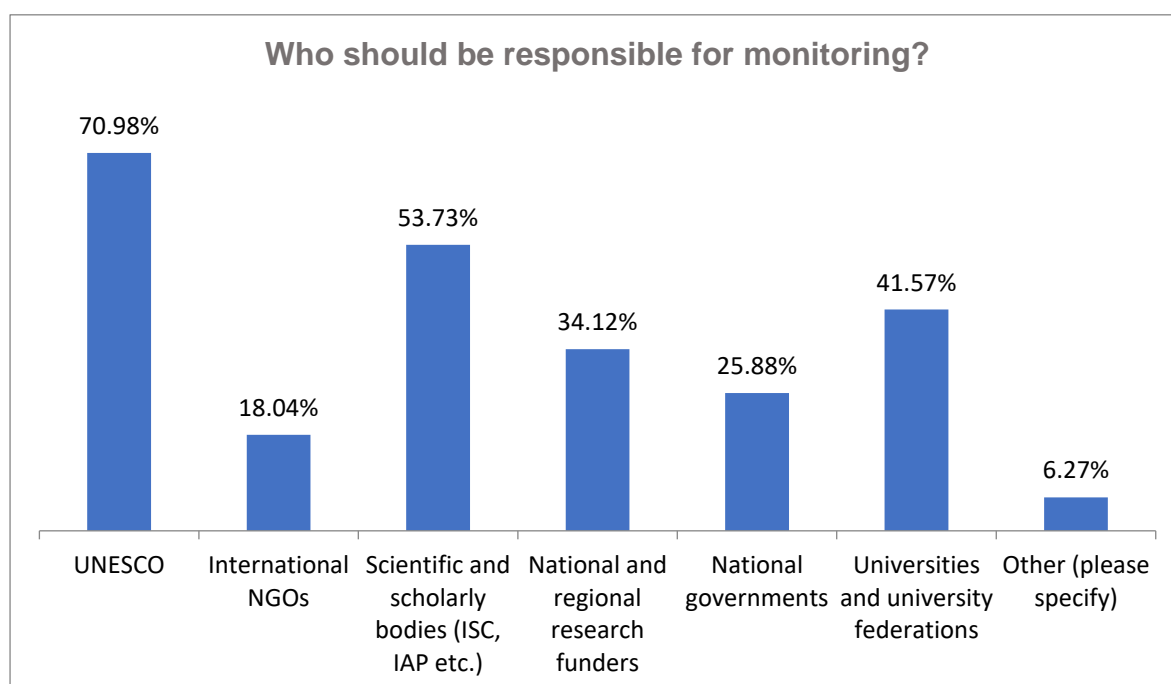### Q 33 Please indicate your preference regarding the UNESCO suggestions for monitoring or suggest an alternative.

Developing strategies to monitor the effectiveness and long term efficiency of Open Science (option c) was preferred by most respondents.

Indicate your preference regarding the UNESCO suggestions for monitoring or suggest an alternative.

- a) Deploying appropriate research mechanisms to measure the effectiveness and efficiency of Open Science policies and incentives against defined objectives; — 41.90%
- b) Collecting and disseminating progress, good practices, innovations and research reports on Open Science and its implications with the support of UNESCO with a multi-stakeholder approach; — 47.04%
- c) Developing strategies to monitor the effectiveness and long-term efficiency of Open Science, which include a multi-stakeholder approach. Such strategies could focus on strengthening the connections between science, policy and society,… — 68.77%
- d) None of the above (suggest alternative) — 3.16%

Very few suggestions for alternatives were suggested including globally orchestrated monitoring, funding Open Science approaches directly and comments on avoiding patronage and clarifying deal with publishers.

Q 34 Who should be responsible for monitoring?

Most respondents indicated they thought that **UNESCO** should be responsible for monitoring, **scientific and scholarly bodies** were the second most commonly selected option.

Who should be responsible for monitoring?

