



EOOSC-hub

D12.3 Business models and procurement: evaluation and recommendations

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Deliverable Abstract

This document identifies and evaluates a set of business models for procuring services in EOOSC and maps them to the EOOSC ecosystem. It identifies open issues requiring more analysis, along with related opportunities and risks. A roadmap for activities beyond the life of the project is presented, including recommendations for key stakeholders.

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TERMINOLOGY

<https://wiki.eosc-hub.eu/display/EOSC/EOSC-hub+Glossary>

Terminology/Acronym	Definition
AC	Associated Countries (with EU Framework Programmes)
B2B	Business to Business
B2C	Business to Consumer
BM	Business Model
BM1-8	Business Models 1-8 (defined in this document)
CA	Contracting Authority
CAPEX	Capital expenditure
CPB	Central Purchasing Body
DA	Demand Aggregation
DPS	Dynamic Purchasing System
EC	European Commission
EU	European Union
EOSC	European Open Science Cloud
ERIC	European Research Infrastructure Consortium (legal body)
ERDF	European Regional Development Fund
ESRF	European Synchrotron Radiation Facility (RI)
FA	Framework Agreement
FAIR	Findable, Accessible, Interoperable and Reusable
GDPR	General Data Protection Regulation
GPU	Graphical Processing Unit
HEU	Horizon Europe (Framework Programme)
IaaS	Infrastructure as a Service
IGO	Intergovernmental Organisation
IT	Information Technology
KPI	Key Performance Indicator
MoU	Memorandum of Understanding
MS	EU Member States
NREN	National Research and Education Network
PaaS	Platform as a Service
PCP	Pre-Commercial Procurement
PDT	Platform Design Toolkit
PIN	Prior Information Notice (for tenders)
PPI	Public Procurement for Innovation
R&E	Research and Education
RI	Research Infrastructure
RPO	Research Performing Organisation
RRF	Recovery and Resilience Facility
SaaS	Software as a Service
SLA	Service Level Agreement
SME	Small and Medium Enterprise
SP	Service Provider
TNA	Trans-National Access
VA	Virtual Access
VAT	Value Added Tax

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Executive summary

Deliverable D12.3 entitled “Business models and procurement: evaluation and recommendations” is the third and last deliverable of EOSC-hub WP12 on “Business Models and Procurement” and is the outcome of Task T12.3, “Evaluation and Recommendations”. It follows up the previous work of D12.1 on “Procurement Requirements and Demand Assessment” and D12.2 on “Report on business model analysis for procuring services in the EOSC” and provides a final evaluation of the business models for procuring services in the EOSC context. The approach is based on presenting the foreseen approach for the next years identifying a set of relevant business models and broader business patterns, along with related opportunities and risks. A roadmap for activities beyond the life of the project is also introduced, including recommendations for key stakeholders. Close cooperation with WP2 on “Strategy and Business Development” has been established, mainly on its related Task T2.3 on “Governance and Sustainability” and its corresponding roadmap deliverable D2.5 “Final Governance and Sustainability Implementation Roadmap”¹.

The document summarises the way forward in terms of procurement of services in the EOSC context. It is foreseen that after the end of the EOSC-Future project in 2023, the EOSC Core and parts of EOSC Exchange will migrate from the current grants-based approach to a public procurement organised by the EC, as this is already featuring in the draft Horizon Europe Research Infrastructures Work Programme 2021-2022. The draft EC WP 2021-2022 has already been discussed with the EU Member States as part of the so-called “Shadow Programme Committee” for Research Infrastructures. It is expected that the WP will be finalised in April 2021 and become public in May 2021. To ensure continuous service delivery of the key EOSC services, the public procurement process will have to start already in 2022 (estimated timeframe is 3rd quarter 2022). This change aims at the operationalisation and professionalisation of EOSC Core and access to EOSC Exchange, based on a cost-effective, transparent, and stricter public procurement framework for contractors (suppliers). It will also open up to industry, catalysing a European market, aligning with commodity services, promoting innovation, and contributing towards longer term sustainability for its users. This is also in-line with the overall approach of the EOSC Partnership, where commitments from both the EC and Member States have been made for the whole 7-year period of Horizon Europe and the draft Partnership MoU duration is 10 years (until 31/12/2030).

Despite the potential benefits of public procurement, there are also related risks in moving away from grants. A first substantial risk is that publicly funded research service providers, in several cases being non-for-profit entities, may find hurdles on their way to participate in tenders. This is due to the limitations in their statutes, e.g., to provide services against payments, issue invoices, bid bonds and letters of guarantee, and accept financial risks and penalty clauses, while they may have limitations (e.g., percentages) in offering part of their resources across borders or in the amount of revenue generated from paid services. Other risks are related to the more complex, time consuming and less flexible nature of the procurement process, compared to grants - especially if the services being procured are not fully matured. Furthermore, public research providers have made significant investments in serving the research communities in the last two decades and have developed

¹ [EGI-doc-3634-v2: EOSC-hub D2.5 Final Governance and Sustainability implementation roadmap](#)

significant knowledge in supporting the research communities. In case several of these are not able to participate in tenders, there is a risk that this knowledge may be lost.

Although the current foreseen approach is that EOSC Core and parts of EOSC Exchange will migrate to public procurement to be run by the EC, a contingency fall-back plan could be made available if needed. The fallback plan would be to use normal grants or a special type of grant (e.g., Framework Partnership Agreement or an operational grant). It should be noted that changing from a grant to a tender in the EC Work Programme is not possible, while the other way round, i.e., changing from a tender to a grant would be still possible. This will be required if there is lack of interest following the tender market consultation or prior information notice or strong disagreement by the Member States.

Complementary to public procurement directions and paths in the short-to-medium term are foreseen, with different business models and money flows, encompassing grants, further procurement, and in-kind contributions. Overall, it is foreseen that different parts of EOSC will be using different business models in the coming years, as already prescribed in the EOSC EB final report. The two types of models identified in the FAIR Lady document by the EOSC Sustainability WG and its relevant studies, i.e., the membership-based learning model with EC co-funding and the platform-based transactional model will need to be combined in a hybrid approach, at least in the initial stages of the EOSC MVE and gradually these two types of models will dynamically change weights over time towards the transactional model.

A set of business models relevant to EOSC has been analysed and evaluated, along with related broader patterns. The Business Models consider previous work in EOSC-hub, both in WP2 (related briefing paper on cross-border service provisioning) and WP12 (previous deliverables), including related use cases. In short, these cover some main types of public procurement (general, framework agreement and demand-aggregation with a Central Purchasing Body), in-kind and/or in-cash contributions (as with major Research Infrastructures and ERICs), public to public cooperation and other models that can reimburse costs within grants (“Virtual Access”). Other relevant efforts have also been analysed, such as the OCRE project tenders, although some of the related challenges, such as VAT, are still being evaluated.

The tender requirements for the public procurement of EOSC Core and parts of EOSC Exchange in 2022 need to be analysed thoroughly and a Business Model needs to be selected that is flexible enough and is able to adapt to evolving requirements. A flexible business model based on a framework agreement (Business Model 2) but also aggregating demand (Business Model 3) appears to be appropriate for this case. A variation of the Framework Agreement where new suppliers can join over the contracted period (called Dynamic Purchasing System) may also be useful in the future, especially for mature or commoditised services. Risk analysis and contingency plans (e.g., falling back from tender to grants) in case of severe challenges faced should be developed. Both the research service providers and industrial suppliers should be prepared for the planned EOSC tenders well in advance, analysing and understanding procedural requirements and potential pitfalls and risks to avoid disqualification and maximise chances of tender success. Public providers that are in many cases non-for-profit entities with several limitations should identify legal, administrative, and financial obstacles, and make an effort to overcome them so that they are able to continue their service offerings to the research community as part of EOSC. Careful thought needs to be given to

the choice of the leading entity that will coordinate joint tender bids. Industrial suppliers interested in the EOSC procurements should also be familiarising with the research community environment, including their needs, and already a significant number of such suppliers has been included in the OCRE services framework agreement (although more straightforward than the EOSC ones). Partnerships or joint bids in the form of consortia composed of both public research bodies and industrial ones can be explored to address the complex requirements of the EOSC tenders, especially for accessing or providing the demanding services of EOSC-Exchange. The new EOSC tripartite governance has a key role in preparing the ground and facilitating the transition from the grants-based approach to the tenders-based approach, also reviewing the roles of its constituents, especially of the EOSC Association.

The EC in close cooperation with the tripartite EOSC governance, key projects such as EOSC-Future and the EOSC research communities should prepare well in advance for the EOSC Core and access to EOSC Exchange procurement and look into maximising flexibility in the tender, so that evolving community requirements can be satisfied. The EOSC-Future project needs to work closely with the EC, the EOSC Association, and the EOSC Steering Board and plan carefully the migration from the grant-based approach to the tender-based procurement towards EOSC operationalisation. An external study with a SWOT analysis contributing towards the exact roles and competences required can be considered in case these are not straightforward or different views or paths may appear viable. In particular, the EOSC Association may be able to complement the EC procurement(s) and provide further flexibility with additional procurement efforts, so that the dynamic requirements of the research community can be better fulfilled over time, especially with regards to the EOSC Exchange and its contents. The horizontal public-to-public cooperation business model (BM7) should be further investigated as it may be applied between EOSC Association and its members, which can provide bespoke services. Awareness raising of the identified Business Models at both EU and national levels needs to be pursued so as to guarantee their appropriate uptake, maximising benefits, and promoting the establishment and upskilling of relevant legal, procurement and financial expert teams at these levels. Better understanding costs of public research providers is becoming urgent.

Mid-to-longer term strategies for EOSC need to be developed by its Governance, in close collaboration with strategic related projects such as EOSC Future, including a roadmap with key milestones for the future. In particular a sustainability strategy for EOSC Core and Exchange, along with a possible exit strategy from the EC funded regime needs to be worked out, provided that EOSC will be fully embraced by the research community in the future. In all cases, a stepwise approach is needed, carefully reviewing the different intermediate steps, before moving to the next. A longer-term strategy for expanding to industry and the public sector may follow later, also considering the further developments up to then.

1 Introduction

This document carries out an **overall evaluation of the EOSC-hub WP12 activities related to purchasing and procurement frameworks and supporting business models** that EOSC will be able to use to acquire digital services from either publicly funded infrastructures or commercial providers. While it is expected that most of the EOSC Core and access to EOSC Exchange services will be acquired using centralised mechanisms, the overall sustainability of EOSC will depend on the ability of the overall ecosystem - Core, Exchange and services made available through them - to adapt to new requirements or opportunities by harnessing the widest range of resource provision options possible. The document summarises the rationale and role of purchasing and procurement frameworks in the EOSC operational phase towards sustainability, considering the analysis of the FAIR lady document² from the EOSC Sustainability WG and the version 1.0 of the EOSC Partnership Strategic Research and Innovation Agenda (SRIA) document³.

According to the current planning, after 2022, EOSC will be using public procurement - rather than grants- to acquire services for the deployment and operation of its core infrastructure. The approach would apply both for the provision of the required resources (computing, data, storage, and related tools) and for access to FAIR data and services. In addition, services made available through the EOSC Exchange marketplace to support research communities can also be procured using purchasing processes outlined in this document.

In general, a continuum of mechanisms exists that encourage the formation, maturing and commoditisation of new/innovative services for the research community. The grant-based funding covers the early stages of this process, from Research and Innovation (RIA) and Innovation Actions (IA). Pre-commercial procurement (PCP) and Public Procurement of Innovation (PPI) can also be considered in the early stages of service development. However, different tender-based approaches eventually contribute to scale up the use of these services (e.g., to fulfil various transparency and competitiveness criteria). Tender-based mechanisms place much higher demands on the maturity of the services and - depending on the specific approach - on the level of standardisation of the service offering. Thus, procurement-based processes play a role in encouraging and speeding up the commoditisation of services.

It is currently envisaged that the procurement of EOSC-Core and parts of EOSC Exchange will be run by the European Commission (EC), in collaboration with the other two members of the tripartite EOSC co-programmed partnership, i.e., the EOSC Association and Steering Board of the Member States to define the key requirements, as well as the EOSC e-Infrastructures (including the EOSC-future project) and EOSC user communities. The EOSC SRIA defines two main tiers set out in the MoU between the EOSC Association and the EC: Tier 1, which is the EC contributions, financial, via its Horizon Europe Work Programmes, and policy, via appropriate mandates and incentives promoting Open Science; and Tier 2, which is the EOSC Association and its members' contributions,

² Solutions for a sustainable EOSC - A FAIR Lady (olim Iron Lady) report from the EOSC Sustainability Working Group <https://op.europa.eu/s/ol6V>

³ EOSC Strategic Research and Innovation Agenda (SRIA) v1.0 [EOSC-SRIA-V1.0_15Feb2021.pdf](#)

financial, in kind and policy ones. Furthermore, the EOSC Association will make best effort to encourage and align financial, in kind and policy contributions from national research stakeholders and other research organisations.

The overall approach is aimed at ensuring continuity, user engagement and alignment with current project outputs and national initiatives. The EC will oversee the fulfilment of the contracted services, while the rest of the partnership partner (EOSC Association and its members) will monitor how the procured resources are actually used, including community uptake, and provide feedback on possible improvements of the overall EOSC operations. A role for the user communities, especially for the services provided in the EOSC-Exchange and the corresponding Rules of Participation, should also be sought. It is likely that the public procurement for EOSC-Core and parts of EOSC Exchange will not cover all the resource needs, and thus the EOSC Association and its member organisations may need to complement the EC procured services with traditional in-kind contributions and services procured through different tendering processes (e.g., national or EU ones). Being able to federate all these services (i.e., procured, and in-house ones) in a common data and service pool for the benefit of the end users requires careful analysis in a dynamic environment.

The use of business models is becoming more and more a common practice also for non-for-profit organisations, in an effort to capture the value that can be delivered to its users, but also due to more scrutiny of the use of public money. Business models are thus also relevant for EOSC, especially in Horizon Europe, where procurement will complement the traditional grants, both of which are appearing in the Work Programme for Research Infrastructures. In the framework of the work for this deliverable, and in order to be able to have standard definitions and compare among the different business models relevant to the EOSC context, appropriate templates were considered essential. Still, the research sector typically works as an ecosystem of interrelated organisations and the value exchange is better modelled by networks than linearly. For this reason, an adapted business model template was developed. Note that the business model for research is not only the corresponding funding model, but the whole process of how value can be achieved describing the necessary elements of this process. Broader patterns for the different business models relevant to EOSC have also been identified classifying the models into areas. An overall assessment of the identified business models along with their relevance to the EOSC next phase that started in 2021 is also provided, based on the filled in detailed templates including mini SW(OT) analyses that are incorporated as annexes.

The deliverable also identifies open issues requiring more analysis and regulatory and policy issues that need to be resolved in order to make large-scale service procurement possible in the EOSC context.

Feedback from the key stakeholders and initiatives has been collected via interviews and a webinar, and a roadmap for future activities with recommendations for policy makers, buyers and service providers is proposed. The ultimate goal is that the output will be exploited in future activities moving forward to implementing EOSC.

1.1 Key definitions

Business model	<i>A business model describes the rationale of how an organisation creates, delivers, and captures value⁴</i>
<p>Although business modelling was initially applied to for-profit organisations, it is now widely understood that it can also be meaningfully applied to the non-profit sector⁵. At the end, any organisation needs to be clear on how they create, deliver, and capture value and remain financially sustainable. On top of this, it should be recognised that the research sector typically works as an ecosystem of interrelated organisations. The value exchange is better modelled by networks more than linearly. The most common tool for business modelling is the business model canvas⁶. There are adaptations of this tool also for the non-profit sector (see example⁷) or evolutions that combine this tool with other tools to model platform ecosystems (e.g., Platform Design Toolkit (PDT)⁸).</p>	
Pattern	<i>In architecture, pattern is the idea of capturing architectural design ideas as archetypal and reusable descriptions (C. Alexanders)</i>
<p>In the context of business modelling, we use the term pattern to refer to an architectural component or common principle that can be used to generate new business models. Identifying those patterns relevant for the EOSC and research domains can facilitate the reasoning and brainstorming on better business models. This idea is inspired by the work of the PDT.</p>	
Public body	<i>For the purpose of this document, a public body is a “body governed by public law” within the meaning of Article 2(1)(4) of Directive 2014/24/EU⁹, which refers to bodies with the following characteristics:</i>
<ul style="list-style-type: none"> • They are established for the specific purpose of meeting needs in the general interest, not having an industrial or commercial character. • They have legal personality; and • They are financed, for the most part, by the State, regional or local authorities, or by other bodies governed by public law; or are subject to management supervision by those authorities or bodies; or have an administrative, managerial, or supervisory board, more than half of whose members are appointed by the State, regional or local authorities, or by other bodies governed by public law. <p>In the majority of the cases (but not all), research organisations around Europe fulfil the above characteristics and thus are considered public bodies.</p>	
Contracting authorities	<i>According to the 2014/24/EU contracting authorities are the state, regional or local authorities, bodies governed by public law or associations formed by one or more such authorities or one or more such bodies governed by public law.</i>

⁴ Alex Osterwalder, Business model generation, <https://www.slideshare.net/endrigo21/business-model-generation-alex-osterwalder>

⁵ <https://frankounl.wordpress.com/2014/05/02/the-business-model-of-not-for-profit-organizations/>

⁶ [Business Model Canvas - Wikipedia](https://en.wikipedia.org/wiki/Business_Model_Canvas)

⁷ <https://frankounl.wordpress.com/2014/05/02/the-business-model-of-not-for-profit-organizations/>

⁸ <https://platformdesigntoolkit.com/>

⁹ <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32014L0024&from=EN#d1e3111-65-1>

The term “Contracting Authority” is used in the 2014/24/EU directive as the public body issuing the tender and is expected to offer a contract to one or more suppliers.	
Private body	<i>A private-sector body which is not a “contracting authority” and usually operates for profit.</i>
Transaction type	<i>By transaction, we refer to an agreement to supply products/services.</i>
<p>In the context of this work, it is relevant to distinguish the nature of each party (provider/customer organisations) as this affects the applicable law.</p> <ul style="list-style-type: none"> • Private to public: a private organisation sells services to a public organisation (e.g., a commercial cloud provider sells services to the research community). • Public to public: A public organisation offers/sells services to another public organisation. • Public to private: A public organisation offers/sells services to a private organisation (e.g., via Virtual Access, an SME may have access to the resources of a public organisation for which the public organisation will be reimbursed). 	
EOSC-Core	<i>From EOSC SRIA v1.0: EOSC Core (or EOSC federating core). The basic architecture, standards and services that form the technical backbone of EOSC and are necessary to operate a Web of FAIR Data and Services.</i>
<p>The EOSC-Core assembles all the basic elements to operate and provide the means to discover, share, access and reuse data and services in a reliable manner. These elements address key technical, cultural and policy decisions of EOSC and they must be maintained over the long term. Specifically:</p> <ul style="list-style-type: none"> • A mechanism for naming and locating documents, data, software, and services. • A mechanism for discovery of and access to documents, data, software, and services. • A common framework for managing user identity and access. 	
EOSC-Exchange	<i>From EOSC SRIA v1.0: The value-added services that will build upon the EOSC-Core and offer its users additional functionality to perform Open Science and share and exploit FAIR (and open) data.</i>
<p>The EOSC-Exchange builds on the EOSC-Core to ensure that a rich set of services (<i>common and thematic</i>), exploiting FAIR data and encouraging its reuse, are available to publicly funded researchers. It is expected that rivalrous services, such as those that store, preserve or transport research data as well as those that compute against it, will be made available via the EOSC-Exchange.</p> <p>Service providers that participate in the EOSC-Exchange will be required to conform to predefined Rules of Participation.</p>	

1.2 Methodology

The methodology for the final evaluation of the business models for procuring services in EOSC with the identifications of outstanding barriers and opportunities, along with a series of recommendations beyond the life of the project was based on 3 main horizontal tracks and 5 vertical blocks or steps.

In more detail, the horizontal tracks can be decomposed into the following:

1. Track 1- Reviewing the work of relevant projects and especially the work done in the relevant EOSC-Hub deliverables and the OCRE work, coming up with some key outcomes and lessons learnt.
2. Track 2 - Review the work of relevant EOSC bodies such as the EOSC Executive Board (EB) and its Working Groups (WGs), along with the related EC plans discussed with the EOSC Governance bodies. This includes the SRIA v1.0, along with the EOSC Sustainability WG and its main outputs, ultimately the FAIR lady document, along with the study on business models and operational costs¹⁰
3. Track 3: Review related business models for non-profits and in particular related patterns and suitable business models for EOSC.

Furthermore, the 5 related sequential steps (vertical blocks) included:

1. Step 1 - The state-of-the-art review with all relevant material, namely the 3 horizontal tracks.
2. Step 2 - The identification of key directions and definitions, including the planned approaches for public procurement by the EC post 2020, lessons learnt from key projects and a list of patterns, business models and corresponding templates, relevant to the EOSC community.
3. Step 3 - The analysis of business models and patterns, along with a corresponding evaluation.
4. Step 4 - The proposed approach(es), taking into consideration the main decision on public procurement for EOSC Core and parts of EOSC Exchange to be run by the EC post 2020.
5. Step 5 - The consultation with the community and key stakeholders, including interviews, a webinar and on-line feedback.
6. Step 6 - The consolidation of the above into a final document.

