EOSC Future

WP2 Report

Calculating National Financial Contributions to EOSC

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WP2 Report / Calculating National Financial Contributions to EOSC

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Abstract

The first annual Survey on National Contributions to EOSC was launched in 2021 and conducted among the European Open Science Cloud Steering Board (EOSC-SB) members. The survey questionnaire reflected three monitoring dimensions: 1) policies, 2) financial investments, and 3) practices. This report describes the dimension of financial investments, serves as the guideline for EOSC-SB, and provides recommendations for calculating national financial contributions to EOSC.

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Glossary

EOSC Future project Glossary is incorporated by reference: https://wiki.eoscfuture.eu/x/JQCK

List of Abbreviations

Acronym	Definition
AC	Associated country
CAPEX	Capital Expenditures
CESSDA ERIC	Consortium of European Social Science Data Archives, European Research Infrastructure
EC	European Commission
EOSC	European Open Science Cloud
EOSC-A	European Open Science Cloud Association
EOSC-SB	European Open Science Cloud Steering Board
ERA	European Research Area
FAIR	Findable, Accessible, Interoperable, Reusable
MC	Member country
Open Science	Means an approach to the scientific process based on open cooperative work, tools, and diffusing knowledge
OPEX	Operational Expenditure
Policy	Can be understood here in a wider sense, e.g., also recommendations, regulations, laws can be considered as a policy. At national/regional level should be understood as being applicable to all Research Performing Organisations/Research Funding Organisations at this level.
RI	Research Infrastructure
SRIA	Strategic Research and Innovation Agenda
TGB	Technopolis Group Belgium

1. Executive Summary

The first annual Survey on National Contributions to EOSC was launched in 2021 and conducted among the European Open Science Cloud Steering Board (EOSC-SB) members. The survey questionnaire reflected three monitoring dimensions: 1) policies, 2) financial investments, and 3) practices. This Report provides information on methodology used for the estimation of financial investments and serves as guideline to EOSC Steering Board on estimation of national financial contributions to EOSC in future surveys.

This document contains results of three core activities implemented to obtain perspectives of member countries while estimating their national financial contributions to EOSC: 1) Survey Feedback Questionnaire, 2) In-dept interviews with EOSC-SB members, and 3) Workshop organised for EOSC-SB members, and two final meetings (EOSC Survey Café and EOSC Observatory Country pages workshop) resulting in final discussions and validation of the general and specific recommendations. Both general and specific recommendations are provided in Section 6 of the Report, while specific recommendations are additionally listed below.

1.1. Specific recommendations

1. The formulation; EOSC and Open Science' should be used consistently in future EOSC-SB surveys, as it was not clear that EOSC includes Open Science and that investments in Open Science are EOSC-relevant.
2. Advice that funding existing before and/or independently of EOSC-related activities has proven to be challenging as some countries do not have earmarked EOSC funding. The budget previously allocated for open access publishing and Open Science should be considered relevant in this category as well.
3. It would be beneficial to include both OPEX (operating expenses) and CAPEX (capital expenditures) in the estimation of EOSC-related investments. Both OPEX and CAPEX are important components of investment in EOSC-related projects and initiatives, and including both types of expenses in the estimation can provide a more accurate and comprehensive picture of the level and nature of investments.
4. When calculating the financial investments for research infrastructures, the arbitrary percentage of 2% of total investments defined with the first 'Recommendations on How to Calculate National Financial Contributions to the EOSC'[1] should be applied. The calculation should include investments in ESFRI Landmarks, international and national RIs, and other RIs if they contribute significantly to EOSC and Open Science.
5. Qualitative descriptions of the financial contributions related to the questions within 2022 EOSC-SB Survey, should be completed and detailed as much as possible describing the methodology used when calculating national contributions to EOSC.