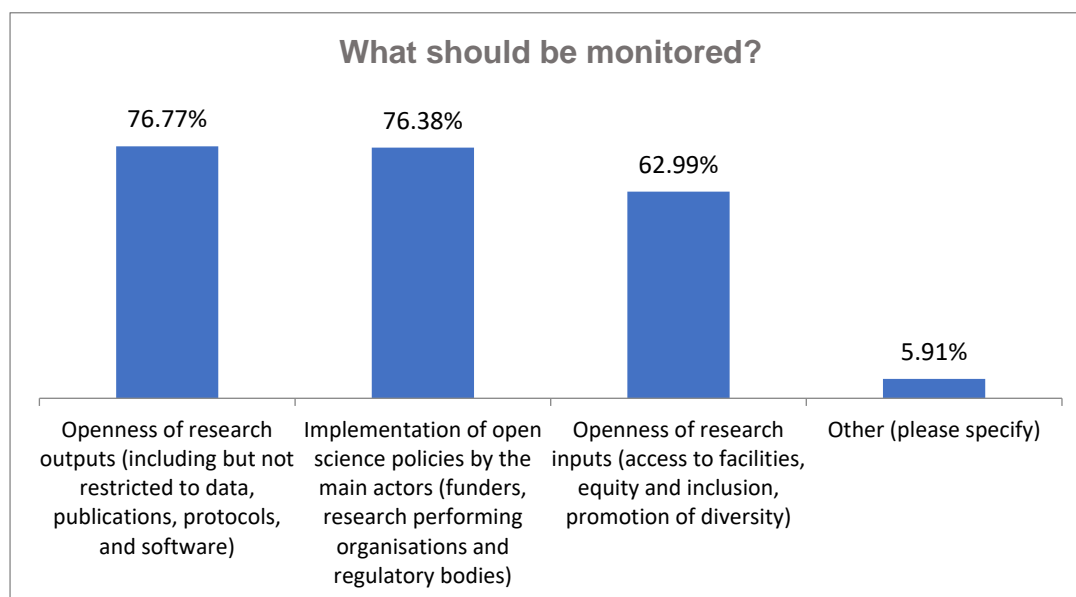| Category	Percentage
UNESCO	70.98%
International NGOs	18.04%
Scientific and scholarly bodies (ISC, IAP etc.)	53.73%
National and regional research funders	34.12%
National governments	25.88%
Universities and university federations	41.57%
Other (please specify)	6.27%

Those who specified **other options** mentioned:

- National monitoring aggregated by UNESCO
- Collaboration of stakeholders
- Independent researchers or cohorts of research teams within institutions
- UNESCO in collaboration with science bodies
- Academies
- Government Science Advisors
- A multi-stakeholder approach, where representatives from different sectors will come together in devising/executing a monitoring strategy. UNESCO can be in charge of coordination and organization of work.

Q 35 What should be monitored

Most respondents **openness of research output and implementation of Open Science policies** should be monitored while a significant but lower proportion voted for monitoring of openness of research input.

What should be monitored?

|			
76.77%	76.38%	62.99%	5.91%
Openness of research outputs (including but not restricted to data, publications, protocols, and software)	Implementation of open science policies by the main actors (funders, research performing organisations and regulatory bodies)	Openness of research inputs (access to facilities, equity and inclusion, promotion of diversity)	Other (please specify)

Of those who chose 'other', the following were the **options for monitoring** specified,

- Implementation by institutions and funders of improved research evaluation methods which avoid a metrics-based approach and instead incentivise open science practices (such as the European Commission's OS-CAM framework)
- Objectives of the Open Science projects
- Benefits drawn from Open Science
- Compliance with the principles of Open Science
- Output quality
- Research culture in terms of supportiveness for Open Science
- Level and extent of collaboration
- Access for non-experts
- Auditing of publishers
- A combination of strategies starting with changes in policies to support Open science to research outputs downstream.

Section 7. General Questions

Q 36 Do you agree with the following statement? "The development of open science as described in the UNESCO draft Recommendations should be supported."

Very high level of agreement with this statement with the average rating being almost 9 out of 10. 94 % of the respondents agreed with this statement of which more than 51% strongly agreed (with a rating of 10).