¹⁰ [The Vivus Study | Zenodo](#)

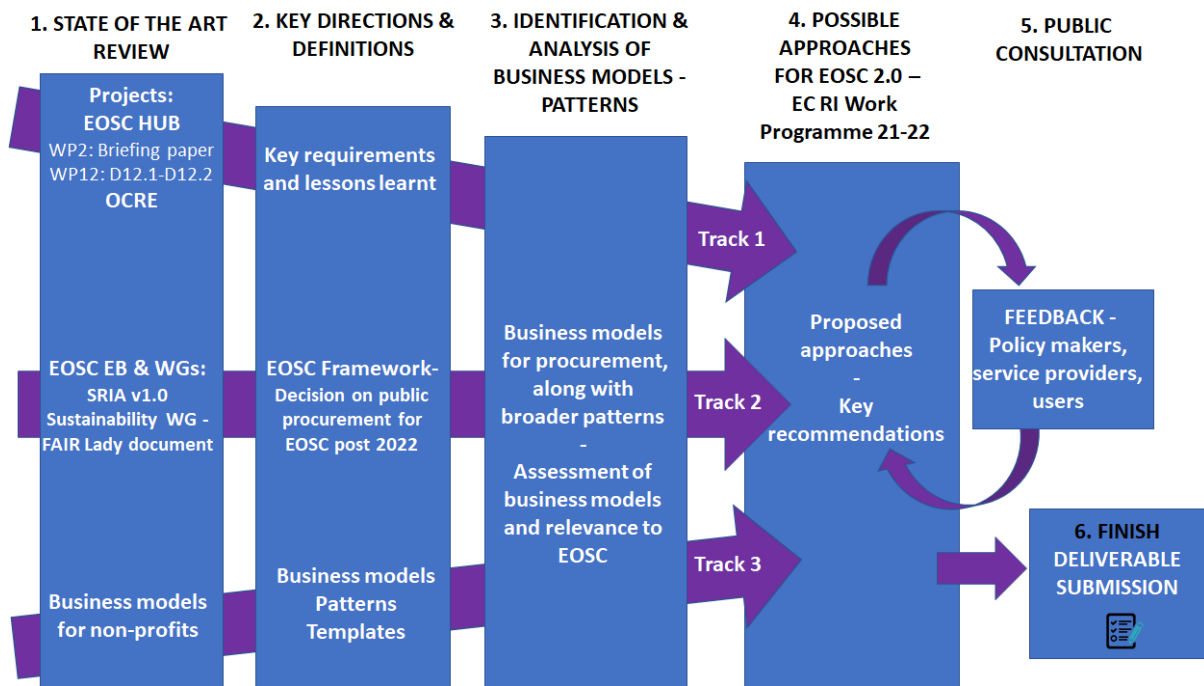


Figure 1.1 – D12.3 Methodology

Combining the horizontal tracks with the vertical blocks or steps, provides an integrated view as follows:

1. State of the art review
 - a. EOSC-Hub
 - i. WP12 previous work (D12.1-D12.2)
 - ii. WP2: Alignment with EOSC briefing paper.
 - b. EOSC WGs-Sustainability WG-FAIR lady
 - i. BoundaryLess work on business models
 - c. Business models for non-for-profit/research
 - d. Projects working/worked on Procurement (OCRE, Helix Nebula, etc.)
2. Agreement on key definitions (business models, patterns) and development of appropriate business model templates for research
3. Identification and analysis of procurement/acquisition business models and related broader patterns, along with their evaluation
4. Draft evaluation of business models and proposed approach for EOSC 2.0 - Formulation of draft recommendations for key stakeholders
5. Feedback - internal (via EOSC-hub) and external (interviews, webinar)
6. Integration of feedback - Finalisation of the deliverable

1.3 Background and related activities

1.3.1 EOSC-hub previous work

D12.3 recaps the previous work from D12.1 on “Procurement requirements and demand assessment” and D12.2 on “Report on business model analysis for procuring services in the EOSC”.

D12.1 analysed the demand of digital services for research from the different research stakeholders, how these demands are currently fulfilled, and the challenges currently faced. In essence it has acted as a requirement capture phase and analysis of practices for the definition of future business models in the EOSC context. D12.2 took up further some of the demand scenarios and analysed relevant case studies, which can be used in EOSC. D12.3 thus builds on top of the previous work of D12.1 and D12.2 and also given the work by the relevant EOSC Workings Groups and main decisions around procurement by the EOSC Governance and the EC, it goes one step further, analysing the future directions and proposing a set of business models for the operational phase of EOSC after 2020 (EOSC 2.0). Furthermore, related recommendations are provided for the different EOSC stakeholders, considering all the previous work done by EOSC and its WGs, EOSC-Hub and relevant projects such as OCRE.

Regarding the WP12 relation to WP2 which deals with the broader “Strategy and Business Development”, WP12 is expected to feed its business models and recommendations into the WP2 work. WP2 and in particular T2.3 which focuses on “Governance and Sustainability” will translate the viable funding and business models into governance and sustainability perspective, investigating constraints and opportunities. Possibly the outputs of both WP2 and WP12 can be further translated into an overall funding model and ultimately a business plan for EOSC, prepared by the EOSC Association in the near future. As WP2 deliverables were not public, a briefing paper has already been released in cooperation with WP12.¹¹ To resolve this issue, the final WP2 deliverable - D2.5 “Final Governance and Sustainability implementation roadmap” has been made public.

1.3.2 OCRE Lessons Learnt

The Open Clouds for Research Environment project (OCRE)¹² has been working on establishing procurement vehicles to provide to the EU research community access to a portfolio of commercial cloud infrastructure services and earth observation platform services. The first set of services (cloud services) that is more relevant to this deliverable can be considered as closer to commodity services, while the latter (earth observation platform services) is considered a more niche or bespoke market. Still, there may be lessons learnt from the latter, as EOSC will also require such niche-type services. An important goal of OCRE is to understand and develop methods that can be used in EOSC for providing commercial cloud services to researchers that are funded by third parties, such as for example the EC.

Following on previous experience, the OCRE tenders have been based on GÉANT and its interconnected NRENs, which in turn are connecting the vast majority of universities and research centres in their countries, reaching around 10.000 organisations Europe-wide. Exploiting this “network” and corresponding relationships, it was deemed appropriate to use framework agreements and demand aggregation to allow for flexibility and improve the terms and conditions, including prices, especially from big players. In this centralised procurement way, suppliers got

¹¹ EOSC-hub Briefing Paper - Provision of Cross-Border Services https://www.eosc-hub.eu/sites/default/files/EOSC-hub%20Briefing%20Paper%20-%20Provision%20of%20Cross-Border%20Services%20-%20final_0.pdf

¹² [OCRE | Open Clouds for Research Environments \(ocre-project.eu\)](https://ocre-project.eu)

much more interested, while the tender complied with the EU procurement directives, which was important for the national stakeholders.

The Cloud tender was initiated with a Prior Information Notice (PIN) in 2019, managing expectations and collecting expressions of interest and feedback from the different suppliers, and was finally published in 2020. The objective was to have IaaS+ cloud platforms in all 40 EU Member States (MS) and Associated Countries (AC) where NREs are established. The result was around 1200 bids. After a proper evaluation, a total of 473 framework contracts were awarded and in total 27 cloud platforms are available. Frameworks are connected both to a supplier and a country, e.g., 14 frameworks are available in the Netherlands, one for each awarded supplier. Currently the vast majority of framework agreements are signed and active. The list of suppliers is available on-line in the OCRE website¹³. The next step is that the tender for the Earth Observation services is launched.

With the current progress, already several challenges have been faced:

- The applicable procurement law.
 - The EU directives have to be enacted into national law. This process allows countries to prioritize or highlight certain aspects if that is (politically and/or economically) desired. With regards to the EU public procurement directive¹⁴ Member States are free to make such alterations as long those deviations are not in contradiction to the directive or any other applicable EU regulation.
 - Given that GÉANT acts as the Central Purchasing Body (CPB) in OCRE and is a Dutch association, GÉANT needs to operate under Dutch public procurement law, implementing the EU public procurement directive. Whilst the Dutch implementation closely follows the original EU directive there are some differences. For example, Dutch procurement law puts more emphasis on proportionality and is stimulating access to government assignments for small and medium sized businesses. This is done by restricting contracting authorities from using aggregate consignments unnecessarily¹⁵. Following the EU directive, and therefore the Dutch procurement law, all orders (call-offs) executed under frameworks agreements awarded by a CPB are governed by the same legislation the CPB is operating under (Dutch). For OCRE this means for example that Dutch procurement law is applicable if a call-off is done by a Spanish institute, regardless in which country the supplier is located. Vice versa, OCRE is aware that some established procurement methods frequently used in the Netherlands are explicitly forbidden or not mentioned in the implementation of the EC directive in other national procurement legislation.

At the moment of the writing (March 2021), this is not a problem, and no issues are identified. For OCRE users, information packages are available and relevant aspects of Dutch procurement law are highlighted to make sure the OCRE framework agreements can be used throughout the 40 countries where they have been made available. It cannot be ruled out however that at a certain moment in time discussions or legal cases

¹³ [Cloud Suppliers | OCRE \(ocre-project.eu\)](https://ocre-project.eu/cloud-suppliers)

¹⁴ Directive 2014/24/EU [EUR-Lex - 32014L0024 - EN - EUR-Lex \(europa.eu\)](https://eur-lex.europa.eu/lexuri-uri.do?uri=CELEX:32014L0024-EN)

¹⁵ [Mag ik opdrachten samenvoegen? | PIANOo - Expertisecentrum Aanbesteden](https://www.piano.nl/nl/over-piano/onderwerpen/mag-ik-opdrachten-samenvoegen) (Dutch only)

can be started on contradictory public procurement legislation. Availability of *an overview of relevant differences in local implementations of the EC directive on public procurement will benefit OCRE and EOSC in the future.*

- The applicable laws in such a multi-country environment.
 - Another aspect is the governing law of the agreements awarded by the CPB. Although GÉANT is a Dutch association that is obliged to comply with Dutch procurement legislation, choice of governing law of the agreements is free. As users and (potential) suppliers are located in many different countries it was decided that agreements under Dutch law would not be the natural choice. Given the fact that Dutch law (as all national laws) is only available in the native language, this would create unworkable situations and would hinder usage. Also, suppliers indicated being unwilling to accept Dutch law as often no in-house knowledge on Dutch law was available. Given that the dominant language -and thus familiarity- is English, there was a strong preference by the suppliers to abide to an English-based law. Given Brexit, it was ultimately decided to use the Irish law, which is very close to the law of England and Wales. Finally, the call-off agreements in each country are based on the local language. In general, it is recommended to choose the law that is applicable in the same country where the individual Contracting Authority calling off the contract is located.
- Value Added Tax (VAT)
 - The VAT is due in the country where the digital service is consumed. GÉANT and suppliers need to facilitate VAT in different countries. If vouchers are used for end users (B2C VAT), then there is an uncertainty on which country VAT percentage applies. As an example, the project buys vouchers in Ireland with 0% VAT for GÉANT (B2B inside the EU with reverse charging). However, when the voucher is used in Sweden from an end user (B2C) Swedish VAT needs to be applied. But the OCRE project cannot recover the Swedish VAT (as there is no Swedish partner who could do so). Thus, there is a clear risk that the country local VAT (e.g., Swedish VAT) needs to be borne by GÉANT or the project, thus creating a considerable financial liability that can act as a showstopper. Splitting the tender in lots per country helps with the first challenge (same VAT), but when vouchers are bought in different countries (from the one of the lots), e.g., in Ireland, then the VAT is not recoverable and thus may have to be carried by the contracting authority's own budget (especially as it will be in the order of 20%). This issue is still open, and it is expected to be further investigated by VAT experts.
- Framework Agreements (FA) vs Dynamic Purchasing System (DPS) for Earth Observation services
 - Framework agreements are good when the scope of the tender is clear and with a specific duration, and the awarded suppliers will stay in for the duration of the contract and cannot be changed.
 - DPS is more dynamic, as suppliers can join over time. It was invented for commodity-like goods/services providing further flexibility. Still, it is the only mechanism that could be used from the EC public procurement directive to meet the current requirements on the Earth Observation platform niche/bespoke market, which is more dominated by niche companies and start-ups.

2 Rationale - scope of procuring resources & services

2.1 Rationale: benefits and trade-offs related to procurement

Until now, provision of most of the pan-European research services and tools (with the exception of research networking) has been based on continued grant-based funding, often framed as initiatives aimed at providing quantitatively or qualitatively novel solutions and services. Continued provision of mature services that are well underway towards commoditisation is often difficult to justify via grants. When service provision is - at least implicitly - seen as a side-effect of a research activity, continuity of services and user satisfaction is harder to manage across projects. For example, while choosing a “principal investigator” of a research project can and should be based primarily on scientific merit, service provision tends to involve customer and supplier relationship management aspects, where organisational learning and social capital can play a role in making the overall system more efficient and responsive to the evolving needs of the users.

Table 2.1 - Comparison of EC grants with tenders

	Grant	Procurement
Procedure	Grant applications in response to a ‘ call for proposals ’.	Usually open competition: tenders are submitted in response to a ‘ call for tenders ’.
Legal Instrument	The outcome of a grant award procedure usually takes the form of a grant agreement .	The outcome of a procurement procedure is a contract .
Mutual obligations	No direct reciprocal obligations. The Commission has the right to monitor technical implementation of the action and the use made of the funds granted.	Imposes reciprocal obligations on both sides . The Commission monitors the delivery of the purchase.
Profit	The grant must not have the purpose or effect of producing a profit for the beneficiary.	The contractor's remuneration includes a margin of profit .
Ownership -IPR	Usually remains with the grant beneficiaries .	Usually remains with the procurer .
EC contribution	The grant may not finance the total cost of the action; only eligible costs are financed.	The Commission pays 100% of the contract price.

As services become more mature and standardised, the grant-based approach becomes less suited for efficient oversight and incentivisation. In a grant, the EC commits to reimbursing the eligible costs of the partners involved, but the eligibility of the costs has no direct link to quality or quantity of service units delivered to the users. In practice, unless the review process can show gross negligence or misconduct, even an underperforming grant beneficiary may be fully reimbursed for the costs reported in the periodic reports. There are also no formal mechanisms to ensure that beneficiaries will be committed to providing the services outlined in the grant agreement. A grant beneficiary may leave the consortium, and until the termination of the participation is completed, the costs reported by the beneficiary will be considered as eligible (again, assuming no gross negligence or misconduct can be demonstrated)¹⁶. These characteristics - while well-suited for ensuring that research and innovation activities have a necessary degree of freedom - make grant-based contractual arrangements a poor match for routine service provision and operation on a massive scale.

With procurement, mechanisms such as bid /performance bonds or multiple framework contracts in "cascade"¹⁷ can be used to ensure that the provider will be available to deliver and will not walk away if the service provision is no longer of interest. For example, even if EOSC interfaces would no longer be relevant to other markets, a commercial provider has an economic incentive to walk away from a grant (services provided at cost, high opportunity cost due to staff being tied to a dead-end technology); with procurement the provider should have a bit of margin between the contract price and the internal costs, and the performance bond can create a financial deterrent against walking away even if the margin turned negative.

It is obvious that - despite the commoditisation of the services provided through EOSC - broadening scope and growing number of users of EOSC will increase some of the "switching costs", if users are forced to change providers arbitrarily, e.g., due to a grant being awarded to a different consortium. This is partially addressed by the creation of a permanent EOSC legal entity, the EOSC Association, that will eventually become the focal point for many of the relationship management aspects of continued service provision. However, as a lightweight federating layer, the EOSC Association cannot grow to provide - or even procure - all the necessary services itself. EOSC will thus gradually transform from an entity federating, coordinating, and aligning grant-based "cooperatives" providing services, into coordinating and aligning contractual arrangements used to procure services to be federated by EOSC. This will dramatically increase the amount of advance planning and alignment of the tender documents, as once the contracts are awarded, the contracting authorities (EC and other actors in the EOSC ecosystem) have much less freedom to re-negotiate specifications of the services (for example according to evolving needs of the user communities).

¹⁶ Paradoxically, launch of a successful commodity service on the commercial market can create financial incentives for a grant beneficiary to leave a consortium. If staff working in the grant-funded activity can be moved to an activity where they can generate additional revenues that exceed their salary costs, early termination of participation might be the approach carrying the smallest risk and highest reward financially.

¹⁷ By "multiple framework contract in cascade" is meant a situation whereby separated but identical framework contracts are concluded between the contracting authority of the procurement and several service providers with a view to ensuring that a contract can be performed in succession by one or the other of the contractors, in descending order.

But this procurement can also take a more traditional form, using a ‘call for tenders’ process to choose between providers in an open, public process. This is usually seen as a potential mechanism to achieve greater cost effectiveness. Open procurement can leverage economies of scale benefits by tapping into a competitive commodity marketplace with a volume greatly exceeding that of “pure” research IT. However, it is possible to identify several additional strategic motivations for purchasing services, including commercial providers:

- Scaling up the e-Infrastructure dynamically (leveraging large pool of commodity ICT resources), including the so-called “Cloud bursting” to cater for the demand spikes from public clouds.
- Possible reductions of opportunity costs by deferring IT-related payments to a later point in time. Procuring commodity solutions from the commercial market would eliminate delays caused by the delivery, setup, and testing of physical IT infrastructure. Eliminating the up-front payments related to CAPEX costs (that tend to precede the actual use of the infrastructure) can often move most of the payments to later fiscal periods and release budget for immediate use (e.g., additional temporary staff for adapting and improving the scientific software so that it is better suited for Cloud environments).
- Stimulate uptake, adoption, and further refinement of solutions (technologies, solutions, processes, and other innovations) from research domain into innovations bringing benefits to the society as a whole.
- Stimulate uptake, adoption, and alignment of research e-Infrastructure with commodity solutions with broad commercial support (to preserve sufficient conceptual similarity to facilitate future technology and knowledge transfer activities).
- Being a catalyst for the domestic or European cloud service market (including speeding up the commoditisation process on advanced cloud-like services) by leveraging the high tolerance for risk that is inherent in some parts of the research IT market.

With the exception of the first two items on the list, these strategic benefits cannot be realised in the absence of pan-European strategy. In general, possible financial benefits are most likely orthogonal to the longer-term, strategic goals that may support the integration of commercial resources into EOSC.

Table 2.2 – Procurement in EOSC: Strengths and Weaknesses

Strengths	Weaknesses
<ul style="list-style-type: none"> ● Professionalisation/Operationalisation of EOSC-Core/access to Exchange <ul style="list-style-type: none"> ○ Based on a transparent and stricter public procurement framework ○ Foresees sanctions for suppliers to deliver (e.g., bid and performance bonds) 	<ul style="list-style-type: none"> ● Procurement poses risks in the participation of public research providers, given their legal and financial limitations in their statutes. <ul style="list-style-type: none"> ● E.g., capability to invoice, issue bid bonds/letters of guarantee, performance bonds/ accept financial risks and penalty clauses. ● Limitations (e.g., percentages) in offering part of their resources across borders or in the amount of revenue generated from paid services.

<ul style="list-style-type: none"> • Opening up to industry towards an EU market, aligning with commodity services, and promoting innovation. 	<ul style="list-style-type: none"> • Given its stricter nature, procurement is less flexible than grants for the dynamic EOSC environment. <ul style="list-style-type: none"> ○ Even EOSC core services encompass rather sophisticated services.
<ul style="list-style-type: none"> • In-line with long term commitment of EC and MS in the EOSC Partnership. <ul style="list-style-type: none"> ○ Contributing towards longer term sustainability for its users. 	<ul style="list-style-type: none"> • More time consuming in preparation (market consultations and bureaucracy, prior information notices, expressions of interest, publications in EU journals, etc.)

On the other hand, there are also weaknesses with regards to moving towards procurement. As already mentioned, public procurement is characterised by a stricter framework, which despite its benefits, also comes with drawbacks, the main one being the lack of flexibility. Flexibility, especially in the dynamic research environment, is vital, so that the infrastructures serving research can satisfy the changing or new requirements by the different communities. It may be very difficult to foresee such requirements well in advance, given also the usually long duration of tender contracts (3-4 years). In particular for EOSC, which is a rather sophisticated environment, even EOSC Core requirements may be difficult to foresee in such a long term, and a shorter timeframe may be more appropriate (e.g., 2 years). Furthermore, public research providers have made significant investments in serving the research communities in the last two decades and have developed significant knowledge in servicing and supporting the research communities. And tenders, with their legal and financial obligations, pose major risks in the participation of publicly funded research organisations. Public research bodies may have limitations in their statutes, to be able to invoice, issue bid bonds, letters of guarantee and performance bonds, accept financial risks and penalty clauses or there may be limitations (e.g., percentages) in offering part of their resources across borders or in the amount of revenue generated from paid services. So, the continuity in service delivery may be at risk if not enough public research organisations can participate in the calls for tenders. Finally, overall, the tender is more demanding and time consuming than grants both for the procurers and the suppliers as the bureaucracy is higher with market consultations and prior information notices before the tenders for checking the interest of the suppliers and in order to make sure that the tender requirements can be satisfied, along with appropriate publications at official EU and national journals.

One further point that needs to be considered during the EC tender preparation in the sophisticated research ecosystem is the potential Conflict of Interest of different research stakeholders, e.g., e-Infrastructure providers, that may be interested in the submission of a bid. So careful planning is required, on one hand engaging with the relevant stakeholders for the preparation of the tender specifications (to understand the current state and the related requirements), similar to a “market consultation”, and on the other hand making sure that the specifications reflect the current state of requirements, without preferential treatment towards potential bidder.

Overall, there are trade-offs in moving from EC grants to procurement for EOSC. On one hand, the procurements for services delivery are more in line with the long-term commitments in EU

partnerships, which secure from the partners the mobilisation and contribution of resources and investments. In particular, the EOSC co-programmed partnership, having the long-term commitment of its members based on a dynamic SRIA, along with the plans for procurement are providing the necessary framework towards professionalisation and operationalisation of the EOSC services. This is not only in the interest of users, who need to have guarantees that services are available in the long term, but also of service providers, who also need a more secure long-term perspective. On the other hand, public research providers currently serving the research communities have made significant investments in the last two decades and have developed significant knowledge in servicing and supporting them. As tenders pose legal and financial challenges to them to be able to offer their services for a fee, especially across borders, and to compete with private entities, such investments and level of maturity reached, may put at risk without careful planning. Thus, a balance point has to be found in this trade-off, where the demanding research ecosystem and ultimately its users can benefit from.

2.2 Foreseen changes

The current planning for the provision of the EOSC-Core and parts of EOSC-Exchange post 2022 (after the end of the EOSC Future project), is that public procurement will be used, executed by the EC. The draft Horizon Europe Research Infrastructures Work Programme 2021-2022 includes such public procurement calls, not only for EOSC-Core (including parts of EOSC Exchange), but also for a research repository for FAIR Digital Objects in the future. Some of the key points identified for an EC-based procurement strategy are the following:

- Procurement of EOSC-Core and access to EOSC-Exchange (including thematic resources).
- Synergies with the next generation Cloud Europe and the European Alliance on Industrial Data and Cloud.
- Collaboration between EOSC-Future, EOSC Association, e-Infrastructures, EOSC 2.0 Strategy Board (Member States) as well as the contractor appointed via the tender process.
- Common Free and Open-Source Software (FOSS) is required, in line with the EC open-source strategy and the European Interoperability Framework recommendations.
- The final EOSC-Core infrastructure and service platform will become Intellectual Property of the European Union and its Member States.

On the rationale for the foreseen change, i.e., i) public procurement instead of a grant and ii) EC to lead the public procurement, the following considerations have been made:

- Ability to better ensure professionalisation of the services.
- EC has the legal framework, knowledge, and mechanisms to run such tenders, with the scientific support of the EOSC Association and related e-Infrastructures/projects as mentioned above.
- The Intellectual Property Rights will stay with the European Union and Member States, instead of with the contracted organisations. It has to be noted, that the EC is developing an action plan to allow the IPR to stay with the contracted organisations¹⁸. This however

¹⁸ <https://ec.europa.eu/digital-single-market/en/news/eu-recommends-member-states-leave-ipr-ownership-public-procurements-contractors>

was mainly conceived for SMEs and in general for private entities to be able to retain their IP, which may be an important source of development and growth for their future.

- The points on the overall procurement rationale made above (possibility to scale up, uptake of and alignment with commodity services, cost-effectiveness/best fit, open up to industry and catalysing the European market, promoting innovation).
- The ability to provide incentives/sanctions for contractors (suppliers) to deliver (as noted in the beginning of this chapter).

2.3 Procurement success criteria: cost vs. value

Depending on the point of view, it is possible to derive success criteria that are potentially orthogonal with each other. For example, dynamic scaling of e-Infrastructure would encourage using cost effectiveness or value for money as primary criteria. On the other hand, assessment based on the effectiveness of a “learning-based” pattern/business models (as explained further in section 3.2), with cross-pollination and organisational learning (both on the supplier and consumer side) requires balancing reductionist unit cost calculations (e.g., core hours provided) with more comprehensive metrics and indicators.