2. Introduction

The European Open Science Cloud Steering Board (EOSC-SB) Survey on National Contributions to EOSC 2021[2], released in December 2021, was one of the tools to support the monitoring of progress on the implementation and uptake of EOSC and Open Science. The survey was published in the EOSC Observatory[3] and conducted among the members of EOSC-SB, i.e., representatives of the EU Member States (MS) and Associated Countries (AC) in the EOSC Tripartite Governance. The survey questionnaire reflected three monitoring dimensions: 1) policies, 2) financial investments, and 3) practices. The focus of this report is on the financial investments dimension, specifically on suggestions for calculating national contribution to EOSC.

[1] Recommendations on How to Calculate National Financial Contributions to the EOSC https://zenodo.org/record/7423953 [Accessed 21 April 2023]
[2] Survey on National Contributions to EOSC https://zenodo.org/record/7423953 [Accessed 21 April 2023]
[3] EOSC Observatory Portal https://eoscobservatory.eosc-portal.eu [Accessed 21 April 2023]

With regards to the financial investments, countries were asked to provide input to the questionnaire on the following topics:

- total amount of national contribution to EOSC in 2020,
- link of financial investments to the policies,
- distribution of investments across EOSC-relevant activities, EOSC-relevant services, and EOSC-relevant infrastructure-related activities.

To facilitate the process of completing the survey responses and mitigate the challenges emerging from budgetary differences among the respondents, EOSC-SB created a support document titled 'Recommendations on How to Calculate National Financial Contributions to the EOSC'[4]. This document was used as a guideline and provided further explanations on the survey terminology and basis for calculation of national financial contributions to EOSC.

After the initial collection of responses, the survey data analysis was conducted as part of the strategic activities of the EOSC Future project and aimed to support the work of EOSC-SB and its Subgroup on 'National Contributions to EOSC'. The analysis of this survey data is presented in the EOSC Future report entitled 'Analysis of Survey on National Contributions to EOSC 2021'.[5]

A common finding that emerged from the survey analysis is the importance to have data that is aligned across the countries, which requires countries to have a shared understanding of terminology and recommendations. This shared understanding ensures that the data being collected are consistent and can be compared across different countries. Another key lesson learned from the survey is that obtaining a 'full picture' of investment granularity is crucial. This means that countries need to have a clear understanding of the different types of investments being made in research infrastructures (RIs), such as capital expenditures (CAPEX) and operational expenses (OPEX).

The survey also highlighted the importance of connections between countries that already have monitoring systems in place and those that are in the process of installing them. One potential model for this connection is the 'twinning model', i.e., institution to institution partnership and peer relationship, which could allow countries to share best practices and learn from each other's experiences.

To further support the survey, it was proven beneficial to provide specific examples of the methodology used for calculating national investments. Two member countries (France and Sweden) presented their detailed formula and investments taken into consideration when estimating the total national financial contribution to EOSC. This could help set the scene for countries that are still in the process of developing their monitoring frameworks.

To further build on these lessons learned, the following actions were initiated:

1. The first action was to develop a feedback questionnaire to gather input from countries (see section 2 of this report).
2. The second action was to conduct interviews with countries to gain further insights into their experiences (see Section 3 of this report).
3. The third action was to discuss and refine the suggestions for calculating national contributions to EOSC in future surveys (see Section 4, Section 5, and Section 6 of this report).

The implementation of listed actions will be detailed in the subsequent sections. Additionally, the final section of the report provides main conclusions and guidelines for countries to calculate national contributions to EOSC in the future annual EOSC-SB surveys on National Contributions to EOSC.

[4] Recommendations on How to Calculate National Financial Contributions to the EOSC https://zenodo.org/record/7423953 [Accessed 21 April 2023]

[5] Analysis of Survey on National Contributions to EOSC 2021 https://zenodo.org/record/7410828 [Accessed 21 April 2023]

3. EOSC-SB Survey Feedback Questionnaire

3.1. Introduction

The survey feedback questionnaire was designed to provide preliminary insights into the challenges that respondents encountered while completing the EOSC-SB Survey on National Contributions to EOSC 2021. The questionnaire contained 9 questions and was completed by 12 EOSC-SB member countries. Questions that were related to financial investments to EOSC were the following:

- When calculating the national financial contributions to the EOSC, what information was immediately available, i.e., easy to provide?
- When calculating the national financial contributions to the EOSC, did you follow the available recommendations?
- Please describe the methodology used for calculating the national financial contribution to EOSC.
- Were there any challenges related to the selected methodology?