THE DEVELOPMENT OF OPEN SCIENCE AS DESCRIBED IN THE UNESCO DRAFT RECOMMENDATIONS SHOULD BE SUPPORTED

■ Disagree   ■ Niether   ■ Agree

3%   3%

94%
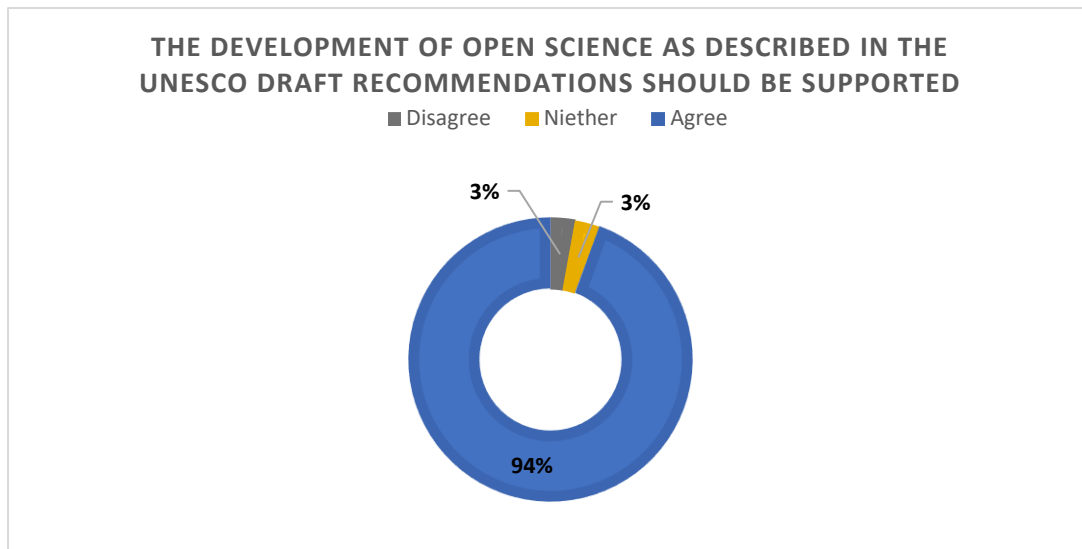
Q 37 What are the key weaknesses/gaps (if any) in the draft Recommendation?

69 respondents answered this question.

Respondents noted that:
- The document is **too long and tedious, language is bureaucratic with several repetitions**
- The Recommendation is **not rooted in practical reality** as it does not address the obstacles of competition amongst researchers in the current system especially for funding and jobs or the vested interests in keeping status quo.
- The question of **costs and who will pay** for open science and the funding possibilities have not been mentioned.
- Points regarding **publishing fees to be clarified** and severe weaknesses in publication systems need to be dealt with. Respondents pointed out that publishers should not be gaining at the expense of scientists.
- The draft does not address questions of **how to solve the existing inequalities in the science** domain and how to deal with the neoliberal capitalistic system that commodifies science and in which the academic and research institutions operate.
- Lack of mention of **commercial interests**. A discussion of policy on Intellectual Property rights - for corporations, institutions and individual scientists is missing. It was stated that corporate investment in research is huge, and future ROI is key.
- Lack of **infrastructure** and lack of open access to science infrastructure and gaps between developed and developing country infrastructures is not mentioned.
- **Potential misuse of Open Science** to be addressed as well as unintended negative consequences. The quality of research must be conserved along with preventing malpractices.
- **Capacity building** needs more prominence
- Some respondents believed that **engineering and engineering sciences don't appear** although they are of prime importance particularly for developing countries. Specific issues related to engineering have not been considered as full access to all information to research is not possible in engineering according to one respondent.
- One respondent suggested that **actions should be divided into as national level and international level**. Another respondent suggested that methodologies be developed for **three groups**: countries that are not engaged in promoting open science; countries that are engaged in promoting Open Science but are unable to implement it and; those that practice Open Science and want to accelerate actions.
- There are **no concrete initiatives and incentives or implementation plan**. There is no follow up plan or no measurable or auditable details.
- The draft should be subjected to **periodic review** according to one commentor

Q 38 Do you agree with the following statement?" The UNESCO Recommendation will be useful in influencing science policies of national and regional funders."

The average rating was almost 9 and 90% of the respondents agreed with the statement of which 44% strongly agreed that the Recommendation will be useful in influencing policies of funders.