These complementary success criteria have an additional challenge: while financial performance of resource provision can be measured within the scale of the fiscal year, the time from a research result to a successful SME tends to be an order of magnitude longer. Cross-sectoral learning can be studied at shorter timescales and can capture signals such as new product or service lines added to the portfolios of service providers, or addition of technologies from the research sector to the commercial products and services. However, it is important to keep in mind that capturing the full value provided by such open innovation ecosystems is difficult in short time scales and with reasonable overhead costs (in terms of data collection costs and potential disruptions of information exchange caused by the observer/data gatherer).

Thus, the criteria for an EOSC-related tender have to be developed carefully based on the exact focus and priorities, ranging from cost to value. In particular, given the special case nature of EOSC, not only of EOSC-Core but also -and more importantly- of EOSC Exchange, emphasis should be given on preparing and documenting well their requirements, so that ultimately the user needs can be well captured and met. In the initial stages of procurement, provided that there is interest and the first tender on EOSC-Core (and parts of EOSC Exchange) goes ahead, it may be wise to give more emphasis on the value proposition, rather than the cost.

In the longer term, if procurement is established as a successful instrument, focus can be gradually shifted towards cost, especially if some of the core services are “commoditised”. Furthermore, concrete tools to monitor the EOSC usage, value and ultimately user satisfaction would need to be approached (for both EOSC Core and Exchange), in-line with EOSC SRIA v1.0 directions that need to be continuously updated and adapted. On the road to such a portfolio of metrics and KPIs, it is also important that service providers better understand their services costs, possibly via a commonly accepted methodology and cost model.

The Virtual Access (VA) reimbursement mechanism for service providers introduced in the EC Research Infrastructure grants has already helped in this direction, but the next steps in terms of cost models are vital while moving from grants to procurements for some core components.

2.4 Goals-outcomes of procurement actions

With the constraints above in mind, we present the goals and outcomes for the procurement activities:

- Capturing the requirements as best as possible
- Efficiency of research result production
- Trans-sectoral learning potential
- Simplicity
- Transparency, compliance with regulatory frameworks
- Cost effectiveness and low overhead costs

As noted above, some of these goals are orthogonal with each other. The prioritisation between them needs to be set as part of the national and European research and innovation strategy. The evaluation of business models and the abstract business patterns they represent can support the decision-making by presenting the trade-offs involved in a concise and systematic manner. While these trade-offs will naturally need to be addressed as an integral part of procurement processes, the overall strategy and structure of EOSC-related procurement will influence the impact of these individual tactical choices.

3 EOSC Landscape in procurement and business models

3.1 Current state of EOSC partnership

In June 2020, the EOSC Governance Board that had a mandate until the end of 2020 agreed to establish the future (post 2020) EOSC as a co-programmed European Partnership under Horizon Europe, the next EC Research and Innovation framework programme following Horizon 2020. In July 2020, a legal entity was set up, entitled “EOSC association”¹⁹ to become the main operational entity to run EOSC after 2020 and represent the broader EOSC stakeholder community.

The new governance model for the EOSC implementation phase after 2020 (EOSC 2.0) will be tripartite including:

- The EC, representing the European Union,
- The EOSC Association, representing the EU research community,
- The Steering Board by EU Member States and Associated Countries (with Horizon Europe), representing the national interests.

The EOSC partnership structure is depicted in the figure below, where the 3 parties are represented, along with some main directions and paths, including business models and money flows (encompassing grants, procurement, and in-kind contributions). The following paths are relevant for the EOSC Core and Exchange in the short to medium term:

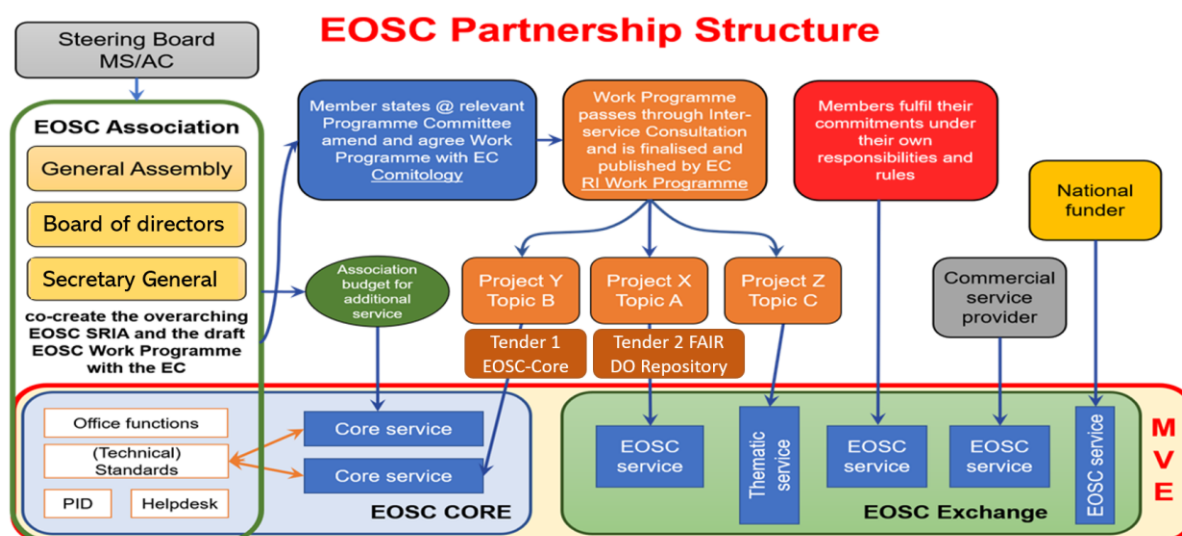


Figure 3.1 – EOSC Partnership Structure

¹⁹ <https://www.eosc.eu/>

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- Orange and brown boxes: EC funding through the Horizon Europe Research Infrastructures Work Programmes, that includes both grant-based projects and procurement.
 - Public Procurements
 - Procurement for the main set of EOSC Core and parts of EOSC Exchange services post 2022 (as already mentioned in previous sections) - Q3 2022 (current planning in the draft Work Programme).
 - Procurement for a research repository for FAIR Digital Objects
 - Both RPOs and commercial suppliers can offer their services via a selection procedure under public procurement
 - Grants (Projects)
 - Enabling an open and FAIR EOSC Ecosystem (including a PID infrastructure, innovative services, web of FAIR data, digital skills, vertical infrastructures for health). In particular, a distributed pan-European user support network, supporting the collaboration of existing networks of competence and data curation centres is foreseen.
 - Next Generation scientific instrumentation, tools and methods and advanced digital solutions
 - Further RI services (especially in Health research, green and digital transformation)
 - A series of other support actions around the development, consolidation, and optimisation of EU Research Infrastructures.
 - Dark Green box: EOSC Association budget for additional EOSC Core services.
 - In the EOSC Association statutes, it is foreseen that the membership fees will be used to run the activities of the Association itself and thus it is currently not foreseen to fund the operation of EOSC services. Still, as maximum flexibility would be needed to be able to adapt to the evolving or new requirements of EOSC, it would be good if such flexibility can be provided via the EOSC Association. This can be done via additional (small) procurements for EOSC Core services in the future (as depicted in the figure) complementing the foreseen procurements and grants. An additional way may be to provide such flexibility via the EOSC Association members and the special case of public-to-public cooperation that will be presented later. Finally, the EOSC Association can also benefit from grants, either as a coordinator or a partner in one or more of the HEU grant-funded projects.
 - Red and dark yellow boxes: EOSC Association members and national funders fulfil their commitments under their own responsibilities and rules.
 - This foresees in-kind contributions either from EOSC Association members and/or Member States/Associated countries that need to be federated in the EOSC ecosystem and is already implemented in the final draft of the MoU for the co-programmed European Partnership on EOSC²⁰.

²⁰ Memorandum of Understanding for the Co-programmed European Partnership on the European Open Science Cloud, draft 11 February 2021, [20210215 EOSC MoU FinalDraft.pdf](#)

By reviewing the EOSC partnership diagram and the above identified “paths” a set of related patterns and business models appears to be relevant that is presented in the next section.

3.2 EOSC EB and WGs related efforts

One of the main efforts which is related to this deliverable is the work of the EOSC Sustainability Working Group and its final publication referred in short “FAIR Lady” report²¹. Furthermore, a targeted study related to business models and costs has been conducted by AcrossLimits and Boundaryless on behalf of the WG, entitled the Vivus study²². Part of the study focused on exploring business models that would support the first iteration of the EOSC instance, called the Minimal Viable EOSC (MVE), comprising the EOSC-Core, federated data and EOSC Exchange.

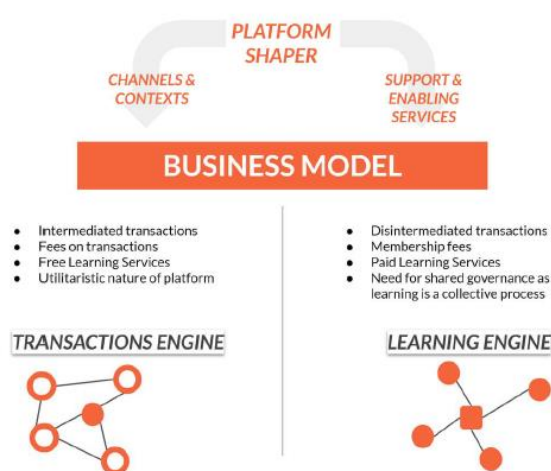


Figure 2.2 The two types of patterns/business models identified in the FAIR lady report

According to the report, in its strategic and operational role, EOSC needs to build trust in and between its user communities, and thus a viable approach is required to move towards longer-term business-like income streams. Relationships and dependencies within the EOSC MVE ecosystem were considered. For the MVE to be sustained, a combination of “platform” business models or patterns is proposed, which would create value by facilitating exchanges among their stakeholders. Ultimately two possible types of business models were identified:

- A **“transaction-based” model**, which is based on the interactions among the stakeholders of the EOSC MVE ecosystem and eventually transactions among them. The main idea is that a “platform” facilitates transactions, bringing together the demand and supply sides, supporting matchmaking with reduced costs, as well as promoting innovation. Still, according to the EOSC-hub project (D12.2 and the related briefing paper on cross-border service provision) and the use cases analysed, complex information needs to be accessed and exchanged before transactions between users and suppliers of research data, resources and services can be concluded. Thus, the role and added value of EOSC is to ease such interactions, providing easy access to resources and services, and facilitate this matchmaking process between users and suppliers, as well as

²¹ Solutions for a sustainable EOSC - A FAIR Lady (olim Iron Lady) report from the EOSC Sustainability Working Group <https://op.europa.eu/s/ol6V>

²² The Vivus study, <https://doi.org/10.5281/zenodo.4395885>

across prosumers (both producers and consumers) and from multiple disciplines. Finally, EOSC users can also benefit from economies of scale with demand aggregation, as well as from in-kind support.

- A **“learning-based” model**, which is based on the principle of membership-based learning, promoting the perceived value of being part of a community and finding support and networking capabilities within its members society. EOSC can offer community dashboards for specific communities, which can be further customised into personalised dashboards, integrating all the users’ services and resources and tracking consumption. Community dashboards can also negotiate resources on behalf of the whole community based on demand aggregation, which could mean better terms and conditions, quality, and costs/economies of scale. Similarly, suppliers would benefit from continuous interactions with users, which can lead to better products and tailored efforts for niche markets.

In essence, the two types of patterns need to be combined in a hybrid approach, at least in the initial stages of the EOSC MVE. According to the **EOSC Executive Board final progress report**²³, the EOSC Core and Federated Data sections can benefit from the membership-based learning pattern, co-funded by the EC and the Member States. The report explains that *“the mission of this part will be to provide support to the entire ecosystem to learn collectively how to allocate resources, how to manage cross-border research activities, and to provide shared cultural elements to spread best practices and seamless integration approaches”*. On the other hand, the EOSC Exchange can benefit from the transactional model, *“pre-paid with monitoring the usage of resources purpose for the commons, FAIR resources, open access resources available free of charge but with strong guiding and orienteering services”*. And the report concludes that *“these models may dynamically change weights over time, building on lean thinking best practices and starting small”*.

Regarding the EOSC funding, the FAIR lady report and corresponding cost study conclude that in its initial stages continued public funding is required, ultimately working towards its sustainability without dedicated public support. Related paradigms need to be studied and best practices need to be identified. The EOSC EB final progress report adds that there are multiple funding sources that can contribute to the different EOSC parts and these need to be studied carefully into a coherent sustainability plan. Strong national political support from MS/ACs is required in order to access funding streams, such as the EU Regional Development Fund (ERDF) or the Recovery and Resilience Facility (RRF). Furthermore, for cross-border service delivery, which is in particular relevant to this deliverable, coordination across MS/ACs would be needed to agree on a spectrum of joint EOSC activities that can be offered across countries, overcoming a series of non-technical barriers, including policy and regulatory ones. EOSC-hub D2.5 identifies such cross-border policy risks and barriers (mainly in its sections 4.1.1 and table in 4.2)²⁴. The establishment of an EOSC funding support team has been recommended to identify and secure funds, liaising with national stakeholders.

²³ EOSC Executive Board Final progress report <https://op.europa.eu/s/oKaU>

²⁴ EOSC-hub D2.5 <https://documents.egi.eu/public/ShowDocument?docid=3634>

Regarding business models, the final EB report recommends that the “EOSC must allow the coexistence of different business models and their evolution over time. Different parts of EOSC can be based on different models”. This is in-line with the analysis performed in this document for the EOSC partnership structure (section 4.1) and the different funding schemes along with appropriate business models as will be highlighted in the next two sections.

4 Patterns and business models for EOSC

This section reviews the state of the art and the current landscape in terms of business models relevant for the purchasing/procurement of services for research in the EOSC context, and of related broader business patterns in section 5.1. A summary of related business models is provided in 5.2, while a detailed analysis of the business models is given in Annex II via an adapted business model template for research, complemented by a mini “Strengths and Weaknesses” analysis. In some cases where it was deemed relevant this was expanded to include Opportunities and Threats (towards a mini “SWOT” analysis), and other aspects including technical, regulatory, policy, business, taxation issues. The analysis includes a brief evaluation of current state and where relevant open issues, including relevance to EOSC and how business models could be carried forward into EOSC.

4.1 Patterns for acquiring resources and services

As already identified in 2.1.2, pattern is the idea of capturing architectural design ideas as archetypal and reusable descriptions. In the context of business modelling, the term pattern is used to refer to a common principle or architectural idea that can be used to generate new business models. Identifying those patterns relevant to EOSC can facilitate the reasoning on better business models. Thus, the idea of patterns applies to EOSC as the broader areas where business modelling could be relevant. Their template was further inspired by the paradigms provided by Platform Design Toolkit related business patterns²⁵ and by relevant material on how to describe a pattern²⁶.

Table 4.1 – Overview of proposed patterns

#	Name	Description
1	Let the best emerge	Stimulates competition, so as to let the best emerge by leveraging reputation or differentiate by quality
2	Simplify/streamline the procurement process	Reduces administrative costs and barriers for organisations to efficiently procure or participate as suppliers
3	Aggregate demand for economies of scale	Aggregating demand leads to higher volumes, lower prices and more suppliers
4	Opening up existing research resources to more researchers	Opens up access to existing research resources and services
5	Joint funding on common interest	In big endeavours with a common interest, joining funding from different parties allows to pursue the objective and sharing the benefits
6	Public-to-public cooperation with reimbursement	Simplifying the way public institutions can collaborate with cost reimbursement can lead to better public services and cost efficiencies

4.1.1 Pattern 1: Let the best emerge

Description: When there are many providers of similar services, the sourcing strategy may consider stimulating competition so as to let the best emerge by leveraging reputation or differentiate by

²⁵ <https://stories.platformdesigntoolkit.com/12-patterns-of-platform-design-to-kickstart-innovation-strategies-500c6dec9c3b>

²⁶ <https://stories.platformdesigntoolkit.com/exploring-ecosystems-the-patterns-of-platformization-6dd0eb6f95f3>

quality. This pattern refers to the plain case of procurement, i.e., the process of selecting the most appropriate provider for the resources or services needed. This is usually one of the following: optimal technical solution, lowest price, or a combination of the two.

Examples: Research Performing Organisations are in most cases public bodies and thus have to go through a tendering process above certain limits and are bound to the EU procurement directive 2014/24/EU. The European Commission follows its own procurement rules, which are very similar to the EU procurement directive. In most cases, the acquired solutions are selected based on a combination of optimal technical solution and cost. National Research entities such as NRENs or NGIs go through such a tendering process for acquiring their corresponding e-Infrastructures. NRENs procure network circuits (fibre IRU leases, lambdas, leased lines, etc.) and corresponding networking equipment (network routers, switches, etc.) to build their networks, along with corresponding support and other services for their Points of Presence. NGIs procure computing equipment, corresponding storage, and related interconnect equipment, along with auxiliary equipment, facilities, and services for their data centres. The EC is also planning to move from grant-based services to procurement-based services for EOSC (for EOSC Core and parts of EOSC Exchange) in Horizon Europe.

4.1.2 Pattern 2: Simplify/streamline the procurement process

Description: High administrative costs in organising or participating in sourcing processes represent barriers for organisations to efficiently procure or participate as suppliers. Focusing on simplifying/streamlining the procurement/sourcing is the intended benefit of this pattern.

Examples: This pattern refers to the group of cases where the need of procurement for individual contracts is waived via appropriate mechanisms such as a framework agreement or a dynamic purchasing system. In some cases, as explained in pattern 3, an individual institution can benefit from a tender organised by a third party (that acts as a central purchasing entity) and acquire resources or services via that third party's framework agreement. A framework agreement is an 'umbrella agreement' that sets out the terms (particularly relating to price, quality, and quantity) under which individual contracts (call-offs) can be made throughout the period of the agreement by the individual institutions. The OCRE project organised a tender with a framework agreement where the beneficiaries are the EU National Research and Education Networks (NRENs) representing a country and their partners within the country. Two models have been used for the distribution of the resources/services within the country. The "Referrer" model, where the NREN acts as intermediary by making the Framework Agreements available in its respective country and facilitating connected institutions in purchasing from the suppliers (direct delivery model). And the "Underwriter" model that further expands the referrer role, and the NREN undertakes further responsibilities and may be involved in the contracting and billing of (some of) its partner institutions' service orders within the country. In this case, the supplier interfaces primarily with the NREN and the NREN may provide additional value-added services to the end-user institution, representing the aggregated volume, often buying upfront, and invoicing the individual institutions. GÉANT may also act as an Underwriter and provide contracting and billing in cases where an NREN asks GÉANT to fulfil this role.

4.1.3 Pattern 3: Aggregate demand for economies of scale

Description: This pattern refers to the aggregation of demand for resources or services from multiple entities that is performed via a central purchasing entity. Raising the required demand volume, will also raise the interest of more suppliers that will have to compete providing better prices, and ultimately better quality and terms and conditions, than if the required volume was procured via the entities alone.

Examples: GÉANT has been acting as a ‘broker of services’ in the form of a Centralised Purchasing Body (CPB) as defined in EC Directive 2014/24/EU. In D12.2 case study 4 GÉANT awarded frameworks on behalf of the NRENs that have mandated GÉANT to do so. The central purchasing entity (CPB) can operate in two different ways: i. Awarding framework agreements on behalf of other contracting authorities (Pattern 2). The framework agreements are used by the contracting authorities that have mandated the CPB. ii. Act as a ‘wholesaler’. In this case the CPB procures goods or services at own risk and sells the procured goods and services to the contracting authorities who mandated the CPB. These options typically come with different levels of risk for the demand aggregator, where higher risk is usually associated with a wholesaler position. Benefits of such demand aggregation naturally include cost savings due to the ability to negotiate better prices with suppliers and to cut down on overhead costs but can also extend to safeguarding service continuity or to ensuring compliance with desired standards or specifications, e.g., with existing authentication and authorisation systems.

4.1.4 Pattern 4: Opening up existing research resources to more researchers

Description: This pattern is about promoting and opening up the access to existing resources and services for use by researchers from public or private research institutes/SMEs.

Examples: Examples include the remote transnational access (TNA) via communications networks and Virtual Access (VA)²⁷. These are financial instruments defined in the “European Research Infrastructures (including e-Infrastructures)” Work Programmes, which are part of the Horizon 2020 framework program. Information about TNA and VA is provided in Article 16 of the EC Annotated Model Grant Agreement²⁸. Such instruments give the ability to reimburse the access provisioning costs to the so called “access providers” (the suppliers/providers of services or resources installations) via corresponding publicly funded grants.

Remote transnational access requires a competitive selection of the users to be served, usually based on scientific excellence. An example of this would be access to a high-performance computer, where computing cycles are limited and need to be allocated competitively. Other cases include services that need project-specific preparatory work (e.g., anonymisation) to enable access to resources via the Internet. Remote trans-national access requires the definition of a unit of access, the set-up of a selection panel for the selection of users and all the other obligations specified in the grant agreement for trans-national access.

Virtual Access is an example of opening up existing resources to more researchers via public funding. The goal of this instrument is to reimburse service providers the cost of provisioning services to

²⁷ https://wiki.egi.eu/wiki/EOSC-hub:VA-TNA_FAQ#Selection_of_users:_can_we_limit_the_user_group_who_can_access_the_services.3F

²⁸ http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/amga/h2020-amga_en.pdf

researchers via the EC grant (service providers are grant beneficiaries and can claim costs, either via unit costs, actual costs, or a mix of both). Such a mechanism has been also used in other projects such as EOSC-hub and OpenAIRE. In EOSC-hub it was used to promote the uptake of related services by users and was initially planned to cover only Operating Expenditures (OPEX). With the EOSC-hub feedback and recommendations the EC has revised the corresponding EC decision on the Virtual Access instrument in February 2019²⁹ and Capital Expenditures can be also claimed (under some conditions). This instrument can further assist public-to-public collaborations, which may complement procurement scenarios in EOSC 2.0.

4.1.5 Pattern 5: Joint funding on common interest

Description: This pattern is about joint funding from different public and private organisations which want to achieve a common goal and for this they need to fund some activity services.

Examples: Joint Undertakings (JUs), launched under article 187 of the Treaty on the Functioning of the European Union, are a special legal instrument of implementing Horizon 2020 through a public-private partnership (PPP) in key strategic areas. Their aim is to implement research and innovation activities to enhance competitiveness and to tackle the grand societal challenges with the active engagement of Europe's industry.³⁰ Concrete examples in e-Infrastructures include EuroHPC JU³¹, which allows the EU and EuroHPC participating countries to coordinate their efforts and pool their resources with the objective of deploying in Europe world-class supercomputers and related technologies/applications. Another example is CERN Openlab, where CERN collaborates with industry (PPP) for the provision of high-end ICT solutions for the CERN Large Hadron Collider (LHC) community³².

4.1.6 Pattern 6: Public-to-public cooperation with reimbursement

Description: This pattern refers to public-to-public service provision in the form of cross-border pooling of resources as part of a cooperation between two or more public-sector bodies, which includes cost recovery for the public body acting as supplier.