3.2. Analysis

This section summarises the responses related to the financial investment questions listed above.

Regarding the question on the information that was immediately available, i.e., easy to provide, 9 out of 12 respondents provided input. For several countries, no information was available (3 out of 9 countries). For other respondents, the available information was related to investments in infrastructures, funding through specific calls, programmes, and project information.

The question related to available recommendations was answered by all participants. The majority of participants (11 out of 12 countries) responded to have followed the provided recommendations (see Figure 3.1)

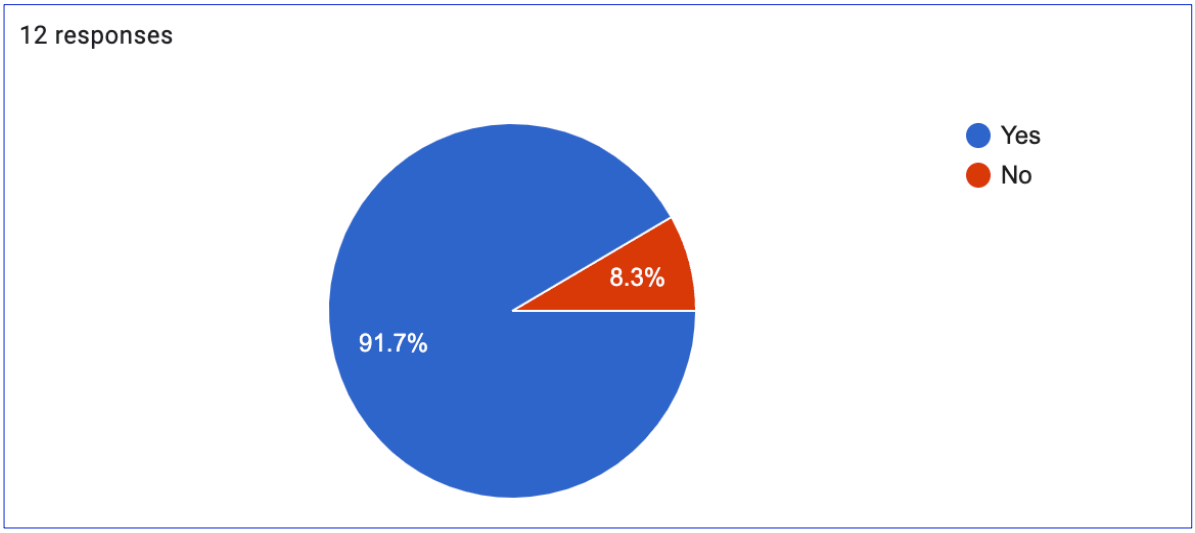

Figure 3.1:Responses on members following the provided recommendations

Additionally, several respondents provided descriptive answers to this question, which can be summarised as follows:

- guidelines need to be adjusted by some countries due to methodological issues,
- distinction between new investments opposed to other contributions was challenging and questionable as some financial contributions that were considered did not happen because of EOSC but may in many cases be the result of work towards digitalisation and advancing open data,
- definition of EOSC-relevant activities is needed and further explanation on the eligibility of some investments that could be included in the calculation, for example, should access activities (publications/journals), investments in supercomputers (indirectly relevant for EOSC-activities),

financial contributions for the EOSC Association, all RPOs & RFOs own investments be included in the total estimation.

All respondents provided answers on the methodology used for calculating the national financial contribution to EOSC. The responses mainly contained detailed descriptions of the calculation methods, some of which will be presented in subsequent sections of this report.

Regarding the question on the challenges related to selected methodology, all respondents provided answers. 9 out of 12 countries reported to have had challenges with the selected methodology, while 3 out of 12 countries have not had challenges with the selected methodology (*see* Figure 3.2).