THE UNESCO RECOMMENDATION WILL BE USEFUL IN INFLUENCING SCIENCE POLICIES OF NATIONAL AND REGIONAL FUNDERS

■Agree ■Niether ■Disagree

6% 4%

90%
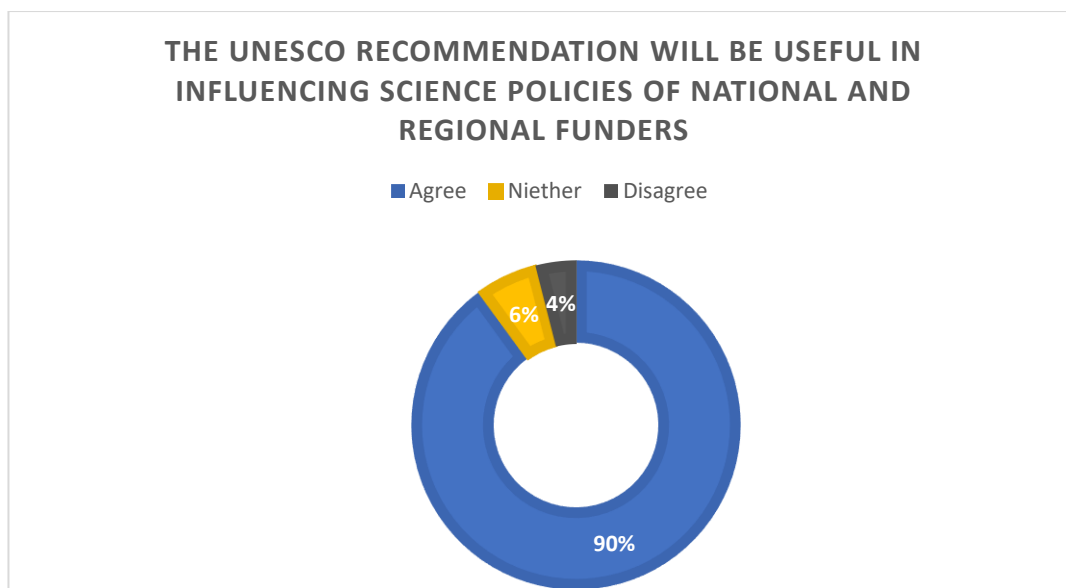
Q 39 If you disagree with the statement under 38., please explain why.

19 respondents answered this question.

Respondents who felt that the Recommendation will not be useful in influencing policies of funders submitted that:

- The document is **not practical** (remains 'starry eyed') and addresses issues incompletely. It is too legalistic. **Need for a simple and practical set of recommendations**.
- **Unintended negative consequences of Open Science are not recognised**.
- Key questions of **funding and benefits need to be clarified for any impact**. The question of 'who will pay' is not addressed and commercial interests not dealt with.

Q 40 What particular benefit could UNESCO deliver to the open science movement?

128 respondents answered this question.

Respondents submitted that UNESCO could:

- Bring in a **global perspective**. It could take the role of coordination and alignment with global and national actors, build and support an international approach to Open Science and champion the cause.
- Use its leadership create a platform to **engage and coordinate various actors** including publishers.
- Promote **awareness and buy-in** for Open Science.
- **Education and capacity building**. Including tools and training programmes to spread basic science education. Specifically, targeted capacity building for young scientists.

- Ensuring **equity and inclusiveness between countries**. This would include pushing to close infrastructure gaps, working with developing country researchers,
- **Influence governments** to adapt these principles in policies and funding decisions. Provide **policy support** and advice.
- Provide **access to scientific data knowledge,** particularly to scientists in developing countries.
- **Uniformity in open science standards.** UNESCO can create criteria and publicize the agreed concepts, ideas, etc. around it.
- **Perpetuate the values** that define Open Science such as human values, transparency, equity, and access to equality.
- Creating **awareness in research funders** that infrastructure in support of Open Science (especially soft infrastructure - repositories, systems, services, and human capacity) cannot be made sustainable without long-term, reliable funding.
- engendering research and innovation by **sponsoring and disseminating research and knowledge on open science**.
- Lobbying and fundraising to **set up high quality open access portals** that are independent of the commercial publishing industry.
- **Identification of incentives and disincentives** to build an open science system which is inclusive, participatory and sustainable.
- **Support and find strategies for freely open journals.**
- **Monitoring and evaluation** of practice of open science and ensuring compliance with minimum standards.
- Encouraging and supporting **research collaboration**
- Gathering and dispersing **funding** in the service of Open Science