Examples: According to the 2014/24/EU procurement directive, if certain conditions apply, cases belonging to such a pattern are exempted from competitive tender requirements. There are two such cases: the first one is the so-called “horizontal case” where the two legal entities are separated from each other (no dependencies/control from one to another) and the second case is the so-called “vertical case” where there is a direct relationship between the two public entities, i.e., a relation of control between one entity and the other. Regarding the horizontal case, a concrete test case of this model is the ELIXIR use case (can be found in more detail in the EOSC Hub briefing paper on cross-border service provisioning and D12.2). In its mandate to offer services to its community, the ELIXIR Research Infrastructure discussed its needs and collaboration opportunities with four publicly funded national e-infrastructures (more details under BM7). Regarding the vertical case, such

²⁹ https://ec.europa.eu/research/participants/data/ref/h2020/other/legal/unit_costs/unit-costs_virtual-access_infra.pdf

³⁰ Commission Staff Working Document on the Interim evaluation of the Joint Undertakings operating under Horizon 2020 - https://ec.europa.eu/research/evaluations/pdf/20171009_a187_swd.pdf

³¹ <https://eurohpc-ju.europa.eu/>

³² <https://home.cern/science/computing/cern-openlab>

cooperation may apply mainly inside the same country, e.g., inside umbrella research organisations and their institutes (CNRS, Fraunhofer, Helmholtz, UKRI, etc.) but the conditions may not easily work across countries, as one of the conditions to apply it is that there is a direct relationship of control from one to the other.

4.2 Business models for acquiring resources and services

This section provides a **summary** of the different business models that are relevant in the EOSC context, while a **more detailed** analysis following a type of extended and adapted business model table is provided as an annex (Appendix II).

Table 4.2 – Overview of proposed business models

<ul style="list-style-type: none"> • BM1: Public procurement with direct contract (by EC or national bodies) • BM2: Public procurement via framework agreement (without a CPB) • BM3: Public procurement with demand aggregation and a Central Purchasing Body (CPB) 	Procurement
<ul style="list-style-type: none"> • BM4: Virtual Access (via EC grant) 	Virtual Access
<ul style="list-style-type: none"> • BM5: Cross-border pooling of resources (in-kind) • BM6: Cross-border pooling of resources (in-kind + in-cash) 	In kind and/or in cash
<ul style="list-style-type: none"> • BM7: Public-public cooperation with cost recovery – “horizontal” • BM8: Public-public cooperation – “vertical” (in house) 	Public-to-Public Cooperation

4.2.1 Business model 1: Public procurement with direct contract

Description: This model refers to the plain case of a public procurement exercise, i.e., the process of selecting the most appropriate provider for the resources or services needed by a contracting authority (public body or similar). An organisation (in our case such as a Research Performing Organisation acting as a contracting authority) prepares a tender for procuring resources/services for its users. Research Performing Organisations are in most cases public bodies and thus have to go through a tendering process for expenditure above certain limits and are bound by the EU procurement directive 2014/24/EU. The European Commission (EC) has similar procurement rules called Financial Regulations. In most cases, the acquired solutions are selected based on a combination of optimal technical solution and cost.

The current planning for the provision of the EOSC-Core and parts of EOSC-Exchange resources/services after the end of the EOSC Future project is to be selected via public procurement that will be run by the EC.

Related patterns: Let the best emerge-plain procurement (Pattern 1).

Examples: Examples of this business model are the tenders run by the EC (for framework programs or for the EC to acquire services), as well as tenders run by other contracting authorities such as the

research performing organisations and research supporting organisations (e.g., NRENs procuring for circuits or networking equipment, NGIs procuring for computing, storage and support services, or cloud services).

Overall assessment: Overall, the general EU public procurement following the 2014/24/EU directive is a robust and professional tool for acquiring services. For the specific case of the research community and for EOSC in particular, it provides professionalisation of the services offered to the users, a stricter framework for suppliers to deliver compared to grants, and some further benefits such as better cost effectiveness, opening up to industry and alignment with industrial commodity services. The IPR may also stay with the EU and Member States instead of the partners of a specific consortium (as with grants).

On the other hand, careful planning is needed to foresee the sometimes-dynamic requirements of the user communities and prepare the tender specifications, as there may be less flexibility compared to EU grants during the course of the tender implementation. That is why the good engagement of the user communities that the services are procured for is vital, so that their requirements are well reflected in the tender specifications. Furthermore, consultations with potential suppliers before the writing of the specifications are crucial for the tender success (provided the principle of equal treatment is observed). Compared to grants, this is less flexible and more complex, as the tender procedure is strictly regulated, and strict procedures must be followed.

Relevance to EOSC: As it is currently planned that the EOSC Core and access to/parts of EOSC Exchange will be procured via EC public procurement so that the resources/services are available in time after the end of the EOSC-Future (procurement needs to start already in 2022), this general model is applicable for this case. Still, a model like BM2 (framework agreement) and/or BM3 (CPB) may be able to provide more flexibility to capture the dynamic requirements of the research communities and to be able to respond to the corresponding demand (in size) over time as the exact required quantities may not be known in advance or may also evolve over the future.

Furthermore, this generic model applies to any other EU or national entity which may want to procure services relevant to EOSC (computing, data, other services) and be federated to the EOSC ecosystem.

4.2.2 Business model 2: Public procurement via framework agreement

Description: A framework agreement is an “umbrella” agreement between the procurer and its supplier(s). This model refers to the cases where the need of repetitive procurement for public institutions is waived via appropriate broader framework agreements. In other words, instead of having multiple tenders (following BM1) there is a single tender which results with the framework agreement, under which individual purchases i.e., “call-offs” can be made over the agreement period. This model refers to the plain case of framework agreement without the involvement of central purchasing function. In this case, a contracting authority establishes a framework agreement for its own needs (not on behalf of others), and then calls-off from that framework agreement from time to time. A framework agreement thus sets out the terms (particularly relating to price, quality, and quantity) under which different contracts (call-offs) can be made throughout the period of the

agreement. The rationale behind the framework agreement is to achieve savings in both costs and time spent in consecutive procurements.

Related patterns: Simplify/streamline the procurement process. (Pattern 2)

Examples: This model is widely used at national level inside the different countries. In particular, framework arrangements have been used in a number of EU countries including France and the Nordic countries (and also UK). The majority of public research provider organisations are using this model to procure resources or services for their communities (e.g., NREs or NGIs for networking, computing, storage infrastructures and services). Frequently this model is combined with the central purchasing function (Pattern 3) and there are also such examples at European level under BM3.

Assessment: This is similar to the general case with the additional flexibility of the framework agreement. Overall, the general EU public procurement following the 2014/24/EU directive is a robust and professional tool for acquiring services. For the specific case of the research community and for EOSC in particular, it provides professionalisation of the services offered to the users, a stricter framework for suppliers to deliver compared to grants, and some further benefits such as better cost effectiveness, opening up to industry and alignment with industrial commodity services. The IPR may also stay with the EU and Member States instead of the partners of a specific consortium (as with grants). The framework agreements give some further flexibility to the user contracting authorities (beneficiaries) to take advantage of the nominated suppliers services.

On the other hand, careful planning is needed to foresee the sometimes-dynamic requirements of the user communities and prepare the tender specifications, as there may be less flexibility compared to EU grants during the course of the tender implementation. That is why the good engagement of the user communities that the services are procured for is vital, so that their requirements are well reflected in the tender specifications. Furthermore, consultations with potential suppliers before the writing of the specifications are crucial for the tender success (provided the principle of equal treatment is observed). Framework Agreements are more flexible than direct contracts (BM1) and well suited when the exact demand/quantities of resources/services are not easy to estimate, as new orders can be done under the same framework. In case of multiple-provider framework agreements the most suitable providers for the specific case can also be chosen. Framework Agreements can also be combined with demand aggregation (see BM3) and thus result in better quality, prices, conditions, and terms for the contracting authorities (economies of scale) and, in the end, also end users and taxpayers.

After the tender procedure starts, it is not possible to include additional users (user contracting authorities). When it comes to additional suppliers, the Dynamic Purchasing System (DPS) is more suitable. A DPS is similar to a framework agreement, but it allows new suppliers to join at any given time. However, a DPS is suitable for “off-the-shelf” purchases, where the requirements can be closely specified in advance. One-off, or heavily bespoke or highly complex requirements are unlikely to be suitable for a DPS.

Relevance to EOSC: As outlined in BM1 and given the current plans that the EOSC Core and access to/parts of EOSC Exchange will be procured via EC public procurement so that the resources/services are available in time after the end of the EOSC-Future (procurement needs to

for this case is the OCRE project tender with a framework agreement where the beneficiaries are the EU National Research and Education Networks (NRENs) representing a country and their partners within the country. Two main models can be used for the distribution of the resources/services within the country. The “Referrer” model, where the NREN acts as intermediary by making the Framework Agreements available in its respective country and facilitating connected institutions in purchasing from the suppliers (direct delivery model). And the “Underwriter” model that further expands the referrer role, and the NREN undertakes further responsibilities and may be involved in the contracting and billing of (some of) its partner institutions’ service orders within the country. ERICs can also act as CPBs, provided that they have appropriate resources, expertise, and capacity.

Assessment: This is again similar to the general case with the additional benefits of the demand aggregation offering better terms and conditions, including prices and quality and overall reduced administration. As already mentioned, this model can be combined with a framework agreement.

Overall, the general EU public procurement following the 2014/24/EU directive is a robust and professional tool for acquiring services. For the specific case of the research community and for EOSC in particular, it provides professionalisation of the services offered to the users, a stricter framework for suppliers to deliver compared to grants, and some further benefits such as better cost effectiveness, opening up to industry and alignment with industrial commodity services. The IPR may also stay with the EU and Member States instead of the partners of a specific consortium (as with grants). The framework agreements give some further flexibility to the user contracting authorities (beneficiaries) to take advantage of the nominated suppliers services.

On the other hand, careful planning is needed to foresee the sometimes-dynamic requirements of the user communities and prepare the tender specifications, as there may be less flexibility compared to EU grants during the course of the tender implementation. That is why the good engagement of the user communities that the services are procured for is vital, so that their requirements are well reflected in the tender specifications. Furthermore, consultations with potential suppliers before the writing of the specifications are crucial for the tender success. Demand aggregation results in better quality, prices, conditions, and terms for the contracting authorities (economies of scale) and, in the end, also end users and taxpayers. If combined with a framework agreement the additional benefits of BM2 apply also.

Relevance to EOSC: As outlined in BM1 and BM2 and given the current plans that the EOSC Core and access to/parts of EOSC Exchange will be procured via EC public procurement so that the resources/services are available in time after the end of the EOSC-Future (procurement needs to start already in 2022), this special business model based on demand aggregation/CPB is applicable in this case (procurement of EOSC Core and parts of EOSC Exchange). Furthermore, it can provide better terms and conditions, aggregating demand, improving quality, and reducing prices. This model can be also combined with BM2 (framework agreement).

Furthermore, this special model may apply to other EU or national entities which may want to procure services relevant to EOSC (computing, data, other services) on behalf of their partners and be federated to the EOSC ecosystem, including Research Infrastructures and ERICs.

4.2.4 Business model 4: Virtual Access (via EC grant)

Description: Virtual Access (VA) refers to a specific financial instrument defined in the “European Research Infrastructures (including e-Infrastructures)” EC Work Programme, which is part of the Horizon 2020 framework program. The goal of this instrument is to reimburse the costs of service providers (also called “access providers”) as beneficiaries of the H2020 grant for provisioning (via the internet) services to researchers. Virtual Access is similar to remote Transnational Access (TNA), but it does not allow differentiation between users. TNA requires a process to select users normally based on scientific excellence (e.g., for the access to a scarce resource such as a supercomputer).

Related patterns: Opening up existing research resources (data, services) to more researchers via public institution funding (Pattern 4).

Examples: There are several concrete examples using the Virtual Access scheme, i.e., Research Infrastructures and e-Infrastructures. These include among others EOSC-hub, OpenAIRE, EGI-ACE, EOSC-future in e-Infrastructures, but there are also several thematic Research Infrastructure projects using VA. The main point in all these examples is that the costs incurred by the corresponding "access provider" for the provision of virtual access to their resources/services (related to computing, data, publications) are reimbursed as estimated in the grant agreement.

Assessment: Overall, this business model provides a flexible way for accessing openly / freely (for the end users) remote resources, while the access providers are being reimbursed via the corresponding grant projects. The main issue is that this mechanism is only applicable in Research Infrastructures (including e-Infrastructures) EC grants. The VA model was further improved during the course of Horizon 2020, as besides operational costs, some capital costs can also be reimbursed.

It is recommended to keep this scheme in the Horizon Europe programme and keep an open dialogue with the community for further improvements.

Relevance to EOSC: As eventually the EOSC Core and part of EOSC Exchange will move from the current grants-based financing to the provision via public procurement, this model will apply only to the remaining EOSC-related projects (grants) in Horizon Europe, either direct EOSC projects (e.g. on enabling a FAIR EOSC Ecosystem including a PID infrastructure, innovative services, web of FAIR data, digital skills, vertical infrastructures for health, next Generation scientific instrumentation, tools and methods and advanced digital solutions) or related Research Infrastructures projects (e.g. on further RI services especially in Health research, and on green and digital transformation).

4.2.5 Business model 5: Cross-border pooling of resources (in-kind)

Description: The in-kind model is based on a community pooling their resources into a "hub" that - one way or the other - encourages fairness of resource sharing. Creating a larger pool of resources increases the likelihood that any user groups' peak demand can be met with the resources available (since the peak represents a smaller portion of the available resources).

The contributions can be based on scientific collaboration agreements such as the ones between thematic Research Infrastructures (ESFRI or others, or related ERICs).

This model resembles the early Citizen Science approaches where the coordinator of the collaborative effort provided contributor visibility and promotion ("kudos") in return for the

resources provided by publishing statistics of the use and work done. In case of member state contributions, the reporting requirements are likely to be somewhat more comprehensive and multifaceted.

Related patterns: Joint effort (in kind) on common interest (Pattern 5).

Examples: As already mentioned, in kind contributions from MS/ACs are found in several Research Infrastructures, e.g., in physical sciences and engineering such as the European Spallation Source³⁴ (ESS) ERIC, the Square Kilometre Array (SKA)³⁵, European XFEL³⁶, Institute Laue-Langevin (ILL)³⁷, and the European Synchrotron Radiation Facility (ESRF)³⁸. Another concrete example is the Worldwide LHC Computing Grid (WLCG³⁹) collaboration which is based on an MoU⁴⁰ between CERN and many research organisations around the world contributing computing resources. The contributions are monitored and reported by CERN. Other examples exist in life sciences and environment, although over the lifetime of a research infrastructure the mixed in kind and in cash contribution may be preferred.

Regarding the nature of concrete in-kind contributions, as part of WLCG that is a clear example, participating countries contribute resources (computing, storage) and personnel depending on the level of participation, i.e., being part of the Tier 1, Tier 2, etc (where Tier 0 is the central facility at CERN). An MoU is signed between CERN and the corresponding CERN Member State where the details of the resources and FTEs are specified.

Assessment: Overall, this business model provides a simple way of accessing cross-border resources via collaboration agreements for achieving a common good, with great potential for excellent science under a common governance/management hierarchy, agile service/technology development and common, discipline-specific practices across MS/ACs. It is also relatively straightforward to expand to global collaborations. However, lack of dedicated funding (EU grants/in cash) may lead to non-dedicated resources/personnel and lack of concrete outputs, and ultimately delays in the construction/operation of the RI. In some cases, it may increase the risk of forming disciplinary silos. Delegating procurement activities to national/MS/AC level may avoid issues related to cross-border VAT, even in the case of lead-buyer/CPB approach Encouraging integration of commercially available commodity/standard solutions into the disciplinary ICT stack will likely reduce the risk of the disciplinary ICT becoming an isolated niche. (e.g., CMS lock-in example^{41, 42}).

Relevance to EOSC: In kind contributions from MS/ACs are found in several Research Infrastructures, ESFRI or others, either legal entities such as ERICs or other that are or will be

³⁴ [Home | ESS \(europeanspallationsource.se\)](https://www.europeanspallationsource.se/)

³⁵ [Square Kilometre Array \(skatelescope.org\)](https://www.skatelescope.org/)

³⁶ [European XFEL](https://www.xfel.eu/)

³⁷ [The Institut Laue-Langevin \(ILL\) - Neutrons for Society](https://www.ill.eu/)

³⁸ [European Synchrotron Radiation Facility \(ESRF\)](https://www.esrf.eu/)

³⁹ <https://wlcg.web.cern.ch/>

⁴⁰ <https://wlcg.web.cern.ch/mou>

⁴¹ https://agenda.infn.it/event/347/contributions/46699/attachments/33007/38881/superb_elmer_computing.pdf
 (slide 9 and 20)

⁴² https://cds.cern.ch/record/687412/files/note02_015.pdf (page 3)

federated to EOSC. Thus, these are related to EOSC either directly or indirectly. For ESFRI or several other cases, the in-kind contributions are usually combined with EU grants/or national in cash funding, in which case this becomes BM6.

4.2.6 Business model 6: Cross-border pooling of resources (in-kind + in cash)

Description: In this case, the in-kind contributions are also complemented by in cash contributions, such as grant(s), EC, national or other, such as the ones supported by the ESFRI Roadmap process that can fund ESFRI RIs or ERICs in different phases, such as design phase, preparatory phase, implementation phase, etc. This combines the advantages of the in-kind model (e.g., community pooling their resources into a "hub" that encourages fairness of resource sharing, increasing the likelihood that peak demands can be met with the resources available) with the advantages of the dedicated funding such as EU/national grants, i.e., dedicated resources / personnel and concrete outputs, ultimately sticking to timelines for the construction/operation of the RI. Furthermore, in accordance with Article 7(3) of the ERIC Regulation, ERICs are recognised as international organisations for the purpose of the EU public procurement directives, and they can adopt their own procurement procedures⁴³. Thus, this model may be combined with the other relevant models on procurement (e.g., BM1-BM3). As identified in the High-Level Expert Group report assessing the progress of ESFRI and other world class RIs in 2020⁴⁴, "procurement processes are more complex and time consuming in Europe, hampering co-creation with the private sector", while ERICs may allow streamlined procurement as part of the ERIC network and partners.

Related patterns: Joint funding on common interest (Pattern 5)

Examples: The EOSC overall framework and in particular the EOSC Partnership is characterised by such a business model, of joint in cash and in cash contributions from EC and MS/ACs. Furthermore, the vast majority of Research Infrastructures use this mixed approach of in-kind and in-cash contributions for the construction and operation of their RI. Most of the projects part of the ESFRI Roadmap process, such as ESFRI Landmarks and/or ERICs or other legal types, belong to this category.

Another concrete example is the EuroHPC Joint Undertaking where the EC and the Member States are sharing the costs, the EU being in cash and the Member States in kind or also in cash (especially for the supercomputing infrastructure). The EC and Member States share the infrastructure costs, (50-50% for the pre-exascale and 35-75% for the petascale) and get the corresponding share of the resource usage. For the in-kind resources appropriate guarantees are foreseen (e.g., audited, certified by appropriate certificates). There is currently less clarity on the obligations and benefits of private members (e.g., industry). In EuroHPC, the combined in kind/in-cash model is also complemented by relevant procurement schemes such as joint procurements by the EuroHPC Joint Undertaking and the hosting entity (country or consortium) mainly for the supercomputing infrastructure, supported by EU grants for competence centres/training/support/applications/innovation and partly also for operations (for pre-exascale

⁴³ [Report on Common Procurement by Research Infrastructures \(xofficio.eu\)](#)

⁴⁴ [EC RTD transformative-impact-ris-on-euro-research.pdf \(europa.eu\)](#)

systems only). Resource allocation will be based mainly on peer-reviewed open calls in collaboration with PRACE, evaluated based on scientific excellence and societal impact criteria, along with industrial innovation and impact ones. Still, strategic initiatives may be allocated resources without being peer reviewed. Geographical balance will be also monitored over time.

Assessment: Overall, this business model combines the effective way of accessing cross-border resources via collaboration agreements for a common good with dedicated funding such as EU/national grants, which in turn leads to dedicated personnel and resources, and thus can provide concrete outputs and effectively increase the chances of the RI being implemented in time. The funding may come from specific processes such as ESFRI Roadmap process with a series of grants (design studies, preparatory phase, implementation phase or other supporting actions) which again contribute to the delivery of the RI outputs. On the other hand, setting up some specific EU legal structures (such as ERICs) may require relevant expertise, increasing complexity and pose some limitations in participations from non-EU Member States. As in the previous case, there is also a risk of formation of disciplinary silos, while this model can also be combined with procurement-based models (e.g., BM1-BM3) initiated by an RI or ERIC.

Relevance to EOSC: Once again, the EOSC Partnership is characterised by such a business model, of joint in kind and in cash contributions from EC and MS/ACs. Furthermore, such a mixed in-kind and in-cash model is relevant to EOSC mainly because of the high number of Research Infrastructures using this model that are or will be federated to EOSC. This model applies to the majority of Research Infrastructures, ESFRI or others, either legal entities such as ERICs or other.

4.2.7 Business model 7: Public-public cooperation with cost recovery outside EU public procurement rules - horizontal case

Description: This business model refers to public-to-public service provision in the form of cooperation between two or more public-sector bodies, which are separated from each other, i.e., the two bodies do not have a direct relationship, i.e., no ownership or control of one (or more) organisation(s) to the other (horizontal case - Dir. 2014/24/EU Art.12.4), that includes cost recovery for the public body acting as supplier. According to 2014/24/EU procurement directive, this case is exempted from competitive tender requirements if certain conditions apply, namely:

- (1) the agreement between the two public entities establishes or implements a broader (than the specific provision) cooperation on a common objective.
- (2) the implementation of that cooperation is governed solely by the public interest; and
- (3) the participating entities perform on the open market less than 20% of the activities concerned by the cooperation.

This model includes a cost-recovery mechanism for the provider procuring the resources.

Related patterns: Public-to-public cooperation with reimbursement (Pattern 6).

Examples: A concrete example where this model was tested is the ELIXIR use case (can be found in more detail in the EOSC Hub briefing paper and D12.2). In its mandate to offer services to its community, the ELIXIR Research Infrastructure discussed its needs and collaboration opportunities with four publicly funded national e-infrastructures: INFN (Italy), SURF (Netherlands), CESNET

(Czech Republic) and CSC (Finland). As the exemption rules may apply, this opportunity for public-to-public cooperation with cost recovery has been investigated. However, as of the date of finalisation of the deliverable this was not materialised, and we are not aware of any other case where this was used across borders (there are cases though where this was used inside national boundaries).

Assessment: The horizontal case of public-to-public cooperation (the two public bodies do not have a direct relationship, rather work on a common goal driven by public interest) is a useful exemption from the application of Directive 2014/24/EU on public procurement that can be used by collaborating research institutions (that fall under the definition of a "contracting authority") to enter into an arrangement without the need to incur the additional administrative burden and costs associated with the conduct of a competitive tender process.