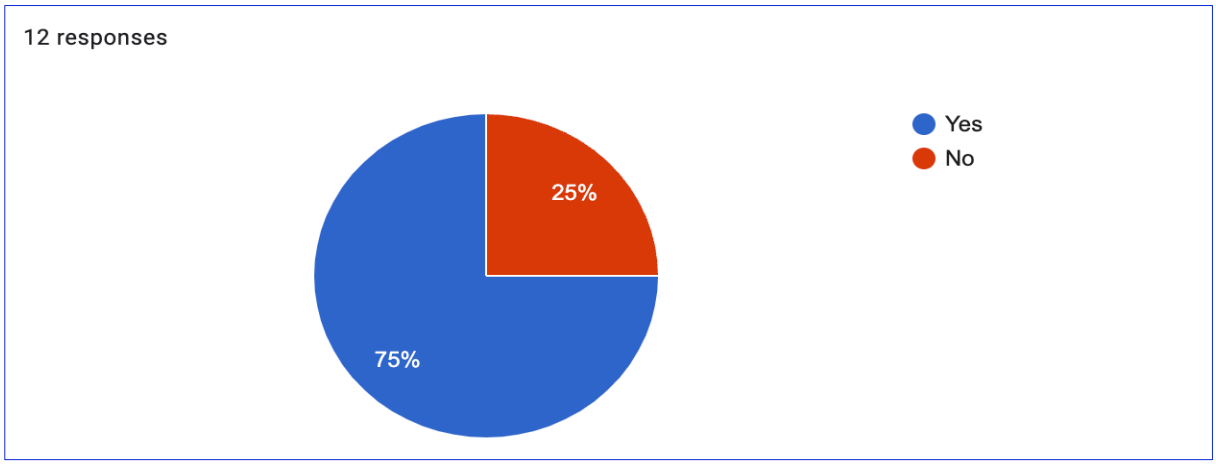

Figure 3.2:Responses on challenges related to selected methodology of national contributions calculation

3.3. Conclusion

The analysis of responses to the survey feedback questionnaire identified challenges that require further discussion and alignment between the EOSC-SB members. Agreement was made to substantiate and clarify the questionnaire responses by organising interviews with representatives of the countries which participated in the questionnaire.

4. EOSC-SB Survey Interviews

4.1. Introduction

In-depth interviews were conducted with 10 national delegates to the EOSC-SB to better understand the different contexts of each country with their respective definitions of financial categories, calculation methods, and policies. The outcome of the interviews should contribute to a guidance for a more stable, yet flexible formula that all countries can apply.

The first part of the interview asked the interviewees to reflect on their initial answers to the EOSC-SB Survey 2021 with respect to the following questions:

- When calculating the national financial contributions to the EOSC, what information was immediately available, i.e., easy to provide?
- When calculating the national financial contributions to the EOSC, did you follow the available recommendations?
- Please describe the methodology used for calculating the national financial contribution to EOSC.
- Were there any challenges related to the selected methodology?

The second part of the interview focused on the interpretation of EOSC-relevant investments and financial contributions by MS/AC with respect to the following questions:

- What do you consider to be an 'EOSC relevant investment'?

- Was there any specific formula for the calculation of the contribution except 2% of the investments in RIs?
- The EOSC Association is also running an annual survey for its members collecting financial contributions to the EOSC Partnership in the 'Additional Activities Plan'. Did you notice any overlaps with this survey when filling in the financial contributions for the EOSC-SB survey? How do you think we could align the two surveys and avoid such overlaps in future surveys?
- Besides the national financial contributions from MS/AC on EOSC/Open Science and the financial contributions from members of the EOSC Association to the EOSC Partnership, there are possibly other financial contributions to EOSC/Open Science (such as in the public and private sector). Are you aware of any such financial contributions to EOSC/Open Science in your country?

A summary of responses related to the second part of the interview are presented in the following section.