Comments on the results

The following comments on the results summary contributed by Geoffrey Boulton (ISC), Luke Drury (ALLEA), Claudia Bauzer Medeiros (coordinated group that wrote IAP recommendations) and Marlene Kanga (Immediate Past president WFEO) on behalf of the partner organizations that undertook this survey.

- Commentators agreed that the common themes of disagreement in response to **Q11** need to be taken seriously in the next steps.

- Commentators pointed out that the remarks about the lack of practicality (lack of focus on implementation) of the recommendations and the insufficient consideration of issues of equity and inclusion are of importance. It is vital to highlight to UNESCO that open science has been developing as a major issue for a decade, and although a broad high level UNESCO declaration will be useful, it would be of great value if it were able to address some of the major sticking points with more force (the potential for yet another global divide, incentives, equitable open access to the record of science).

  In particular, the possibility that practices of Open Science may result in another kind of global divide is important to note.
- Specifically, the commentator from IAP registered a disagreement with **Q16** (Do you agree with the following statement? "The definition of open science presented in section II of the draft UNESCO Recommendation is adequate") and pointed out that as opposed to the IAP report, UNESCO objectives did not sufficiently emphasize the view that "Open Science is about global collaboration without temporal, geographic or cultural borders and suggested that as such, an additional negative response should be "Promoting and enabling scientific collaboration through openness and reuse, thereby ensuring longevity of knowledge produced"

- Negative responses to **Q17** are important to note.

- Response to **Q18** were surprising and positive. Negative comments for example from the social sciences/humanities had been expected. The response regarding IP is important.

- **The Q19** responses are very informative and should be highlighted. IP is a significant issue for many governments and must be addressed.. Along with the issues regarding patents, respondents also pointed out that many disciplines such as engineering, arts and humanities are not emphasized. These points are critical to whether the recommendations on Open Science will be accepted by member states. It is also to be noted that only 41 respondents completed this question.

- Responses to **Q22-Q23-Q24** are very important. Researchers-funders-policymakers-institution leaders come out clearly as key targets.

- **Q27** – The point that open science facilitates better use of evidence for policy is important and relevant to UNESCO's audience.

- **Q29** – responses highlight reproducibility/replicability issues. "Trust" is another guiding principle that should be explicitly stated (as explicitly stated in the IAP report to UNESCO)

- **Q32** produces very revealing responses especially in highlighting capacity building and publishing. "Capacity building" also brings us to the role of educators as a bridge between the researchers (bottom-up) and funders-policy makers-institution leaders (top-down).

- **Q33** produces the most significant response on monitoring.

- Commentators agreed that responses to **Q37** may be the most important of all the responses.

It is suggested by the commentators that what us missing from the draft Recommendation is the overall acknowledgement that there are many "Open Science" dimensions and definitions, and that promoting a common understanding may be difficult.

One commentator offered the following summarization: ''The literature on open science exposes a variety of perspectives. Some advocate open science and greater sharing of data and information as means of increasing the efficiency of scientific inquiry. Some see benefits to interdisciplinary science in having open access to the record of science and to a wide variety of its data streams. Some see access to, and integration of diverse, multi-dimensional data streams as means of analysing inherently complex problems. And some see open science as a democratizing process, in which openness is socially contextualized. There are also major reservations about open science: some see it as a barrier to commercialization of science, some from the global south see it as a neo-colonial enterprise; some defend the rights of the individual against the collective; and some see it as corporatization of science that disproportionately benefit large corporations''.

It might be worth exploring whether the Recommendation could focus on a narrower definition of OS that may be feasible to implement (for instance, OS at certain levels of basic research in the natural sciences would support capacity building in developing countries and achieve implementation more successfully than the current wide definition).