Despite the fact that a similar model has been used in EC grants where third parties supported a main grant beneficiary in its tasks (usually under a common umbrella or broader goal, e.g., via an MoU), outside grants this is a relatively new model. ***Thus, it is proposed that the EOSC governance takes action to study further this scheme as one of the available options to maximise cross-border interoperation with cost reimbursement among public institutions. It should be investigated whether this model can apply between the EOSC Association and its members. In case the supply includes also computing or storage resources, for this to work an agreed methodology across Europe would be needed to calculate such costs. For personnel this may be much more straightforward. The EOSC governance can also work in this direction, and ultimately also develop contractual templates for this kind of public-to-public cooperation between research facilities. The EOSC portal could also publicise such opportunities for public-to-public cooperation.***

Relevance to EOSC: This model may be relevant to EOSC, as several RIs that are or will be federated to EOSC can use it to get services from public e-Infrastructure providers, which can be reimbursed for their service provision. This may complement other models, e.g., public procurement, in which public bodies may not be able to participate, especially the ones not having relevant expertise or legal restrictions. It should be checked whether and to what extent this model can apply between the EOSC Association and its members.

4.2.8 Business model 8: Public-public cooperation with cost recovery outside EU public procurement rules - vertical case ("in-house")

Description: This business model refers to public-to-public service provision in the form of cooperation between two or more public-sector bodies with a direct relationship to each other, i.e., there is a relation of control between one entity and the other (vertical case - Dir. 2014/24/EU Art.12.1). According to the 2014/24/EU procurement directive, this case is exempted from tender if certain conditions apply, namely:

- (1) The contracting authority must exercise sufficient control over the "supplying entity" (with the test applied being that the control should be similar to that which the contracting authority exercises over its own departments); and
- (2) More than 80% of the activities of the supplying entity are performed for the controlling authority or authorities., and

(3) There is no direct private capital participation in the 'supplying authority'.

It is unlikely that the vertical case that requires such conditions and relations applies across EU countries (unless there are several EU legal offices of the same entity). However, such relations usually apply within countries in the public sector.

Related patterns: Public-to-public cooperation with reimbursement (Pattern 6)

Examples: Such cooperation may apply mainly inside the same country, e.g., inside umbrella research organisations and their institutes (CNRS, Fraunhofer, Helmholtz, UKRI, etc.), but the conditions may not easily work across countries and in general will not apply between the EOSC Association and its members.

Assessment: As this may apply mainly inside a country, the complete analysis has been omitted; still the assessment would have been similar to the BM7.

Relevance to EOSC: It is unlikely that the vertical case that requires such conditions and relations applies across EU countries, unless there are several EU legal offices of the same entity. In general, it will not apply between the EOSC Association and its members. However, such relations sometimes apply within countries in the public sector.

5 A view into the future

Based on the introductory sections including the rationale and landscape and the previous sections on the patterns and business models of relevance to EOSC, a view into the future with proposed/viable approaches for EOSC 2.0 and applicable business models is given in this section, also outlining some key directions and actions for further investigation. First a brief mapping of all identified Business Models into EOSC is given and then more details are provided for the required next steps, as part of the future of EOSC.

A major planned change is the transition from grants to public procurement with a view on operationalising EOSC-Core and parts of EOSC Exchange in 2023. This change is currently featuring in the draft Horizon Europe Research Infrastructures Work Programme 2021-2022. The draft EC WP 2021-2022 has already been discussed with the EU Member States as part of the so-called “Shadow Programme Committee” for Research Infrastructures. It is expected that the WP will be finalised in April 2021 and become public in May 2021. To ensure continuous service delivery of the key EOSC services, the public procurement process will have to start already in 2022 (estimated timeframe is 3rd quarter 2022). This change aims at the operationalisation and professionalisation of EOSC Core and parts of EOSC Exchange, based on a stricter public procurement framework for contractors (suppliers) to deliver.

However, there are also related risks in moving away from grants. A first substantial risk is that publicly funded research service providers, in several cases being non-for-profit entities, may find hurdles on their way to participate in tenders. This is due to the aforementioned limitations in their statutes, being in most cases public bodies/non-for-profit entities. Other risks are related to the less flexible, more complex, and time-consuming nature of the procurement process, compared to grants - especially if the services being procured are not fully matured. Public research providers have made significant investments in serving the research communities in the last two decades and have developed significant knowledge in supporting the research communities. In case several of these are not able to participate in tenders, there is a risk that this knowledge may be lost.

Although the current foreseen approach is that EOSC Core and parts of EOS Exchange will migrate to public procurement to be run by the EC, a contingency fall-back plan could be made available if needed. The fallback plan would be to use normal grants or a special type of grants (e.g., Framework Partnership Agreement or an operational grant). It should be noted that changing from a grant to a tender in the EC Work Programme is not possible, while the other way round, i.e., changing from a tender to a grant would be still possible. This will be required if there is lack of interest following the tender market consultation or prior information notice or strong disagreement by the Member States.

5.1 Mapping the business models to the EOSC ecosystem

This section provides a mapping of business models to the EOSC ecosystem, including the national constituents. ***First of all, as it is stated in the EOSC EB final report, different parts of EOSC will be using different business models. It is expected that all the identified business models will be used***

in the next phase of the EOSC ecosystem. In more detail, based on the analysis in Section 4, the following mapping of the identified business models to EOSC may apply:

- All procurement related BMs (BM1-BM3) are widely used for procurement at national/institutional level (buying services for the computing and data centres and repositories).
 - For the specific EC procurement of EOSC Core and parts of EOSC Exchange foreseen in 2022, if this goes ahead, a hybrid model combining Framework Agreement with elements of Demand Aggregation and Central Purchasing Body appears to be appropriate (as analysed further in the next subsection).
 - It should be noted that besides EOSC-Core, it is currently not clear which parts of EOSC-Exchange are included in the first tender of 2022. Some common EOSC-Exchange may be better suited for a public procurement since the related requirements may be better defined by 2022. On the other hand, the EOSC-Exchange “contents” (including research artefacts such as data, publications, software) are less well-defined and more open to change, expansion, and innovation, although they may be bound to the related domain specific services.
 - To better incorporate user needs, other approaches may need to be considered beyond this deliverable to complement the related procurements, such as a combination of PCP/PPI to bring new services to the market and/or a DPS based on the EOSC rules of participation for commercialised, off-the-shelf services, such as commodity computing and storage.
 - This may also imply the consideration of separate tenders for the EOSC Exchange common services and thematic/contents parts, pending confirmation of the above separation.
- Virtual Access (BM4) will still apply to the new Horizon Europe Grants, and there are related Research Infrastructure grants where VA should apply.
- Cross-border pooling of resources in kind and/or in cash (BM5-BM6) are inherent in EOSC and the EOSC Partnership, where the EC has committed funding (in cash) and the Member States have agreed to match the EC contribution (in kind), and in practice they are expected to at least double the EC contribution. These BMs also apply to a series of other Research Infrastructures including e-Infrastructures and ERICs, where they have been working relatively well inside the communities. It may be also investigated whether pooling of resources could be used across communities (especially for computing), to be able to meet peak demands, supposing that there will be cases where peaks may not come at the same time across communities.
- Public-to-public cooperation with cost reimbursement (BM7-BM8) may also apply in the EOSC overall ecosystem, giving paths for exemptions from tenders. In this case, the supplier public body can be reimbursed for the services it provides to the other public body (or bodies), without going through a tender, if the specific conditions identified in the previous section can be satisfied.
 - The horizontal case (BM7), where there is no direct ownership or control between the two public bodies is already used at national level, and it should be studied

whether it can apply between the EOSC Association and its (almost 200) member organisations. This may give considerable flexibility in the EOSC ecosystem and be able to complement the procurements nicely.

- The vertical case (BM8) may be used at national level as there is an ownership/control requirement that would be difficult to meet across borders.

5.2 Roadmap – Next steps

This subsection provides the main elements of future steps related to business models and procurement, and further elaborates the overall mapping identified in section 5.1.

The main elements of this roadmap into the future are the following:

- a. ***Thorough analysis of Business Models in EOSC and Business Models selection:*** *The first main step would be to continue the work of this deliverable as part of the new EOSC Governance. Already the EOSC Association is proposing a set of new EOSC Advisory Groups and Task Forces to its members organisations. The related ones to this work are an **Advisory Group on “Sustaining EOSC” with a corresponding Task Force on “Funding and Business model for EOSC”**. Since multiple funding/business models for the EOSC ecosystem (including national level) are relevant, it is proposed that this Task Force is renamed to “Funding and Business models for EOSC” (plural). As part of this Task Force, further business models can be identified for EOSC Exchange to operate related data spaces (data, software, and resources) from both public and private sources, via the appropriate integrator roles. Collaboration on this point with key efforts from the private sector, including GAIA-X⁴⁵, can be fostered in the near future.*
- b. ***Proposed business model for the EC procurement on EOSC Core and Exchange post 2022:*** *As presented already, it is currently planned that the provisioning of EOSC-Core and parts of EOSC Exchange services after the EOSC-Future project will migrate from a grants-based approach to a public procurement one run by the EC. This is already documented in the draft EC Research Infrastructures Work Programme 2021-2022, which is expected to become public in May 2021. A major decision required is the selection of the appropriate Business Model for this public procurement. Based on the analysis of the business models in section 4, a combined business model including BM2 (Framework Agreement) with some elements from BM3 (Demand Aggregation) appears to be a good approach for EOSC-Core and parts of EOSC-Exchange (for the latter at least the “common/operational” part/services; for the “contents” see the point in section 5.1). In the EC financial regulations, a CPB role appears to be present, along with some elements of demand aggregation. These two can therefore be combined with the framework agreement business model (BM2). In essence, based on the available information at the time of the writing, **the EOSC-hub WP12 team recommends investigating a hybrid business model (such as BM2+BM3) which provides the necessary flexibility from the framework agreement concept, and also optimisation of terms and conditions, including prices and quality, from demand aggregation. A Dynamic Purchasing System (DPS) approach should be also investigated, especially for off-the-shelf***

⁴⁵ [GAIA-X - Home \(data-infrastructure.eu\)](https://gaia-x.eu) - A Federated Data Infrastructure for Europe

resources/services, such as commodity computing/storage services. Further lessons learnt from the currently on-going OCRE tender on Earth Observation services need to be considered. The plain case of procurement (BM1) is less flexible compared to the framework agreement, especially given the uncertainty in the exact quantities of resources required to support related EOSC Core and Exchange services that will essentially depend on its usage.

- i. **OCRE experience:** *The OCRE tender was targeted towards national stakeholders and the framework agreement was agreed between GÉANT and the NRENs. On the other hand, the public procurement for EOSC Core and parts of Exchange will be dealing at first level with the EU services and required infrastructure, however there may be national components contributing. Furthermore, the OCRE tender was also based on a BM2+BM3 approach, relying on framework agreements and demand aggregation, including the role of CPB. In any case, the OCRE tender findings and lessons learnt would be very useful input. In particular, **it is recommended that the challenges with the applicable laws for the procurement, including framework agreements and call-offs, are studied in detail, are documented, and reported to the new EOSC Governance. Although the EC, which is expected to run the EOSC-Core and Exchange public procurement(s), is not subject to VAT, it is recommended that related VAT challenges faced within OCRE procurements (which at the time of the writing are still being investigated) are also documented and reported to the new EOSC Governance, so that there is a complete picture.***
- c. **EOSC Association and EOSC Steering Board roles:** *The EOSC Association and the EOSC Steering Board roles for the new EOSC phase that started in 2021 are being shaped in the context of the tripartite governance. In particular, regarding business models and procurement, it needs to be agreed whether the EOSC Association will complement the EC public procurement and related grant-based projects, by performing further acquisitions, adapting to new requirements or to evolving requirements, not foreseen in the EC tenders. As outlined in the previous point on the EC procurement, already adequate flexibility would be needed in the EC tenders via appropriate means, such as procurement based on framework agreements. Still, **it is recommended that additional flexibility is provided to the EOSC procurement ecosystem. One possible way would be to assign a complementary role to the EOSC Association to perform additional procurement (see figure 3.1), along with the appropriate budget for such a role.** As it appears in figure 3.1 (green box), a complementary role for the EOSC Association has been indeed foreseen, labelled “Association budget for additional service(s)” (for EOSC Core) for providing extra EOSC core services. In other words, the EOSC Association may complement the main EC procurement, so that it provides further flexibility in satisfying new requirements or adapting to changing ones, that the framework agreement cannot do. If the issue appears more complex than foreseen, **a study on how the EOSC Association complements the EC tender and its exact role can be tasked. The EOSC-Future project needs to work closely with the EOSC Association, the EOSC Steering Board and the EC to carefully plan the migration from the grants-based approach to the tenders-based procurement and EOSC operationalisation. If indeed this role is assigned to the EOSC Association, then the appropriate capabilities and expertise need to be planned (initially appropriate personnel need to be hired and further***

developed). **A role in managing/monitoring the (in kind or in cash) contributions from MS/ACs in the EOSC Partnership needs also to be assigned, possibly by the EOSC Association with guidance from the EC. Finally, the EOSC Association is expected to be part of HEU grants, which may also provide some flexibility in the system, further complementing the procurements.**

- d. **Preparation of both the research service providers and industrial suppliers for the tenders** (see also EOSC-Hub D2.5, page 38 and also section 4.1.43 on page 29): Both research providers and industrial suppliers need to prepare for the tenders-based procurements that are currently planned, including opportunities and risks. On one hand, the research providers, in several cases being not-for-profit organisations, may be having restrictions in their statutes in submitting bids, provisioning of services against payments, issuing invoices and bid bonds, and accepting financial risks and penalty clauses, resulting from SLAs and other performance metrics, while they may have limitations (e.g., percentages) in offering part of their resources across borders or in the amount of revenue generated from paying services. Thus, **during the next period, publicly funded providers should be checking internally with their legal and financial experts on such restrictions and limitations, abiding to national and EU laws (including state-aid and unfair competition clauses) and make effort to identify and overcome these obstacles so that they are able to participate in tenders and continue the service offerings to the research community as part of EOSC.** In particular, in case of a consortium applying to the tender, the role of the coordinating entity should be well prepared, to be able to comply with all laws, regulation and rules, and be able to transact with the other members of the consortium. Sharing findings and practices among the research providers would be a prerequisite for the tender good preparation, thus a collaborative approach is recommended. **On the other hand, industrial suppliers interested in such procurements, should also be familiarising with the research community environment and try to better understand their requirements and needs, including the provided user support to the researchers** (see also EOSC Hub D2.5, pp 39-40). **The new EOSC tripartite Governance, including the EC and the EOSC Association have a key role in facilitating the transition from the grants-based approach to the tenders-based approach and organising relevant consultations.** Already a multitude of suppliers have participated in the OCRE tender, although the latter should be much more straightforward for industrial suppliers than the demanding and sophisticated EOSC ecosystem, especially the EOSC Exchange and its contents.

Not excluding other solutions, potential partnerships or “joint bids” in the form of consortia between public research bodies and industrial ones may be able to address well the complex requirements of the tender, especially for the demanding EOSC-Exchange, where a multitude of bespoke thematic services by the research community in different domains and subdomains cannot be easily replaced by third parties.

- e. **Further flexibility to adapt to new or changing requirements:** This topic was already addressed in both of the previous points, i.e., as part of the main EC procurement for operationalising EOSC, as well as providing additional roles (e.g., by the EOSC Association) to complement the EC procurement with additional flexibility. Still, the move from a grant-based approach to a tender-based approach may bring unexpected challenges not foreseen

if not well prepared. Thus, it is recommended that an expert group deals with this topic, not only proactively, well in advance during the EOSC-Future project and as part of the EC tender preparation, but also reactively during the course of the EC tender implementation (after tender agreements are signed, if all go well). In other words, additional mechanisms should be foreseen to cope with the issue of possible lack of flexibility with the public procurement approach, changing/adapting the tender requirements over time, which may have been easier with a grant. As an example, topics such as framework agreements or dynamic purchasing systems (DPS) should be reviewed. Finally, other approaches could be investigated such as in-kind contributions from MS/AC (BM5) to cope with some further flexibility and/or public to public cooperation (horizontal case- BM7) between the EOSC Association and its members.

- f. **EC procurement contingency plans:** *Although currently the foreseen approach remains as planned (i.e., EOSC Core and parts of EOSC Exchange to be operationalised via public procurement by the EC), a contingency fall-back plan could be made available if needed. The fallback plan would be to operationalise the EOSC Core and parts of Exchange via normal or a special grant (e.g., FPAs or an operational grant). It should be noted that changing from a grant to a tender in the EC Work Programme is not possible, while the other way round, i.e., changing from a tender to a grant would be still possible. However, this should be put only as a fallback case, e.g., no consensus among EC/MSs, lack of interest following tender consultation or prior information notice, difficulty in documenting the tender requirements or lack of maturity/challenges in public research providers to participate.*

Other relevant business models (see also EOSC-Hub D2.5, page 35): *Already several of the analysed business models have been identified as part of the EOSC procurement ecosystem; still, all other analysed business models are still relevant in the EOSC broader ecosystem, either directly or indirectly. The EOSC final EB report states that “EOSC must allow the coexistence of different business models and their evolution over time. Different parts of EOSC can be based on different models”. In particular, the business models BM5 and BM6 on in-kind or hybrid in-kind/in cash are relevant to the thematic Research Infrastructures both at EU and national levels, part of the EOSC ecosystem. BM5 may also be used by the members of the EOSC Association to provide in kind contributions to EOSC. BM4 on virtual access is still relevant to the related EC-funded grants for both Research Infrastructures and e-Infrastructures federated with EOSC, while BM7 and BM8 are relevant for cooperation among public bodies with cost recovery (in most cases the horizontal case). In particular the public-to-public cooperation horizontal case (BM7), needs to be investigated whether it can be used between the EOSC Association and its members. The general procurement case BM1 is also still relevant and valuable for individual tenders at national or EU levels contributing to the EOSC ecosystem. It is thus clear that all analysed Business Models are relevant in the EOSC Ecosystem; but even if this were not the case, having a relevant and rather full list and related analysis of Business Models would have been necessary for completeness. The new EOSC Governance has also proposed a (new) Advisory Group on “A funding and business model for EOSC”. However, with the above analysis a single model is not foreseen, thus it is recommended to amend the title of the group to “Funding and business models for EOSC”. Best effort will be made to disseminate the results of this work to the EOSC Governance.*

6 Feedback summary from key stakeholders

In order to validate the analysis and related recommendations, stakeholders were engaged via bilateral interviews and a public webinar. Fifteen interviews were conducted in March 2021 with selected representatives from the following stakeholder categories:

- e-Infrastructure providers (6) - 40%
- User Communities (and D12.2 case study representatives) (3) - 20%
- Funding agencies/policy makers (3) - 20%
- Procurement experts (3) - 20%

The interviewees were from nine EU Member States, one Associated Country and one Third country (UK), while there were also two representatives of International or European organisations.

In addition, a public webinar was held on March 31st⁴⁶. 31 people participated in the webinar, while 40 were registered. The registrants were from the following stakeholder categories:

- Policy officers (10) - 25%
- Project managers (8) - 20%
- Researchers (8) - 20%
- Directors/Chief Executive Officers (7) - 17,5%
- Business/Innovation Officers (3) - 0,75%
- Software developers (2) - 0,5%
- Procurement experts (1) - 0,25%
- User support member (1) - 0,25%

The registrants were from 16 countries (13 EU Member States and 3 Associated or Third Countries) with another 4 from International or EU organisations. The vast majority 32 (80%) were from the research community, while there were 8 (20%) from the private sector (all from SMEs).

There were a lot of questions on getting more information, while there was interest on the topics of procurement vs. grants and the participation in tenders from research organisations vs. industry. Finally, questions were addressed on how the work will be followed up. The feedback received was only positive and the webinar was much appreciated.

The main points provided as part of the feedback from the 15 interviews were the following:

1. With regards to the foreseen migration from grants to procurement for EOSC Core (and parts of EOSC Exchange), the majority considered that *a tender will indeed provide a professionalised, operationalised and accountable approach* in-line with the commitments of member states in the EOSC Partnership. However, *the interviewees stressed that the public providers may face considerable challenges in submitting bids given their inherent restrictions*. In some cases, it was felt that these restrictions may be overcome with proactive efforts (and existing collaborations may help to justify this), in some other cases not.

⁴⁶ <https://www.eosc-hub.eu/news/webinar-analysis-business-models-acquiring-services-eosc>

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- a. The public research providers have made considerable investments in EOSC and its components over the past and such investments need to be considered in the tender.
 - b. Depending on the source of funding of national services from public research providers, there may be limitations in offering (selling) their services across borders.
 - c. Alignment between the committed in-kind contributions of MS/ACs in the EOSC Partnership and the corresponding ones in the EOSC Association (from mandated or other members in the country) may be challenging to deal with.
 - d. The interest of industrial entities to participate in several bespoke services included in EOSC Exchange (primarily) - besides computing, storage, interconnection commodity services- and EOSC Core (secondarily) was questioned. Some interviewees considered industrial entities may be able to take up EOSC Core services in the medium to long term. Industry should be able to learn quickly and get up to speed for EOSC Core.
 - e. There should be a mechanism to review the progress of the procurement, and make sure that the desired outcome was achieved. Lessons learnt need to be drawn and avoid repeating mistakes.
 - f. On the other hand, given the interconnected research ecosystem *potential Conflict of Interest within the public research providers* may be applicable, which have to be dealt with caution.
 - g. There are different approaches in the different countries with regards to the plans for the provision of the in-kind contributions of MS/ACs in the EOSC Partnership. Countries are currently discussing and getting organised how to deal with this.
 - h. Universities/researchers are not well represented in EOSC. So, the vision is more a vision of national research providers, which are subject to specific rules and have severe limitations in using their services across borders.
 - i. Eventual alignment of policies across countries in the longer term should contribute towards a legal/policy “interoperability”.
2. With regards to the consideration of EOSC-Core and parts of EOSC-Exchange requirements, there were considerable differences in the answers on the two areas. *For EOSC-Core the vast majority stated that requirements of EOSC-Core are more straightforward* and thus can be better served in a tender, especially the ones closer to “commoditisation”. On the other hand, *EOSC-Exchange is much more complex and demanding (it was referred to as “a different beast”), and only some generic parts (common services) may be able to be served via a procurement.* The rivalrous services of EOSC Exchange (computing, storage, etc.) may be also served appropriately, including industry. There were some few interviewees stating that EOSC Core will not be served appropriately, as EOSC Core is not yet mature for such a procurement. *Overall, there is different maturity in the different EOSC components and thus not all can be served via such a procurement process.*
 - a. The process for the definition of the requirements specification needs to be clear and make sure that there are no biases. The EC would need to consult well the different stakeholders. EOSC is also not static. It should be foreseen how EOSC will

- keep up with the technical evolution and how the procurements or grants will be designed the right way.
- b. EOSC needs to provide added value to its providers and users to be sustained.
 - c. User support is an inherent part of the research e-Infrastructures and of EOSC in particular. This needs to be appropriately planned in the corresponding tenders but also grants.
 - d. EOSC user community representatives stated that they have not seen the benefits of EOSC yet, although they are still working in the area. Currently EOSC is more about “FAIRification” to them.
 - e. Their requirements may be fed mainly via EOSC Cluster projects or corresponding RIs/ERICs. In general, there are very different requirements between user communities, and this point is difficult to be addressed.
 - f. Technical people need to be used to explain in detail the requirements of the procured services/resources.
 - g. GAIA-X approach on federation of services is different from EOSC, and it should be followed closely.
3. The vast majority of interviewees stated that the listed business models and related patterns are appropriate for the EOSC ecosystem (both at EU and regional/national levels).
 - a. Different flavours of framework agreements are available and are heavily used in the different countries. Several other business models (from the ones identified in this deliverable) are used in the different countries.
 4. Concerns from some policy makers/national funders were raised about the Intellectual Property Rights of the tender outcome, in particular how the Member States (and Associated Countries) will be owning the outputs, since it will be the EC running the procurement. Proactive investigation would be required.
 - a. For SMEs participating in tenders IP is important, so they may want to keep the rights. If IPR needs to be preserved, then the price may be multi-fold. In most cases, right of use may be enough to deal with this.
 5. The MS/ACs commitment for long term funding EOSC (10-15 years) was raised by national funding agencies/policy maker representatives. As the draft EOSC Partnership MoU between the EC and the EOSC Association includes as an end date the end of 2030 (~10 years), this is already in line with the above point.