4.2. Responses

4.2.1. EOSC-relevant investments

Respondents' calculations on what they considered an investment as an EOSC-relevant investment varied to an extent that the results widened the confidence interval to an undesired level and contained major outliers. For this reason, the more in-depth interviews focused on the following related questions:

- Comments on the previous 'Recommendations on How to Calculate National Financial Contributions to the EOSC',
- What do you consider to be an 'EOSC relevant investment'?

The need for consensus across countries was raised on whether to include or exclude the following investments:

- High-Performance Computing (HPC): costs of hardware, costs of running and maintenance, costs of applications to perform the research work,
- Open access publishing: in terms of agreements with major publishing companies and transformational agreements,
- RI operational costs,
- Inclusion of costs for only ESFRI landmarks and international RIs or also adding national RIs costs.

4.2.2. Calculation of National Contributions

Responses in this section refer to the following questions:

- Was there any specific formula for the calculation of the contribution except 2% of the investments in RIs?
- Besides the national financial contributions from MS/AC on EOSC/Open Science and the financial contributions from members of the EOSC Association to the EOSC Partnership, there are possibly other financial contributions to EOSC/Open Science (such as in the public and private sector). Are you aware of any such financial contributions to EOSC/Open Science in your country?

In many cases, respondents used their own formula to calculate their contributions (with 2% of the investments in RIs excluded). On average these contained:

- Defined percentage of membership fees and annual spending for RIs,
- Defined percentage of HPC,
- Defined percentage of Open Science coordination,
- Defined percentage of government funding,

- Free framework for other related activities,
- Related national funding.

But this cannot be applied in many cases due to the lack of a centralised database or related protocols on acquiring the data needed. In other cases, the formula was so broadly defined that vaguely related data were also included, resulting in unrealistically high figures. Another misunderstanding arose from the interpretation of 'earmarked funding', which was not clear for many respondents. Earmarked funding for EOSC was not reported in any of the cases. Consensus is clearly needed on the definition of earmarked funding for EOSC and a method of assigning costs for EOSC-relevant investments. The need was also raised to include a text box under the calculation in future surveys to collect qualitative data on the used formula and its meaning.

4.2.3. Overlap of the EOSC-SB Survey with EOSC Association (EOSC–A) Survey

While some interviewees raised the need for merging the two surveys, some did not recognise the parallels and there was also a comment that the two surveys have different target groups and different type of questions. While the EOSC-SB survey has a policy focus, the EOSC-A survey is impact driven. The distribution of membership is also different and therefore the two surveys have the potential to complement one another. Caution is needed in defining financial investments as the surveys contain potentially similar financial indicators but from different groups of stakeholders. The separation of national/regional level and organisation-level indicators would be necessary to define and distinguish between the surveys.

4.2.4. Other financial contributions

Regarding other financial investments not taken into consideration in the EOSC-SB survey questions, such as private funding and contributions to other Open Science initiatives from the private sector, there was a consensus that it is hard to obtain a data set that is comparable between different countries. Some inputs from the private sector can be asked and other links can be partially mapped (like GAIA-X) but those are in the initial stage and their relevance to EOSC has limitations. The integrity of reported data cannot be ensured.

4.3. Conclusion

Conducting the interviews, it was possible to summarise the main limitations for making the financial estimates. These were identified as follows:

- There is no directed or earmarked funding towards Open Science or EOSC at the central level and reporting requirements for the used funds are not sufficiently detailed to allow a reliable estimate of the EOSC-relevant proportions of the funding above.
- These amounts do not distinguish between operational costs (OPEX) and capital investments (CAPEX).
- The funding is considered relevant for EOSC but does not give a complete picture of the funding that may be relevant through other public funding streams for research.
- Some countries did not include the contributions that would have existed independently of EOSC even when these contributions were EOSC relevant.
- In cases of less advanced monitoring systems, the difficulty was the thorough collection of data.