7 Recommendations for key stakeholders

In this section relevant recommendations both within this document (section 6) but also from the relevant EOSC governance bodies are further analysed. While preparing the recommendations the following stakeholders were considered:

- Policy makers
- Buyers and mediators
- Service providers/suppliers
- EOSC Association legal entity
- EOSC Future project
- Other stakeholders such as legal and financial experts in public procurement.

EOSC-hub deliverable D2.5 also provides a list of recommendations on sustainability and governance, taking input from this document.

The following main elements have been identified, both from external sources and from this document analysis:

- a. **Relevant recommendations from related external documents** (FAIR lady document, the relevant BM/cost studies and EOSC EB final progress report):
 - i. *“EOSC must allow the coexistence of different business models and their evolution over time. Different parts of EOSC can be based on different models”*. This is in-line with the analysis performed for the EOSC partnership structure and the different funding schemes along with appropriate businesses models as has been highlighted in this document.
 - ii. *“The EOSC Core and Federated Data sections can benefit from the membership-based learning business model, co-funded by the EC and the Member States”*. On the other hand, *“the EOSC Exchange can benefit from the transactional model”*. In essence, the two types of models need to be combined in a hybrid approach, at least in the initial stages of the EOSC MVE. And finally, *“these models may dynamically change weights over time, building on lean thinking best practices and starting small”*.
 - iii. *“EOSC needs to build trust in and between its user communities, and thus a viable approach is required to move towards longer-term business-like income streams”*. The FAIR lady report and corresponding cost study conclude that in its initial stages continued public funding is required, ultimately working towards its sustainability without dedicated public support. Related paradigms need to be studied and best practices need to be identified. The EOSC EB final progress report adds that there are multiple funding sources that can contribute to the different EOSC parts and these need to be studied carefully into a coherent sustainability plan. This deliverable complements the above recommendation on funding and sustainability, with the provision of appropriate business models and related uses.
- b. **Recommendations from this document analysis**
 - i. ***Thorough analysis of Business Models and related BMs selections that are able to adapt to evolving requirements:***

1. *Ensure that requirements for EOSC-Core and Exchange are well documented and planned from both e-infrastructures and RIs/user communities, and that they can be fulfilled with the new public procurement scheme.*
2. *Community requirements may need to be adapted/updated in the future (dynamic nature). Requirements from different communities may be conflicting in some cases and a process on how to treat these should be established.*
3. *An agile approach with multiple feedback cycles in the future tenders should be foreseen (if possible). This may complement the lack of flexibility compared to the grant approach, where the EC could have requested a change via different means (e.g., following project reviews by independent experts).*
4. *A hybrid business model (such as a combination of framework agreement and demand aggregation/CPB (BM2-BM3) appears to be better suited for the EOSC environment, as this may provide the necessary flexibility from the framework agreement concept, and also optimisation of terms and conditions, including prices and quality, from demand aggregation. A Dynamic Purchasing System (DPS) approach should be also considered, especially for future off-the-shelf resources/services (such as commodity computing and storage).*
5. *More detailed plans and options for the EC tenders can be also defined and analysed, including whether separate tenders for EOSC Core and Exchange would be needed or a joint tender with separate lots would be preferred.*
6. *Risk analyses and contingency plans (e.g., falling back from tender to grants) in case of severe challenges faced should be developed and how this would be decided.*

ii. Proactive preparation for public procurements:

1. *During the next period (up to year 2022), publicly funded providers should be checking internally with their legal and financial experts on restrictions and limitations which would prevent them from submitting tender bids. Public providers should identify and make an effort to overcome these obstacles so that they are able to continue the service offerings to the research community as part of EOSC, given their long investments, including user support.*
2. *In case of a consortium applying to the tenders, the role of the coordinating entity should be well prepared, to be able to comply with all laws, regulations, and organisational policies, and be able to transact with the other members of the consortium. Sharing findings and practices among the research providers would be a prerequisite for the tender good preparation, thus a collaborative approach is recommended.*
3. *Industrial suppliers interested in such procurements, should also be familiarising with the research community environment and make an effort to better understand their requirements and needs.*

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4. *The new EOSC tripartite Governance, consisting of the EU represented by the European Commission, the Member States and the Associated Countries involved in the EOSC-SB and the wider EOSC stakeholder community represented by the EOSC Association, have a key role in facilitating the transition from the grants-based approach to the tenders-based approach and organising relevant market consultations.*
 5. *Public research bodies and industrial ones may want to explore corresponding partnerships or “joint ventures” in the form of consortia composed of both types of entities to address well the complex requirements of the EOSC tenders, especially for the demanding EOSC-Exchange.*
- iii. EOSC Association and the rest of the EOSC governance roles need to be shaped and agreed:**
1. *Additional flexibility needs to be provided to the EOSC ecosystem by assigning a complementary role to the EOSC Association to perform additional acquisitions (e.g., via additional small procurements or grants), along with the appropriate budget for such a role.*
 2. *The EOSC-future needs to work closely with the EOSC Association, the EOSC Steering Board and the EC to carefully plan the migration from the grant-based approach to the tender-based procurements for EOSC operationalisation. In particular, e-Infrastructures and RI/user communities and other key related projects need to be in close collaboration with the EC for the definition of the tender specifications for the public procurements.*
 3. *If the exact role of the EOSC Association is not straightforward, (or of the related projects), a study on the exact role of the EOSC Association (and other governance bodies) in this mixed scheme of grants and procurements can be commissioned.*
- iv. Awareness raising of the different Business Models:**
1. *As already identified, all identified Business Models are either directly or indirectly relevant to the broader EOSC Ecosystem. Appropriate awareness raising activities need to be undertaken by the EOSC Governance (including the EOSC Association) and future projects (including EOSC Future) to guarantee their appropriate uptake, along with the establishment and upskilling of relevant expert teams at all levels (including legal, financial and procurement ones).*
- c. Mid-to-longer term recommendations**
- i. EOSC Governance develops strategies for the future:**
 1. *The EOSC Governance in close collaboration with strategic related projects such as EOSC Future should develop a roadmap with key milestones for the future:*
 - a. *A sustainability strategy and how to best operationalise EOSC, reviewing the currently foreseen migration strategy from the grants-based approach for EOSC Core and parts of Exchange to the tender-based approach.*

- b. *A stepwise approach in EOSC development would be needed, including interim evaluation at intermediate steps.*
- c. *A mid-to longer term sustainability strategy for EOSC Core and Exchange, with different scenarios and impact assessment for each of them needs to be developed. This should consider the potential impact of migrating from grants to tenders for some parts of the EOSC MVE. A possible exit strategy from the EC funded regime for EOSC Core and commoditised services of EOSC Exchange may be considered, depending on the uptake and use. A longer-term model could be to have the EC fund the EOSC Core and EOSC Exchange operational parts, while the MS/ACs to fund the EOSC Exchange contents. The transition from an EC-funded to an MS/AC-funded model would need to be gradual with a transition period as suggested in the FAIR lady document. However, again this will need to be reviewed at a later stage depending on the EOSC procurement results and user uptake. It should be clear that grants will always be required for innovative services, which over time become mature and move into operationalisation.*
- d. *Possible further engagement of industry over time and expansion towards the public sector.*

8 Conclusions

Following the analysis in this document some key conclusions can be drawn namely:

1. The way towards public procurement for EOSC Core and parts of Exchange by the EC in 2022, replacing the current grants-based approach, includes risks that need to be assessed and carefully planned, in particular around the ability of public research providers to participate and continue to deliver their services and expertise, including user support. On the other hand, the main arguments in favour of public procurement include the:
 - a. professionalisation/operationalisation of the EOSC services,
 - b. a stricter framework with incentives/sanctions for contractors (suppliers) to deliver,
 - c. EOSC IPR stays with the European Union and Member States.
2. The new tripartite EOSC partnership needs to prepare well for the future steps, clarifying the roles of all constituents. In particular, one of them that requires immediate actions and convergence is the possible migration towards public procurement for EOSC Core to be run by the EC towards the end of 2022. Other directions and paths in the short-to-medium term, with relevant business models and money flows, encompassing grants, further procurement and in-kind contributions are also foreseen. Related recommendations from the EOSC first phase Executive Board and related Working Groups have been also analysed. The deliverable analysis is in line with the related EC and Sustainability WG recommendations, that EOSC must allow the coexistence of different business models and their evolution over time. Different parts of EOSC can be based on different models, based on the corresponding maturity of each of them. The two types of models identified in the corresponding study, i.e., the membership-based learning model and the platform-based transactional model need to be combined in a hybrid approach, at least in the initial stages of the EOSC MVE. Initially, the EOSC Core and Federated Data sections can benefit from the membership-based learning business model, co-funded by the EC and the Member States, while the EOSC Exchange can benefit from the transactional model, acting as a matchmaking platform for open access and FAIR resources and services. These two types of models may dynamically change weights over time.
3. A set of business models relevant to EOSC has been analysed and evaluated, along with related broader patterns. The Business Models consider previous work in EOSC-hub, both in WP2 (related briefing paper on cross-border service provisioning) and WP12 (previous deliverables), including related use cases. In short these cover some main types of public procurement, in-kind and/or in-cash contributions, public to public cooperation and other models that can reimburse costs within grants (virtual access). Other relevant efforts have also been analysed, such as the OCRE project tenders, although some of the related challenges, such as VAT are still being evaluated.
4. The proposed way forward is further analysed taking into account the identified Business Models, providing a list of main actions, along with related recommendations. The key recommendations can be summarised as follows:
 - a. The tender requirements for the public procurement of EOSC Core and Exchange in 2022 need to be analysed thoroughly and a Business Model needs to be selected

that is flexible enough and is able to adapt to evolving requirements. A flexible business model based on BM2 and BM3 appears to be appropriate for this case, while elements such as a Dynamic Purchasing System need to be reviewed. Risk analysis and contingency plans (e.g., falling back from tender to grants) in case of severe challenges faced should be developed.

- b. Both the research service providers and industrial suppliers should be prepared for the planned EOSC tenders well in advance analysing requirements and potential obstacles and risks to maximise chances of tender success. Public providers should identify and make an effort to overcome these obstacles so that they are able to continue their service offerings to the research community as part of EOSC, also given their significant investments and knowledge developed, in particular on research support. Industrial suppliers interested in such procurements, should also be familiarising with the research community environment, including their needs. The new EOSC tripartite governance has a key role in preparing the ground and facilitating the transition from the grants-based approach to the tenders-based approach. Corresponding partnerships or “joint bids” in the form of consortia composed of both public research bodies and industrial ones can be explored to address well the complex requirements of the EOSC tenders, especially for the demanding parts of EOSC-Exchange.
 - c. The EOSC Association and the rest of the EOSC governance roles need to be agreed, maximising flexibility in the procurement of EOSC Core/Exchange. The EOSC-future needs to work closely with the EOSC Association, the EOSC Steering Board and the EC to carefully plan the migration from the grant-based approach to the tender-based procurement and EOSC operationalisation. An external study with a SWOT analysis contributing towards the exact roles and competences required can be considered in case the exact roles are not straightforward or different views or paths may appear viable.
 - d. Awareness raising of the identified Business Models at both EU and national levels needs to be pursued so as to guarantee their appropriate uptake, maximising benefits, and promoting the establishment and upskilling of relevant procurement expert teams at these levels.
 - e. Mid-to-longer term strategies for EOSC need to be developed by the EOSC Governance, in close collaboration with strategic related projects such as EOSC Future, including a roadmap with key milestones for the future. In particular a sustainability strategy for EOSC Core and Exchange, along with a possible exit strategy from the EC funded regime for EOSC Core needs to be worked out. A longer-term strategy for expanding to the public sector and industry may follow later, also considering the developments up to then.
5. The feedback from the related stakeholders has been also summarised. Key elements are as follows:
- a. With regards to the foreseen migration from grants to procurement for EOSC Core (and parts of EOSC Exchange), the majority considered that *a tender will indeed provide a professionalised, operationalised and accountable approach* in-line with

the commitments of member states in the EOSC Partnership. However, *the interviewees stressed that the public providers may face considerable challenges in submitting bids given their inherent restrictions*. In some cases, it was felt that these restrictions may be overcome with proactive efforts.

- b. With regards to the consideration of EOSC-Core and parts of EOSC-Exchange requirements, there were considerable differences in the answers on the two areas. *For EOSC-Core the vast majority stated that requirements of EOSC-Core are more straightforward and thus can be better served in a tender, especially the ones closer to “commoditisation”*. On the other hand, *EOSC-Exchange is much more complex and demanding (it was referred to as “a different beast”), and only some generic parts (common services) may be able to be served via a procurement*. The rivalrous services of EOSC Exchange (computing, storage, etc.) may be also served appropriately, including industry. *Overall, there is different maturity in the different EOSC components and thus not all can be served via such a procurement process*. GAIA-X approach on federation of services is different from EOSC, and it should be followed closely.
- c. The vast majority of interviewees stated that the listed business models and related patterns are appropriate for the EOSC ecosystem (both at EU and regional/national levels).
- d. Concerns from some policy makers/national funders were raised about the Intellectual Property Rights of the tender outcome, in particular how the Member States (and Associating Countries) will be owning the outputs, since it will be the EC running the procurement. Proactive investigation would be required.

Appendix I. Business model template for research

Introduction

In order to collect information on the different business models with regards to obtaining/procuring resources for the research community, a template is deemed appropriate to be able to structure the information and make it comparable. From the initial research in D12.1 on business models and the use cases analysed in D12.2, it is perceivable that clear business models are not always applicable for the research sector, which is a rather non-for-profit area, despite the fact that there are business opportunities for potential market stakeholders, such as the private sector (e.g., commercial cloud providers) or other intermediate market players (e.g., brokers or demand aggregators). On the other hand, business models are nowadays becoming more and more common for non-for-profit organisations, in an effort to describe the value that can be delivered to its users. Still, the research sector is a complicated ecosystem with multiple layers of stakeholders and dependencies among them, and an adapted business model template seems appropriate. In this document, we have tried to come up with such an adapted business model template taking into account the particularities of the research sector. One main point to consider is the perspective or viewpoint of the stakeholder offering the solution or service presented in the business model, that is why a concrete entry has been added to the template.

Templates

In order to come up with a suitable template for research, the following elements have been reviewed:

- Business model canvas areas (adapted for NGOs/non-for-profits)
- Business cases templates, such as Simplifiable one
- SWOT analysis (SW on internal forces, OT from external forces)
- PESTLE analysis (can be combined with the OT analysis from the PESTLE external forces analysis)
- Organisational patterns with forces/Porter 5 forces model (adapted for NGOs/non-for-profits)

Again, as the procurement in the research sector is a rather specific case, a unique template from the above may not be fully appropriate. It is deemed that the proposed template needs to be based on both simplicity and familiarity. Thus, besides key elements from the business model canvas, other elements from the above are deemed necessary to depict this complex ecosystem, such as Strengths and Weaknesses, other optional external forces, Assumptions and Constraints, etc. as presented below.

Proposed business model template for research

Business model short name

1.	Business model (full) name	<i>Full name of the business model</i>
2.	Short description	<i>Short description of the business model</i>
3.	Example(s) <i>(added to ease understanding in the research world)</i>	<i>An example of the business model</i>
4.	Perspective/viewpoint <i>(added to clarify the viewpoint in the research ecosystem)</i>	<i>Perspective this business model is developed, i.e., who is the “value provider”</i>
5.	Business model type/pattern (if applicable)	<i>Type of business model (e.g., public to private) and related business pattern(s)</i>
6.	Key partners <i>(from business model canvas)</i>	<i>Who are the key partners/ stakeholders involved in the business model? Who are the key providers/suppliers? Which key resources are we acquiring from partners? Which activities do partners perform?</i>
7.	Key activities <i>(from business model canvas)</i>	<i>What key activities do our Value Propositions require? Main actions to deliver the business model and the value which comes with it. Relationship with users: e.g., support/ training.</i>
8.	Key resources (from business model canvas)	<i>What Key Resources do our Value Propositions require? The physical, intellectual (including publications, data, software, patents along with corresponding IP rights/licences) financial and human assets required to make the business model/case deliver.</i>
9.	Value (from business case/pattern) or value propositions (from business model canvas)	<i>Value delivered to the users: What problem are we solving, what bundles of outputs and services are we offering to each user type/customer segments? Which needs are we satisfying? (Include potential impact here or separately?)</i>
10.	<i>Assumptions and constraints (from Simplifiable business case model)</i>	<i>Assumptions and constraints/barriers (even if obvious)</i>

11.	<i>User Segments & Relations (can be optional)</i>	<i>For whom are we creating value? Most important users. User base type (mass market, segmented, diversified, multi-sided platform) Relationships with user segments and how to maintain them</i>
12.	<i>Channels / Networks (can be optional)</i>	<i>Through which Channels / Networks do our User Segments can be reached</i>
13.	<i>Evaluation: Strengths and Weaknesses (internal factors) Optional: Opportunities, Threats (external factors) from SWOT analysis. Can be complemented by other elements of PESTEL analysis. (PESTEL: Political, Economic (including taxes/VAT, Social, Technological, Environmental and Legal (including regulatory)</i>	<i>A short evaluation of main Strengths and Weaknesses (from SWOT analysis) as internal factors. If needed/relevant these can be complemented by Opportunities/Threats or other elements of PESTLE analysis Internal factors: Strengths Weaknesses External factors: Opportunities Threats Other external factors relevant (PESTEL including regulatory)</i>
14	<i>Funding/financial analysis (from Simplifiable business case model, also taking some elements from business model canvas if applicable)</i>	<i>Funding and financial aspects, including elements such as budget sources and viability, and if applicable expenditures, income/revenue)</i>
15.	<i>Overall assessment and recommendations</i>	<i>Outlook of the business model on how effective and viable it is, given the SWOT and other analyses, and also outlook on a way forward including recommendations to key partners and roadmap/next steps/ /milestones.</i>
16.	<i>Relevance to EOSC</i>	<i>Relevance of the business model with the EOSC context, either directly (e.g., procurement foreseen in EOSC) or indirectly (e.g., business models relevant to EOSC-related projects such as on Research Infrastructures or business models relevant to national/EU stakeholders, such as in-kind/in cash contributions for Research Infrastructures)</i>

Appendix II. Detailed descriptions of Business Models

Business Model 1

Business model (full) name <i>Full name of the business model</i>	EU Public procurement of resources/services by a contracting authority via a tender to be awarded with a direct contract.
Short description <i>Short description of the business model</i>	<p>This model refers to the plain case of a public procurement exercise, i.e., the process of selecting the most appropriate provider for the resources or services needed by a contracting authority (public body or similar). An organisation (in our case such as a Research Performing Organisation acting as a contracting authority) prepares a tender for procuring resources/services for its users. Research Performing Organisations are in most cases public bodies and thus have to go through a tendering process above certain limits and are bound by the EU procurement directive 2014/24/EU. The European Commission (EC) has similar procurement rules called Financial Regulations. In most cases, the acquired solutions are selected based on a combination of optimal technical solution and cost.</p> <p>The current planning for the provision of the EOSC-Core and parts of EOSC-Exchange resources/services after the end of the EOSC Future project in 2023 is to be selected via public procurement that will be run by the EC.</p>
Example(s) <i>An example of the business model</i>	Examples of this business model are the tenders run by the EC (for framework programs or for the EC to acquire services), as well as tenders run by other contracting authorities such are the research performing organisations (e.g., NRENs procuring for circuits or networking equipment, NGIs procuring for computing, storage and support services or cloud services).
Perspective/viewpoint <i>Define from which perspective this business model is developed, i.e., who is the “value provider”</i>	Viewpoint: of the procurer (contracting authority), in our case the research performing organisation or the EC.
<u>Business model type/pattern (if applicable) - click the link for descriptions.</u> <i><u>Type of business model (e.g., public to private) and related business pattern(s).</u></i>	Type: Private to public (mostly), i.e., a private body sells services to a public body, can also be public to public. Pattern(s): Let the best emerge-plain procurement.

<p>Key partners (from business model canvas) <i>Key partners/ stakeholders involved in the business model. Who are the key providers/suppliers? Which key resources are we acquiring from partners? Which activities do partners perform?</i></p>	<p>In case of an EC tender: Procurer (Contracting Authority)-> EC Users -> Research Performing Organisations (Universities, research institutes, e-Infrastructure legal entities and other bodies that are part of the wider R&E community provided their procurements need to be compliant with the EC Directives for public procurement). Suppliers -> all entities that are interested in supplying services to the R&E community (these can be both private and public entities/RPOs). In case of the RPO itself issuing the tender: Procurer (Contracting Authority)-> RPO Users -> The users of the Research Performing Organisation (RPOs), can be universities, research institutes, e-Infrastructure legal entities and other bodies that are part of the wider R&E community provided their procurements need to be compliant with the EC Directives for public procurement). Suppliers -> all entities that are interested in supplying services to the R&E community (these can be both private and public entities/RPOs).</p>
<p>Key activities (from business model canvas) <i>Key activities our Value Propositions require. Main actions to deliver the business model and the value which comes with it. Relationship with users: e.g., Support/ training.</i></p>	<p>Contracting authority gathers user requirements in collaboration with relevant stakeholders. The contracting authority (in our case EC or RPO) issues the tender. Suppliers submit their offers and the best one(s) is(are) selected (may be a consortium). Users can use resources/services from the selected supplier(s).</p>
<p>Key resources (from business model canvas) <i>Key Resources our Value Propositions require. The physical, intellectual (including publications, data, software, patents along with corresponding IP rights/licences) financial and human assets required to make the business model deliver.</i></p>	<p>Suppliers' resources/services and support/training. Users that benefit from the services.</p>
<p>Value (from business case/pattern) or value propositions (from business model canvas) <i>Value delivered to the end users (what problem are we solving, what outputs are we offering to the end users, potential impact)</i></p>	<p>Professionalisation of the services offered to the users. The ability to provide incentives/sanctions to contractors (suppliers) to deliver (more strict rules than grants). Technical, financial, and business value (possibility to scale up, uptake of and alignment with commodity services, cost-effectiveness/best fit, open up to industry, catalysing the European market, promoting innovation). The Intellectual Property Rights will stay with the European Union and Member States.</p>

<p>Assumptions and constraints (from Simplifiable business case model) <i>Assumptions and constraints/barriers (even if obvious)</i></p>	<p>Legal/Financial: Being the general procurement case, the main assumption is that the procurer (contracting authority) abides to the EU procurement directive 2014/24/EU and the EC follows its (so-called) "Financial Regulations". In most cases, the acquired solutions are selected based on a combination of optimal technical solution and cost. The tender documents need to describe accurately the (user) requirements.</p> <p>The main constraint compared to an EC grant may be some lack of flexibility after the contract is signed, so a well-planned process for the definition of evolving or dynamic requirements may need to be in place at the time of the tender specifications.</p>
<p>User Segments & Relations (Relations is optional -only if relevant) <i>Who are we creating value for? Most important users. User base type (mass market, segmented, diversified, multi-sided platform)</i> <i>What type of relationship does each of our User Segments expect us to establish and maintain with them? Which ones have we established? How are they integrated with the rest of our business model? How costly are they?</i></p>	<p>EC case: End users: are the individual researchers of the RPOs on behalf of which the EC issues a tender (the users are supposed to obtain the services "free at the point of use". Researchers are part of universities, research centres, SMEs, etc.</p> <p>RPO case: End users: individual researchers of the public sector or SMEs using the service "free at the point of use". Researchers are part of universities, research centres, SMEs, etc.</p>
<p>Channels / Networks (Optional - only if relevant) <i>Through which Channels / Networks do our User Segments can be reached/ can work best.</i></p>	<p>Relevant channels can be University networks, NREN communities, ESFRI RI/ERIC communities' networks, and other related channels.</p>
<p>Evaluation: Strengths and Weaknesses (internal factors) Optional: Opportunities, Threats (external factors) from SWOT analysis or PESTEL analysis <i>A mini-SWOT analysis, complemented by elements of PESTLE analysis (only when relevant)</i> <i>Internal factors:</i> <i>Strengths</i> <i>External factors:</i> <i>Opportunities</i> <i>Threats</i> <i>Other external factors relevant (PESTEL including regulatory)</i></p>	<p>Strengths: Solution (compared to grant):</p> <ul style="list-style-type: none"> - Professionalisation of the services offered to the users. - Incentives/sanctions (carrot/stick) to contractors (suppliers) to deliver (stricter rules than grants). - Technical, financial, and business value (possibility to scale up, uptake of and alignment with commodity services, cost-effectiveness/best fit, open up to industry, catalysing the European market, promoting innovation). - The Intellectual Property Rights stay with the European Union and Member States (not with the specific consortium as with the grants). <p>Users:</p> <ul style="list-style-type: none"> - Free at the point of use offered by the EC or RPO. - Centralised services that are easy to use - Support/training for using the services

	<p>Suppliers</p> <ul style="list-style-type: none"> - A good way of engaging with the public sector (in this case research community). (Opportunity) - Benefit from interaction with the research community in terms of new market and high-end/novel needs/innovation potential. <p>Weaknesses:</p> <p>Contracting Authority:</p> <ul style="list-style-type: none"> - Cumbersome to prepare the tender specification foreseeing the community needs well in advance and how they will evolve. - Also, the tender procedure has to be repeated if there is no framework agreement. - In case not an EU tender on behalf of the European research community, it is cumbersome as it may need to be performed by each RPO in each country. - Less flexibility compared to a grant after the contract signature, i.e., during the course of the tender implementation. <p>Users</p> <ul style="list-style-type: none"> - Less flexibility compared to a grant after the contract signature, i.e., during the course of the tender implementation. <p>Suppliers</p> <ul style="list-style-type: none"> - May invest time and not get the contract (in the EOSC case, a supplier may be also an RPO/e-Infrastructure provider).
<p>Funding/financial analysis (from Simplifiable business case model, also taking some elements from business model canvas if applicable)</p> <p><i>Funding and financial aspects, including elements such as budget sources and viability, and if applicable expenditures, income/revenue)</i></p>	<p>In case of an EC tender (on behalf of the EU community) as with the planned tender for the EOSC-Core/Exchange in 2022:</p> <ul style="list-style-type: none"> - Funding comes from the EC, as part of Work Programmes (similar to grants) <p>In case of an EU tender by another intermediate entity (not the EC), e.g., EOSC Association if it ever takes this role:</p> <ul style="list-style-type: none"> - In case direct EU funding is available, then the risk is smaller. In case direct EU funding is not available (as membership fees may not be enough to cover procurement activities), a framework agreement may be more appropriate (referrer or intermediate role not taking up the risk). See BM2-BM3. <p>In case of national/local tenders:</p> <ul style="list-style-type: none"> - Funding may come from EU funds (e.g., European Structural and Investment Funds-ESIF), national sources (ministries/research councils, or other). In some cases, funding comes from the users of the services (e.g., an NREN may be getting paid for the services offered to Universities and Research Centres).

<p>Overall assessment and recommendations <i>Outlook of the business case on how effective and viable it is, given the SWOT and other analyses, and also outlook on a way forward including recommendations to key partners and roadmap/next steps/ /milestones.</i></p>	<p>Overall, the general EU public procurement following the 2014/24/EU directive is a robust and professional tool for acquiring services. For the specific case of the research community and for EOSC in particular, it provides professionalisation of the services offered to the users, a stricter framework for suppliers to deliver compared to grants, and some further benefits such as better cost effectiveness, opening up to industry and alignment with industrial commodity services. The IPR may also stay with the EU and Member States instead of the partners of a specific consortium (as with grants).</p> <p>On the other hand, careful planning is needed to foresee the sometimes-dynamic requirements of the user communities and prepare the tender specifications, as there may be less flexibility compared to EU grants during the course of the tender implementation. That is why the good engagement of the user communities that the services are procured for is vital, so that their requirements are well reflected in the tender specifications. Furthermore, consultations with potential suppliers before the writing of the specifications are crucial for the tender success (provided the principle of equal treatment is observed). Compared to grants, this is less flexible and more complex, as the tender procedure is strictly regulated, and strict procedures must be followed.</p>
<p>Relevance to EOSC <i>Relevance of the business model with the EOSC context, either directly (e.g., procurement foreseen in EOSC) or indirectly (e.g., business models relevant to EOSC-related projects such as on Research Infrastructures or business models relevant to national/EU stakeholders, such as in-kind/in cash contributions for Research Infrastructures).</i></p>	<p>As it is currently planned that the EOSC Core and access to/parts of EOSC Exchange will be procured via EC public procurement so that the resources/services are available in time after the end of the EOSC-Future (procurement needs to start already in 2022), this general model is applicable for this case. Still, a model like BM2 (framework agreement) and/or BM3 (CPB) may be able to provide more flexibility to capture the dynamic requirements of the research communities and to be able to respond to the corresponding demand (in size) over time as the exact required quantities may not be known in advance or may also evolve over the future. Furthermore, this generic model applies to any other EU or national entity, which may want to procure services relevant to EOSC (computing, data, other services) and be federated to the EOSC ecosystem.</p>

Business Model 2

Business model (full) name <i>Full name of the business model</i>	Procurement of services through framework agreement
Short description <i>Short description of the business model</i>	<p>A framework agreement is an “umbrella” agreement between the procurer and its supplier(s). This model refers to the cases where the need of repetitive procurement for public institutions is waived via appropriate broader framework agreements. In other words, instead of having multiple tenders (following BM1) there is a single tender which results with the framework agreement, under which individual purchases i.e., "call-offs" can be made over the agreement period. This model refers to the plain case of framework agreement without the involvement of central purchasing function. In this case, a contracting authority establishes a framework agreement for its own needs (not on behalf of others), and then calls-off from that framework agreement from time to time. A framework agreement thus sets out the terms (particularly relating to price, quality, and quantity) under which different contracts (call-offs) can be made throughout the period of the agreement. The rationale behind the framework agreement is to achieve savings in both costs and time spent in consecutive procurements.</p>
Example(s) <i>An example of the business model</i>	<p>This model is widely used at national level inside the different countries. In particular, framework arrangements have been used in a number of EU countries including France and the Nordic countries (and also UK). The majority of public research provider organisations are using this model to procure resources or services for their communities (e.g., NRENs or NGIs for networking, computing, storage infrastructures and services). Frequently this model is combined with the central purchasing function and there are also such examples at European level under BM3.</p>
Perspective/viewpoint <i>Define from which perspective this business model is developed, i.e., who is the “value provider”</i>	Viewpoint: of the procurer (contracting authority), in our case the research performing organisation.
Business model type/pattern (if applicable) - click the link for descriptions. <i>Type of business model (e.g., public to private) and related business pattern(s).</i>	<p>Type: Private to public (mostly). Pattern(s): Simplify/streamline the procurement process. Private (commercial) providers (SME to Multinational) providing / selling services to contracting authorities (users in the public sector / organisations funded by public means). .</p>

<p>Key partners (from business model canvas) <i>Key partners/ stakeholders involved in the business model. Who are the key providers/suppliers? Which key resources are we acquiring from partners? Which activities do partners perform?</i></p>	<p>Procurer-> Universities, research institutes, e-Infrastructure legal entities and other bodies that are part of the wider R&E community provided their procurements need to be compliant with the EC Directives for public procurement. Suppliers -> all entities that are interested in supplying Cloud services to the R&E community (these can be both private and public entities)</p>
<p>Key activities (from business model canvas) <i>Key activities our Value Propositions require. Main actions to deliver the business model and the value which comes with it. Relationship with users: e.g., Support/ training.</i></p>	<p>Framework agreements act as an 'umbrella agreement' that set out the terms (particularly relating to price, quality, and quantity) under which individual contracts (call-offs) can be made throughout the period of the agreement. The contracting authority defines the tender specifications to procure services that meet the requirements and issues the tender. Suppliers submit offers and the best ones are selected for each area (lot). Resources/services from the pool of selected suppliers can be used and several call-offs can be instantiated to satisfy the demand.</p>
<p>Key resources (from business model canvas) <i>Key Resources our Value Propositions require. The physical, intellectual (including publications, data, software, patents along with corresponding IP rights/licences) financial and human assets required to make the business model deliver.</i></p>	<p>Suppliers' resources/services and support/training. Users that benefit from the services.</p>
<p>Value (from business case/pattern) or value propositions (from business model canvas) <i>Value delivered to the end users (what problem are we solving, what outputs are we offering to the end users, potential impact)</i></p>	<p>The procurer (contracting authority) and ultimately its end users benefit from a simplified/streamlined/faster procurement process via the framework agreements. They may also benefit from cost and time efficiency and added value from the economies of scale achieved, including support and training.</p>
<p>Assumptions and constraints (from Simplifiable business case model) <i>Assumptions and constraints/barriers (even if obvious)</i></p>	<p>There is limited flexibility in changing the framework agreements after the tender (e.g., to include new members, or change requirements). It is not possible to include additional users (user contracting authorities) after the procedure has started. When it comes to additional suppliers, there is the so-called Dynamic Purchasing System (DPS). A DPS is a different procedure, similar to a framework agreement, but it allows new suppliers to join at any given time. However, a DPS is suitable for "off-the-shelf" purchases, where the requirements can be closely specified in advance. One-off, or heavily bespoke or highly complex requirements are unlikely to be suitable for a DPS.</p>

<p>User Segments & Relations (Relations is optional -only if relevant) <i>Who are we creating value for? Most important users. User base type (mass market, segmented, diversified, multi-sided platform)</i></p>	<p>End users: are the individual researchers of the NREN/NGI/RPO on behalf of which the main contracting authority issues a tender (users obtaining the services “free at the point of use”. Researchers are part of universities, research centres, SMEs, etc.</p>
<p>Evaluation: Strengths and Weaknesses (internal factors) Optional: Opportunities, Threats (external factors) from SWOT analysis or PESTEL analysis <i>A mini-SWOT analysis, complemented by elements of PESTLE analysis (only when relevant)</i> <i>Internal factors:</i> <i>Strengths</i> <i>External factors:</i> <i>Opportunities</i> <i>Threats</i> <i>Other external factors relevant (PESTEL including regulatory)</i></p>	<p>Strengths: Solution (compared to BM1 - plain case): - More efficient than BM1, as the contracting authority does not have to go through the tendering process every time the requirements arise and can do so once, reducing tendering costs. Thus, simplifies / streamlines the procurement process avoiding tender bureaucracy and costs. - More flexible than BM1 and well suited when the exact demand of resources/services is not easy to estimate, as new orders can be done under the same framework, especially in case of multiple-provider framework agreements the most suitable providers for the specific case can be chosen. - Can be combined with demand aggregation (see BM3) and thus result in better quality, prices, conditions, and terms for the contracting authorities (economies of scale) and, in the end, also end users and taxpayers. - Otherwise, similar to the main case.</p> <p>Users: - Free at the point of use offered by the EC or RPO. - Centralised services that are easy to use - Support/training for using the services</p> <p>Suppliers - A good way of engaging with the public sector (in this case research community) for a longer period of time and with multiple contracting authorities (compared with the plain case-direct contract).</p> <p>(Opportunity) - Benefit from interaction with the research community in terms of new market and high-end/novel needs/innovation potential.</p> <p>Weaknesses: - May imply a long-term partnership with the suppliers, and in case not fully content with the quality, may be bound with the set of selected suppliers. Also new suppliers with innovative solutions not part of the framework agreement may not be able to enter the framework agreement. There are ways though to add supplies (e.g., DPS analysed above), however, usually for off-the-shelf services. Local implementations of the directive may be different. Lack of flexibility in adding users (beneficiaries) For suppliers who invest a lot of time to get a framework agreement and not get any contracts.</p>

<p>Funding/financial analysis (from Simplifiable business case model, also taking some elements from business model canvas if applicable)</p> <p><i>Funding and financial aspects, including elements such as budget sources and viability, and if applicable expenditures, income/revenue)</i></p>	<p>In case of an EC tender (on behalf of the EU community) as with the planned tender for the EOSC-Core/Exchange in 2023:</p> <ul style="list-style-type: none"> - Funding comes from the EC, as part of Work Programmes (similar to grants) <p>In case of an EU tender by another intermediate entity (not the EC), e.g., EOSC Association if it ever takes this role:</p> <ul style="list-style-type: none"> - In case direct EU funding is available (e.g., OCRE), then the risk is smaller. In case direct EU funding is not available (as membership fees may not be enough to cover procurement activities), a framework agreement may be more appropriate (referrer or intermediate role not taking up the risk). See next two business models (BM2-BM3). <p>In case of national/local tenders:</p> <ul style="list-style-type: none"> - Funding may come from EU funds (e.g., European Structural and Investment Funds-ESIF), national sources (ministries/research councils, or other). In some cases, funding comes from the users of the services (e.g., an NREN may be getting paid for the services offered to Universities and Research Centres).
<p>Overall assessment and recommendations</p> <p><i>Outlook of the business case on how effective and viable it is, given the SWOT and other analyses, and also outlook on a way forward including recommendations to key partners and roadmap/next steps/ /milestones.</i></p>	<p>This is similar to the general case with the additional flexibility of the framework agreement. Overall, the general EU public procurement following the 2014/24/EU directive is a robust and professional tool for acquiring services. For the specific case of the research community and for EOSC in particular, it provides professionalisation of the services offered to the users, a stricter framework for suppliers to deliver compared to grants, and some further benefits such as better cost effectiveness, opening up to industry and alignment with industrial commodity services. The IPR may also stay with the EU and Member States instead of the partners of a specific consortium (as with grants). The framework agreements give some further flexibility to the user contracting authorities (beneficiaries) to take advantage of the nominated suppliers services.</p> <p>On the other hand, careful planning is needed to foresee the sometimes-dynamic requirements of the user communities and prepare the tender specifications, as there may be less flexibility compared to EU grants during the course of the tender implementation. That is why the good engagement of the user communities that the services are procured for is vital, so that their requirements are well reflected in the tender specifications. Furthermore, consultations with potential suppliers before the writing of the specifications are crucial for the tender success (provided the principle of equal treatment is observed). Framework Agreements are more flexible than direct contracts (BM1) and well suited when the exact demand/quantities of resources/services are not easy to estimate, as new orders can be done under the same framework. In case of multiple-provider framework agreements the most suitable providers for the specific case can also be chosen. Framework Agreements can also be combined with demand aggregation (see BM3) and thus result in better quality, prices, conditions, and terms for the contracting authorities (economies of scale) and, in the end, also end users and taxpayers.</p> <p>After the tender procedure starts, it is not possible to include additional users (user contracting authorities).</p>

	<p>When it comes to additional suppliers, the Dynamic Purchasing System (DPS) is more suitable. A DPS is similar to a framework agreement, but it allows new suppliers to join at any given time. However, a DPS is suitable for “off-the-shelf” purchases, where the requirements can be closely specified in advance. One-off, or heavily bespoke or highly complex requirements are unlikely to be suitable for a DPS.</p>
<p>Relevance to EOSC <i>Relevance of the business model with the EOSC context, either directly (e.g., procurement foreseen in EOSC) or indirectly (e.g., business models relevant to EOSC-related projects such as on Research Infrastructures or business models relevant to national/EU stakeholders, such as in-kind/in cash contributions for Research Infrastructures).</i></p>	<p>As outlined in BM1 and given the current plans that the EOSC Core and access to/parts of EOSC Exchange will be procured via EC public procurement so that the resources/services are available in time after the end of the EOSC-Future (procurement needs to start already in 2022), this special business model based on a framework agreement is applicable for this case (EOSC Core and part of Exchange procurement). In addition, it can provide more flexibility to capture the dynamic requirements of the research communities and to be able to respond to the corresponding demand (in size) as the exact required quantities may not be known in advance or may also evolve over the future. This model can be also combined with BM3 (demand aggregation/CPB) as already stated.</p> <p>Furthermore, this special model may apply to other EU/national entities that may want to procure services relevant to EOSC (computing, data, other) on behalf of their partners and be federated to EOSC ecosystem.</p>

Business Model 3

Business model (full) name <i>Full name of the business model</i>	Procurement with demand aggregation (through a central purchasing body)
Short description <i>Short description of the business model</i>	<p>The EC public procurement directive (2014/24/EC) provides the opportunity for a contracting authority to operate as a Centralised Purchasing Body (CPB) on behalf of other contracting bodies. The individual contracting bodies can thus benefit from a tender organised by a CPB and acquire resources or services via the broader agreement with the CPB. The demand for common services from research and education users can be aggregated in order to get the best deal from suppliers in the market whilst complying with procurement regulations. The CPB can be an EU body with a central role (e.g., GÉANT on behalf of the NRENs) or a corresponding national one (e.g., NREN on behalf of its member or served institutions).</p> <p>In more detail, the individual contracting bodies, i.e., the users (and future beneficiaries) contact the main contracting authority (CPB) with a request to tender on their behalf. The users (future beneficiaries) mandate the contracting authority to execute the tender as CPB and the CPB will award an agreement binding the users and the supplier(s) that won the tender. The users (beneficiaries) can now use the services from the suppliers available in the contract.</p> <p>The CPB can take various roles, with different levels of involvement in this process, ranging from an intermediate facilitator to a more active role (wholesaler) that involves reselling or modifying the procured services (in the latter the CPB undertakes the risk).</p> <p>This model can be combined with the framework agreement one (BM2) and in this case the framework agreement and its call-offs over the period of the agreement are used by the individual contracting authorities as users.</p>
Example(s) <i>An example of the business model</i>	<p>A concrete example for this case is GÉANT that has been acting as a ‘broker of services’ in the form of a Centralised Purchasing Body (CPB) as defined in EC Directive 2014/24/EU towards the EU NRENs. In EOSC-hub D12.2 case study 4 GÉANT awarded frameworks on behalf of the NREN’s that have mandated GÉANT to do so. An example of a service offered to NRENs is commodity internet (from upstream commercial internet service providers) via the GÉANT network (known as GÉANT World Service, formerly DANTE World Service). OCRE is another example that combines the CPB role (BM3) between GÉANT and the NRENs with the framework agreement (BM2). In this case the beneficiaries are the EU National Research and Education Networks (NRENs) representing a country and their partners within the country. In other words, the framework agreement and its "call-offs" over the period of the agreement are used by the individual NRENs.</p> <p>Two main models can be used for the distribution of the resources/services within the country. The “Referrer” model, where the NREN acts as intermediary by making the Framework Agreements available</p>

	in its respective country and facilitating connected institutions in purchasing from the suppliers (direct delivery model). And the “Underwriter” model that further expands the referrer role, and the NREN undertakes further responsibilities and may be involved in the contracting and billing of (some of) its partner institutions’ service orders within the country.
Perspective/viewpoint <i>Define from which perspective this business model is developed, i.e., who is the “value provider”</i>	Viewpoint: The model is described from the viewpoint of the central purchasing body, who has a key role in assessing and aggregating demand and procurement
Business model type/pattern (if applicable) - click the link for descriptions. <i>Type of business model (e.g., public to private) and related business pattern(s).</i>	Type: Private to public or public to public Pattern: Aggregate demand for economies of scale
Key partners (from business model canvas) <i>Key partners/ stakeholders involved in the business model. Who are the key providers/suppliers? Which key resources are we acquiring from partners? Which activities do partners perform?</i>	Users: Universities, Research institutes, members of R&E community Service Providers: can be from private or public sectors. Central Purchasing Body: NREN or the like
Key activities (from business model canvas) <i>Key activities our Value Propositions require. Main actions to deliver the business model and the value which comes with it. Relationship with users: e.g., Support/training.</i>	The CPB mobilises its community to align on specifications and requirements and form a buyer group. The CPB procures services that meet the requirements of the community. The CPB signs a service commencement form, authorising direct contact between service providers and the research organisations which they represent. The CPB champions the adoption of services through activities such as promotion, education, training, etc.
Key resources (from business model canvas) <i>Key Resources our Value Propositions require. The physical, intellectual (including publications, data, software, patents along with corresponding IP rights/licences) financial and human assets required to make the business model deliver.</i>	Suppliers' resources/services and support/training. Users that benefit from the services.
Value (from business case/pattern) or value propositions (from business model canvas) <i>Value delivered to the end users (what problem are we solving, what outputs are we offering to the end users, potential impact)</i>	The contracting authorities (CPB and beneficiaries) and ultimately the beneficiary users benefit from the cost-efficiency and added value by the joint purchase of similar services, including support and training. Works well for commodity-like services.