Based on the input received during the interviews, the following conclusions were made on the needs:

- Consensus is needed on what should be considered an EOSC-relevant investment.
- Consensus is needed on what should be considered earmarked funds for EOSC.
- Consensus is needed on whether or not and to what extend to include:
  - HPC - costs of hardware, costs of running and maintenance, and cost of applications to do the research work,
  - Open Access publishing - in terms of agreements with major publishing companies and transformative agreements,
  - Operational costs (OPEX)

  - Costs of ESFRI Landmarks, international RIs, and national level RIs costs.
- Consensus is needed on a method of assigning costs for EOSC-relevant investments.
  - To what extent is the cost included / with which percentage and why?
  - Is it an estimate of what a country is investing at the moment, or what was invested last year; consideration also on what "annual" means (in terms of budgets)?
  - A stable formula is needed with specific guidelines on what to include.

Additionally, some direct suggestions to improve the guidelines were as follows:

- Use the formulation; EOSC and Open Science' and use it both consistently across guidelines and the survey (as it was not clear that EOSC implies Open Science and investment in Open Science is EOSC-relevant).
- Remove the following from the guidelines: advice that funding existing before and/or independently of EOSC related activities should not be included. It has shown to be problematic as some countries do not have earmarked EOSC funding. The budget previously allocated for open access publishing and Open Science should be considered relevant in this category.

The above mentioned items were taken forward for further discussion in subsequent workshops with the EOSC-SB members. A summary of these discussions follows in the next section.

5. EOSC-SB Workshop in October 2022

Based on the conclusions and open questions arising from interviews with EOSC-SB members, a dedicated workshop was organised with the EOSC-SB as a next step to obtain clear recommendations to support the Survey on National Contributions to EOSC 2022.

5.1. Introduction

An EOSC-SB and EOSC Future workshop on monitoring national contributions to EOSC was held on 07 October 2022. The overarching objective of the workshop was to validate the indicators for policies and practices in the EOSC-SB monitoring framework and discuss how to calculate national financial contributions to EOSC.

The workshop was focused on achieving three primary goals. The first goal was to collect concrete suggestions for the improvement of the EOSC-SB monitoring framework for the upcoming EOSC-SB Survey 2022. The second goal was to have a comprehensive and shared overview of the methodological approach for calculating financial contributions at a national level. Finally, the third goal was to gather specific suggestions for improving the methodological approach for calculating financial contributions.

During the workshop, concrete examples of how to calculate contributions were given by two EOSC-SB members i.e., representatives of France and Sweden. By showcasing two different approaches, the countries were encouraged to adopt methods that suit their own unique contexts, while also ensuring comparability across different national monitoring systems. The interactive nature of the presentations allowed for questions and feedback from participants and laid the foundation for the ensuing discussion.

5.2. Discussion

To foster further engagement and active participation, the workshop organised a discussion in break-out groups. During the break-out groups, participants engaged in lively discussions on questions related to the survey methodology and terminology. Specifically, the following questions, extracted as the most problematic items that need consensus on:

Terminology:

- What do you consider as an EOSC-relevant investment?
- What are earmarked funds in the context of this survey?

Methodology:

- What should be taken into consideration when calculating the contribution: investments (CAPEX) or operational costs (OPEX) or both?
- Which type of RIs should be included in the calculation (e.g., national, international, or ESFRIs)?
- What are the benefits of the two national models (from France and Sweden) presented as examples? How could these models be applied to other countries?

5.3. Conclusions and take-aways

Main approaches and take-ways of the decisions are explained in the following paragraphs.

5.3.1. EOSC-relevant investments

The following points were identified as relevant for calculation of EOSC-relevant investments:

- **Investment to research infrastructures and especially investments in data management -** The open question being how to include and calculate the costs of HPC and cloud computing or specifically:
  - Should the costs of hardware be included, and if so, to what extent?
  - Should the costs of personnel working on the maintenance of the infrastructure be included, and if so, how?
  - How should the costs of using external HPC and cloud services be calculated and included?
- **Investments related to Open Science**
  - investments in promoting the federation, integration, collaboration of scientific communities with the outcome towards Open Science and data, with possible considerations for: data sharing, sharing infrastructure to enable researchers to share their research data openly,
  - Open access publishing - investments in open access publishing infrastructure and platforms to enable researchers to publish their research outputs openly and make them accessible, investments in the development of open education resources, or investments in collaboration tools, virtual research environments and online collaboration platforms.
- **Not to limit to only 'new' investments** - It is important to decide how to treat investments relevant for EOSC but for which funding has existed or they have existed prior to and regardless of EOSC. This should be regulated by a specific formula. The requirement of 'newness' in this respect is problematic and will not yield the accurate estimation.
- **Investments Directly relevant for creation, population of EOSC and relevant EOSC ecosystem** – considering that EOSC ecosystem is a wider frame and includes more funding than the share for the coordinating part or creating EOSC core.
- Investment **linked to EOSC aims** - prerequisite for which should be defining areas that are "in" or "out" of the EOSC context, avoiding the risk of double-counting.
- EOSC-relevant investment **should be mirrored in the questions for policies in place.**

5.3.2. EOSC Earmarked Funds

The following comments were provided on the question of earmarked funds:

- Earmarked funds should refer to **investments in Open Science and data, promotion of collaboration among scientific communities, upgrading infrastructure to EOSC, investments in interoperability frameworks, and national platforms for Open Science.**
- Some funding sources are strictly determined for Open Science, FAIR data, or EOSC, while other determination of other sources may be more moderate, such as the promotion of Open Science funded by national science funds.
- Open Science should be seen as a broad concept that includes EOSC, FAIR data, and open access.

- It should **not always be necessary for EOSC to be explicitly mentioned in funding descriptions.**
- The distinction between earmarked and non-earmarked funds may not be useful in surveys that include EOSC and Open Science.
- Questions about EOSC-relevant investments should be included in the survey regardless of whether specific funding streams exist, as it can be difficult to determine which investments are aimed specifically at Open Science.

5.3.3. Capital investments (CAPEX) and/or Operational costs (OPEX)

EOSC-SB members agreed that is important to **include both OPEX and CAPEX investments with a clear division and indication between them.** Open Science funds for upgrading and development investments should hereby be distinguished to better understand forward-looking investments. The following priorities were identified for CAPEX and OPEX investments:

- CAPEX investments that acquire physical or digital infrastructure to support EOSC, such as high-speed networks, cloud computing platforms, and data centres, are relevant to EOSC.
- OPEX investments that maintain and support the infrastructure and services necessary to keep EOSC running smoothly, such as personnel, training, and infrastructure maintenance, are also relevant to EOSC.

5.3.4. Research Infrastructures

Coming to the question about the type of infrastructures to be included in the calculation of contributions, and whether national, international, and ESFRI Landmarks and Projects should be included, the opinion turned out to be unanimous. All participants agreed on the inclusion of different types of infrastructures, and that the suggested list should not be exhaustive, and not limited to ESFRI/EIRO Forum infrastructures, national or international, or other:

Some important comments to guide the calculation logic are:

- Different percentages of funding should be considered depending on the type of the RI,
- A distinction should be made between contribution/membership fees and other/additional costs,
- A distinction should be made between distributed and single-site RIs, where the member states are partially funding the operations in the national service providers or the headquarters the RI is situated in the member state.

5.3.5. French and Swedish Calculation Models

The final discussion that took place was related to the two national examples presented before the break-out sessions and resulted in several key conclusions:

- One disadvantage is that conservative estimations may not include all relevant investments, so some definition is needed.
- Qualitative definitions should be used to describe what is relevant, while quantitative definitions should be specific and comparable across countries.
- A case-by-case approach is needed, considering different national funding streams and systems.
- It's important **not to overly define**, and to provide multiple examples of models that countries can choose from based on their situation, in the **form of an annex to the guidelines**. More examples would be helpful and are needed.

In conclusion, the EOSC-SB workshop on monitoring proved to be an invaluable platform for engaging in further discussions regarding the survey process. The outcomes derived from the workshop will serve as a significant milestone in the task of creating a new guidance document for future EOSC-SB surveys.

6. Recommendations

Following the discussions held at the Workshop and publication of the EOSC Steering Board Survey on National Contribution to EOSC 2022, EOSC-SB Survey Café was organised in January 2023. Participants were presented

with the content of the 2022 Survey and with changes that were implemented with regards to the 2021 Survey. The event provided a platform for discussion, clarification, and alignment on requirements for the successful completion of the Survey questionnaire. One of the topics related to the calculation of financial investments to EOSC and served as a follow-up discussion on the conclusions brought by the EOSC-SB Workshop held in October 2022:

- Definition of EOSC - relevant investment
- Inclusion of OPEX and CAPEX
- Calculation of investment

A discussion continued at the session titled 'Calculating EOSC Contributions Report' that was a part of the EOSC Future, EOSC Observatory Country pages workshop held in February 2023. These events hosted final discussions and validations of the topics derived from previous activities and resulted with the final set of recommendations proposed for future surveys.

The following recommendations may prove useful for EOSC-SB-SB in their work on continuous enhancement of the monitoring tools and definition of financial contributions to EOSC. Recommendations are divided into two groups: general recommendations which relate to long-term challenges and specific recommendations to update the 'Recommendations on How to Calculate National Financial Contributions to the EOSC' document and used as a guideline for filling in the Survey on National Contributions to EOSC 2022.

6.1. General Recommendations

1. Challenges to fully grasp the scope of an EOSC-relevant financial investment remain, especially regarding a clear distinction between EOSC and other areas of Open Science, as there may be significant overlap and interdependence between different Open Science initiatives and projects. Therefore, it may be necessary to use a more nuanced approach that takes into account the specific goals and objectives of different Open Science initiatives and the extent to which they are related to EOSC.

   The suggested approach to potentially tackle the challenge could include the following:

   - Define the actors that are considered as key stakeholders in the framework of EOSC and find a way to monetize their potentially relevant investments.
   - Classify funding by relevance to EOSC according to its alignment with the goals and objectives of EOSC as well as its specific application to EOSC-related activities and projects.
   - Continue assessing the quality and reliability of data that is available for each funding source.
   - Put an emphasis on an analysis of funding sources in future EOSC-SB surveys.

2. Harmonization and standardization of data input requires further discussions, case-to-case basis assessments, definition of the narrower frame of eligible costs, and public disclosure of the financial investment methodology calculations from a higher number of EOSC-SB members.

3. Development of the methodology would benefit from enhanced engaged participation of member countries in the activities implemented within the framework of EOSC-SB work plan.

6.2. Specific Recommendations

1. The formulation; **EOSC and Open Science'** should be used consistently in future EOSC-SB surveys, as it was not clear that EOSC includes Open Science and investments in Open Science are EOSC-relevant.

2. Advice that funding existing before and/or independently of EOSC-related activities has proven to be challenging as some countries do not have earmarked EOSC funding. The budget previously allocated for open access publishing and Open Science should be considered relevant in this category as well.

3. It would be beneficial to include both OPEX (operating expenses) and CAPEX (capital expenditures) in the estimation of EOSC-related investments. Both OPEX and CAPEX are important components of investment in EOSC-related projects and initiatives, and including both types of expenses in the

estimation can provide a more accurate and comprehensive picture of the level and nature of investments.

4. When calculating the financial investments for research infrastructures, the arbitrary percentage of 2% of total investments defined with the first 'Recommendations on How to Calculate National Financial Contributions to the EOSC'[6] should be applied. The calculation should include investments in ESFRI Landmarks, international and national RIs, and other RIs if they contribute significantly to EOSC and Open Science.

5. Qualitative descriptions of the financial contributions related to the questions within 2022 EOSC-SB Survey, should be completed detailed as possible describing the methodology used when calculating national contributions to EOSC.

[6] Recommendations on How to Calculate National Financial Contributions to the EOSC https://zenodo.org/record/7423953 [Accessed 21 April 2023]

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