<p>Assumptions and constraints (from Simplifiable business case model) <i>Assumptions and constraints/barriers (even if obvious)</i></p>	<p>Assumes that many users in (segments of) R&E community have similar demands.</p>
<p>User Segments & Relations (Relations is optional -only if relevant) <i>Who are we creating value for? Most important users. User base type (mass market, segmented, diversified, multi-sided platform)</i> <i>What type of relationship does each of our User Segments expect us to establish and maintain with them? Which ones have we established? How are they integrated with the rest of our business model? How costly are they?</i></p>	<p>End users: are the individual researchers of the RPO on behalf of which the CPB issues a tender (users obtaining the services “free at the point of use”. Researchers are part of universities, research centres, SMEs, etc.</p>
<p>Channels / Networks (Optional - only if relevant) <i>Through which Channels / Networks do our User Segments can be reached/ can work best.</i></p>	
<p>Evaluation: Strengths and Weaknesses (internal factors) Optional: Opportunities, Threats (external factors) from SWOT analysis or PESTEL analysis <i>A mini SWOT analysis, complemented by elements of PESTLE analysis (only when relevant)</i> <i>Internal factors:</i> <i>Strengths</i> <i>External factors:</i> <i>Opportunities</i> <i>Threats</i> <i>Other external factors relevant (PESTEL including regulatory)</i></p>	<p>Strengths: Solution (compared to other cases). - Demand aggregation results in better prices, quality, conditions, and terms for the contracting authorities and, in the end, also end users and taxpayers. - Reduced overhead and administration costs - Demand aggregation can increase competition (however, see also potential weakness for small players). - Can be combined with other frameworks, such as framework agreements (BM2). Users - Free at the point of use offered by the EC or RPO. - Centralised services that are easy to use - Support/training for using the services - Benefit from common standards, in particular in the area of access & identity management Suppliers - A good way of engaging with the public sector (in this case research community) for a longer period of time and with multiple contracting authorities (compared with the plain case-direct contract). (Opportunity)</p>

	<p>- Benefit from interaction with research community in terms of new market and high-end/novel needs/innovation potential.</p> <p>Weaknesses:</p> <ul style="list-style-type: none"> - May not be optimal for niche or more specific services. - Although demand aggregation may increase competition and engage large players in the market, this may become a potential weakness for small market players (e.g., SMEs) to be able to compete with the large players. <p>Suppliers may invest significant time and not get any contract (including RPOs/e-Infra providers)</p>
<p>Funding/financial analysis (from Simplifiable business case model, also taking some elements from business model canvas if applicable) <i>Funding and financial aspects, including elements such as budget sources and viability, and if applicable expenditures, income/revenue</i></p>	<p>In case of an EC tender (on behalf of the EU community) as with the planned tender for the EOSC-Core/Exchange in 2023:</p> <ul style="list-style-type: none"> - Funding comes from the EC, as part of Work Programmes (similar to grants) <p>In case of an EU tender by another intermediate entity (not the EC), e.g., EOSC Association if it ever takes this role:</p> <ul style="list-style-type: none"> - In case direct EU funding is available (e.g., OCRE with CPB), then the risk is minimised. In case direct EU funding is not available (as membership fees may not be enough to cover procurement activities), a framework agreement may be more appropriate (referrer or intermediate role not taking up the risk). See next two business models (BM2-BM3). <p>In case of national/local tenders:</p> <ul style="list-style-type: none"> - Funding may come from EU funds (e.g., European Structural and Investment Funds-ESIF), national sources (ministries/research councils, or other). In some cases, funding comes from the users of the services (e.g., an NREN may be getting paid for the services offered to Universities and Research Centres).
<p>Overall assessment and recommendations <i>Outlook of the business case on how effective and viable it is, given the SWOT and other analyses, and also outlook on a way forward including recommendations to key partners and roadmap/next steps/ /milestones.</i></p>	<p>This is again similar to the general case with the additional benefits of the demand aggregation offering better terms and conditions, including prices and quality and overall reduced administration. As already mentioned, this model can be combined with a framework agreement.</p> <p>Overall, the general EU public procurement following the 2014/24/EU directive is a robust and professional tool for acquiring services. For the specific case of the research community and for EOSC in particular, it provides professionalisation of the services offered to the users, a stricter framework for suppliers to deliver compared to grants, and some further benefits such as better cost effectiveness, opening up to industry and alignment with industrial commodity services. The IPR may also stay with the EU and Member States instead of the partners of a specific consortium (as with grants). The framework agreements give some further flexibility to the user contracting authorities (beneficiaries) to take advantage of the nominated suppliers services.</p> <p>On the other hand, careful planning is needed to foresee the sometimes-dynamic requirements of the user communities and prepare the tender specifications, as there may be less flexibility compared to EU grants</p>

	<p>during the course of the tender implementation. That is why the good engagement of the user communities that the services are procured for is vital, so that their requirements are well reflected in the tender specifications. Furthermore, consultations with potential suppliers before the writing of the specifications are crucial for the tender success. Demand aggregation results in better quality, prices, conditions, and terms for the contracting authorities (economies of scale) and, in the end, also end users and taxpayers. If combined with a framework agreement the additional benefits of BM2 apply also.</p>
<p>Relevance to EOSC <i>Relevance of the business model with the EOSC context, either directly (e.g., procurement foreseen in EOSC) or indirectly (e.g., business models relevant to EOSC-related projects such as on Research Infrastructures or business models relevant to national/EU stakeholders, such as in-kind/in cash contributions for Research Infrastructures).</i></p>	<p>As outlined in BM1 and BM2 and given the current plans that the EOSC Core and access to/parts of EOSC Exchange will be procured via EC public procurement so that the resources/services are available in time after the end of the EOSC-Future (procurement needs to start already in 2022), this special business model based on demand aggregation/CPB is applicable in this case (procurement of EOSC Core and parts of Exchange). Furthermore, it can provide better terms and conditions, aggregating demand, improving quality, and reducing prices. This model can be also combined with BM2 (framework agreement). Furthermore, this special model may apply to other EU or national entities which may want to procure services relevant to EOSC (computing, data, other services) on behalf of their partners and be federated to the EOSC ecosystem, including Research Infrastructures and ERICs.</p>

Business Model 4

Business model (full) name <i>Full name of the business model</i>	Virtual access to EU Research Infrastructures including e-Infrastructures in the Horizon 2020 framework program
Short description <i>Short description of the business model</i>	Virtual Access (VA) refers to a specific financial instrument defined in the “European Research Infrastructures (including e-Infrastructures)” EC Work Programme, which is part of the Horizon 2020 framework program. The goal of this instrument is to reimburse service providers (also called “access providers”) the costs of provisioning (via the internet) services to researchers as beneficiaries to the H2020 grant. Virtual Access is similar to remote Transnational Access (TNA), but it doesn’t allow differentiation between users. TNA requires a process to select users normally based on scientific excellence (e.g., for the access to a scarce resource such as a supercomputer).
Example(s) <i>An example of the business model</i>	There are several concrete examples using the Virtual Access scheme, i.e., Research Infrastructures and e-Infrastructures. These include EOSC-hub, OpenAIRE, EGI-ACE, EOSC-future in e-Infrastructures, but also in several cases of Research Infrastructure projects. The main point in all these examples is that the costs incurred by the corresponding "access provider" for the provision of virtual access to their resources/services (related to computing, data, publications) are reimbursed as estimated in the grant agreement.
Perspective/viewpoint <i>Define from which perspective this business model is developed, i.e., who is the “value provider”</i>	Viewpoint: of the service provider receiving virtual access funding via a grant offering access to resources to a set of users
Business model type/pattern (if applicable) - click the link for descriptions <i>Type of business model (e.g., public to private) and related business pattern(s).</i>	Type: Public to public, public to private, private to public (depending on grant beneficiaries offering the service (“access providers”) and end users from the public sector or SMEs) Pattern: opening up existing research resources (data, services) to more researchers via public institution funding.
Key partners (from business model canvas) <i>Key partners/ stakeholders involved in the business model. Who are the key providers/suppliers? Which key resources are we acquiring from partners? Which activities do partners perform?</i>	Suppliers assisting to offer the service (with equipment, personnel, knowhow) Grant funder: EC as contracting authority offering the grant via a competitive call.

<p>Key activities (from business model canvas) <i>Key activities our Value Propositions require. Main actions to deliver the business model and the value which comes with it. Relationship with users: e.g., Support/training.</i></p>	<p>EC issues a call for proposals that includes VA for access to RIs. A consortium is formed that includes Access providers or they can be added in the Grant via an open call. Grant Agreement with VA is prepared and signed. Access providers offer the services openly and free and researchers can access them</p>
<p>Key resources (from business model canvas) <i>Key Resources our Value Propositions require. The physical, intellectual (including publications, data, software, patents along with corresponding IP rights/licences) financial and human assets required to make the business model deliver.</i></p>	<p>Access providers installations, including access infrastructure (connectivity) Access providers personnel offering the services along with related support (training, helpdesks, etc.) Users that require/benefit from the services H2020 grant funding for reimbursing access cost (OPEX, and under conditions also CAPEX via unit costs) Monitoring infrastructure (metrics) to monitor access</p>
<p>Value (from business case/pattern) or value propositions (from business model canvas) <i>Value delivered to the end users (what problem are we solving, what outputs are we offering to the end users, potential impact)</i></p>	<p>Free at the point of use remote access to RI installations services Added value services such as training and support. Access providers are reimbursed for the Opex (and possibly some of their Capex)</p>
<p>Assumptions and constraints (from Simplifiable business case model) <i>Assumptions and constraints/barriers (even if obvious)</i></p>	<p>Legal: EC grant with VA (usually part of RI/e-Infrastructure calls). A WP is required with a special access costs table. Financial: Reimbursement via the Grant cost claim form as actual costs, unit costs or both. A monitoring infrastructure is required including metrics/KPIs. Access providers need to comply with their local access policies.</p>
<p>User Segments & Relations (Relations is optional -only if relevant) <i>Who are we creating value for? Most important users. User base type (mass market, segmented, diversified, multi-sided platform) What type of relationship does each of our User Segments expect us to establish and maintain with them? Which ones have we established? How are they integrated with the rest of our business model? How costly are they?</i></p>	<p>End users: researchers of the public sector or SMEs using the service “free at the point of use”. The end users are primarily researchers but can also be the public sector or SMEs or citizen scientists or even the general public, using the service “free at the point of use”. Researchers are part of universities, research centres, industry/SMEs, etc. <i>Relationships with user segments and how to maintain them.</i> In several cases the entities behind a service (e.g., EOSC association in this case) may be transparent to the users. This is similar for university users accessing EU or national research networks may not be aware of the entities behind (NRENS, GÉANT). Still, there may be portals/marketplaces where users can provide feedback, helpdesk functions where users can ask for support or training sessions for better exploiting the services and for users upskilling.</p>

<p>Channels / Networks (Optional - only if relevant) <i>Through which Channels / Networks do our User Segments can be reached/ can work best.</i></p>	<p>Depending on the virtual access users, corresponding networks can be used at EU, regional, national, campus levels, e.g., European university or researchers or librarian networks, NRENs, segmented campus networks. Examples of EU ones: LIBER, CESAER, EUA, LERU and Science Europe Or if the provided service is part of a specific thematic area (e.g., biobanks, mobile networks testbeds or living labs), corresponding thematic channels can be used.</p>
<p>Evaluation: Strengths and Weaknesses (internal factors) Optional: Opportunities, Threats (external factors) from SWOT analysis or PESTEL analysis <i>A mini-SWOT analysis, complemented by elements of PESTLE analysis (only when relevant)</i> <i>Internal factors:</i> <i>Strengths</i> <i>External factors:</i> <i>Opportunities</i> <i>Threats</i> <i>Other external factors relevant (PESTEL including regulatory)</i></p>	<p>Strengths Users: Open/free/remote use (no authentication, no authorisation, although the access may be limited to a community, no VAT issues) Easy to access/ simple access policies (only by providers) Access Providers Easy way to offer services and get their Opex (Capex) reimbursed via the grant. Only their local access policies apply. Demand aggregation can be achieved via the grant. Grant funders No procurement required (and related rules) /only the grant with VA. Flexible in improving the mechanism (already now Capex partly allowed) Weaknesses Users: Usually limited to the available funding /resources offered; cannot scale further. May require training and support to be able to access the services (including studying access providers policies) Access Providers Cost calculations may not be straightforward (e.g., unit costs require historical data) Not all Capex can be reimbursed. Monitoring infrastructure (metrics/KPIs) may not be straightforward (including project management overhead) VA scheme may not be compatible with national policies (restrictions on access or costs reimbursement) Only non-deductible VAT on the eligible costs can be recovered. Grant funder Relies on EC to prepare a call with the VA scheme. External factors: Access Providers</p>

	National regulations/policies may limit the VA scheme applicability
Funding/financial analysis (from Simplifiable business case model, also taking some elements from business model canvas if applicable) <i>Funding and financial aspects, including elements such as budget sources and viability, and if applicable expenditures, income/revenue)</i>	Budget comes from the EC/via the grant and the cost category is Virtual Access according to the Model Agreement article 16.2. Opex and partly Capex is eligible (income for access providers)
Overall assessment and recommendations <i>Outlook of the business case on how effective and viable it is, given the SWOT and other analyses, and also outlook on a way forward including recommendations to key partners and roadmap/next steps/ /milestones.</i>	Overall, this business model provides a flexible way for accessing openly / freely (for the end users) remote resources, while the access providers are being reimbursed via the corresponding grant projects. The main issue is that this mechanism is only applicable in Research Infrastructures (including e-Infrastructures) EC grants. The VA model was further improved during the course of Horizon 2020, as besides operational costs, some capital costs can also be reimbursed. It is recommended to keep this scheme in the Horizon Europe programme and keep an open dialogue with the community for further improvements.
Relevance to EOSC <i>Relevance of the business model with the EOSC context, either directly (e.g., procurement foreseen in EOSC) or indirectly (e.g., business models relevant to EOSC-related projects such as on Research Infrastructures or business models relevant to national/EU stakeholders, such as in-kind/in cash contributions for Research Infrastructures).</i>	As eventually the EOSC Core and Exchange will move from the current grants-based financing to the provision via public procurement, this model will apply only to the remaining EOSC-related projects (grants) in Horizon Europe, either direct EOSC projects (e.g. on enabling a FAIR EOSC Ecosystem including a PID infrastructure, innovative services, web of FAIR data, digital skills, vertical infrastructures for health, next Generation scientific instrumentation, tools and methods and advanced digital solutions) or related Research Infrastructures projects (e.g. on further RI services especially in Health research, and on green and digital transformation).

Business Model 5

Business model (full) name <i>Full name of the business model</i>	Cross-border pooling of resources (in-kind contributions)
Short description <i>Short description of the business model</i>	<p>The in-kind model is based on a community pooling their resources into a "hub" that - one way or the other - encourages fairness of resource sharing. Creating a larger pool of resources increases the likelihood that any user groups' peak demand can be met with the resources available (since the peak represents a smaller portion of the available resources).</p> <p>The contributions can be based on scientific collaboration agreements such as the ones between thematic Research Infrastructures (ESFRI or others, or related ERICs). Another type of collaboration agreement can be found in the Worldwide LHC Computing Grid (WLCG) approach, where LHC experiments estimate computing resources that the CERN member states should contribute, agreed in a Memorandum of Understanding (MoU). The actual contributions provided are monitored and reviewed.</p> <p>This model resembles the early Citizen Science approaches where the coordinator of the collaborative effort provided contributor visibility and promotion ("kudos") in return for the resources provided by publishing statistics of the use and work done. In case of member state contributions, the reporting requirements are likely to be somewhat more comprehensive and multifaceted.</p>
Example(s) <i>An example of the business model</i>	As already mentioned, in kind contributions from MS/ACs are found in several Research Infrastructures, e.g., in physical sciences and engineering such as the European Spallation Source (ESS) ERIC. Another concrete example mentioned above is the WLCG collaboration which is based on an MoU https://wlcg.web.cern.ch/mou between CERN and the corresponding national computing centres. Other examples exist in life sciences and environment, although over the lifetime of a research infrastructure the mixed in kind and in cash contribution may be preferred.
Perspective/viewpoint <i>Define from which perspective this business model is developed, i.e., who is the "value provider"</i>	Viewpoint: the hub of a community-oriented approach that can be a legal entity, project or based on an MoU-like document
Business model type/pattern (if applicable) - click the link for descriptions. <i>Type of business model (e.g., public to private) and related business pattern(s).</i>	Type: public to public, possibly also private to public ("corporate sponsorship" scenario). Public to private likely mostly a theoretical option. Pattern: aggregate demand for economy of scale.

<p>Key partners (from business model canvas) <i>Key partners/ stakeholders involved in the business model. Who are the key providers/suppliers? Which key resources are we acquiring from partners? Which activities do partners perform?</i></p>	<p>National research communities in MS/ACs (historically thematic/disciplinary ones) providing the motivation and potentially also metrics for assessing the fairness of sharing. Funding agencies in MS/ACs interested in improving academic metrics (publications)</p>
<p>Key activities (from business model canvas) <i>Key activities our Value Propositions require. Main actions to deliver the business model and the value which comes with it. Relationship with users: e.g., Support/training.</i></p>	<p>Establishing the collaboration agreement and related terms of resource sharing Implementing the resource sharing and fine tuning the terms Community building Supporting lobbying efforts in MS/ACs Monitoring and governing the resource sharing. Joint dissemination and lobbying activities</p>
<p>Key resources (from business model canvas) <i>Key Resources our Value Propositions require. The physical, intellectual (including publications, data, software, patents along with corresponding IP rights/licences) financial and human assets required to make the business model deliver.</i></p>	<p>MS/AC partners' different installations/resources and personnel including access to the sharable resources (e.g., based on national allocations in computing centres, pooling of hobbyist resources or other formal or informal arrangements). Users that require/benefit from the services Software solutions (often community-specific and -based), data outputs and related publications/patents.</p>
<p>Value (from business case/pattern) or value propositions (from business model canvas) <i>Value delivered to the end users (what problem are we solving, what outputs are we offering to the end users, potential impact)</i></p>	<p>High potential output if a significant (e.g., across EU) collaboration is achieved and if successful. Free at the point of use. Common, discipline-specific practices across MS/ACs. Fairness of resource sharing can be based on higher level concepts than plain "number of core hours". Relatively straightforward to expand to global collaborations. Social capital (the networks of relationships among people who work in the collaboration, sharing a common goal, understanding, norms, values, and trust).</p>
<p>Assumptions and constraints (from Simplicible business case model) <i>Assumptions and constraints/barriers (even if obvious)</i></p>	<p>Assumptions: Legal: A collaboration agreement or MoU for a common good is a prerequisite. This may be expressed as simply abiding to a set of Terms of Reference, Rules and Policies. Funding: National funding for the procurement of national resources Other: The research outputs are open and freely exploitable (reducing the pressure to define relative ownership shares using fixed methods). There is a commonly accepted concept of fairness of resource sharing. Shared vision and aligned business cases ("if one of us gets a Nobel, all of us will get tenure or additional postdoc")</p>

	<p>Constraints:</p> <p>Suited for research projects where the differences in national legal frameworks are not a major issue (open datasets, no obvious security implications, areas where interpretation of personal information differs between different countries).</p> <p>The decision making/governance hierarchy needs to reflect the values of the related research community (e.g., co-chairs of collaboration elected on seniority or scientific track record, not on the share of resources national budget).</p> <p>A monitoring infrastructure is required including metrics/KPIs.</p>
<p>User Segments & Relations (Relations is optional -only if relevant)</p> <p><i>Who are we creating value for? Most important users. User base type (mass market, segmented, diversified, multi-sided platform)</i></p> <p><i>What type of relationship does each of our User Segments expect us to establish and maintain with them? Which ones have we established? How are they integrated with the rest of our business model? How costly are they?</i></p>	<p>End users: relatively advanced specialists in the thematic area/discipline served.</p> <p>Thematic/Disciplinary research communities</p>
<p>Channels / Networks (Optional - only if relevant)</p> <p><i>Through which Channels / Networks do our User Segments can be reached/ can work best.</i></p>	
<p>Evaluation: Strengths and Weaknesses (internal factors)</p> <p>Optional: Opportunities, Threats (external factors) from SWOT analysis or PESTEL analysis</p> <p><i>A mini-SWOT analysis, complemented by elements of PESTLE analysis (only when relevant)</i></p> <p><i>Internal factors:</i></p> <p><i>Strengths</i></p> <p><i>External factors:</i></p> <p><i>Opportunities</i></p> <p><i>Threats</i></p> <p><i>Other external factors relevant (PESTEL including regulatory)</i></p>	<p>Strengths</p> <p>Great potential for excellent science.</p> <p>Common governance/management hierarchy</p> <p>Agile service/technology development (direct link between science case and IT service)</p> <p>Free at the point of use and fair/agreed resource sharing (for users)</p> <p>Common, discipline-specific practices across MS/ACs</p> <p>Relatively straightforward to expand to global collaborations.</p> <p>Weaknesses</p> <p>Lack of dedicated EU grant (in cash) funding may lead to non-dedicated resources/personnel and concrete outputs, and ultimately delays in the construction/operation of the RI.</p> <p>Hard to generalise (unless disciplines supported resemble each other)</p> <p>Harder to reach the critical mass and economies of scale (in the ICT solutions sphere)</p> <p>Inter-sectoral collaboration is likely harder (clash between academic and commercial business models)</p>

	<p>Opportunities Innovation opportunities based on the collaboration (spin-off, start-ups on the new methods, outputs produced). The lead buyer approach for ICT resources can be easy to accommodate, especially in cases where it could be part of a broader scheme for balancing in kind contributions (building and maintaining physical infrastructure, developing scientific instruments etc)</p> <p>Threats Skillsets and technical solutions may end up deviating from mainstream solutions to a degree that they represent a very small niche that will have difficulties in maintaining sufficient number of sufficiently skilled ICT specialists (e.g., due to difficulties in talent acquisition and retention).</p>
<p>Funding/financial analysis (from Simplifiable business case model, also taking some elements from business model canvas if applicable) <i>Funding and financial aspects, including elements such as budget sources and viability, and if applicable expenditures, income/revenue</i></p>	<p>Budget typically a part of the overall disciplinary research budget from MS/ACs.</p>
<p>Overall assessment and recommendations <i>Outlook of the business case on how effective and viable it is, given the SWOT and other analyses, and also outlook on a way forward including recommendations to key partners and roadmap/next steps/ /milestones.</i></p>	<p>Overall, this business model provides a simple way of accessing cross-border resources via collaboration agreements for achieving a common good, with great potential for excellent science under a common governance/management hierarchy, agile service/technology development and common, discipline-specific practices across MS/ACs. It is also relatively straightforward to expand to global collaborations. However, lack of dedicated funding (EU grants/in cash) may lead to non-dedicated resources/personnel and lack of concrete outputs, and ultimately delays in the construction/operation of the RI. In some cases, it may increase the risk of forming disciplinary silos. Delegating procurement activities to national/MS/AC level may avoid issues related to cross-border VAT, even in the case of lead-buyer/CPB approach. Encouraging integration of commercially available commodity/standard solutions into the disciplinary ICT stack will likely reduce the risk of the disciplinary ICT becoming an isolated niche. (e.g., CMS lock-in example).</p>
<p>Relevance to EOSC <i>Relevance of the business model with the EOSC context, either directly (e.g., procurement foreseen in EOSC) or indirectly (e.g., business models relevant to EOSC-related projects such as on Research Infrastructures or business models relevant to national/EU stakeholders, such as in-kind/in cash contributions for Research Infrastructures).</i></p>	<p>In kind contributions from MS/ACs are found in several Research Infrastructures, ESFRI or others, either legal entities such as ERICs or other that are or will be federated to EOSC. Thus, these are related to EOSC either directly or indirectly. For ESFRI or several other cases, the in-kind contributions are usually combined with EU grants/or national in cash funding, in which case this becomes BM6.</p>

Business Model 6

Business model (full) name <i>Full name of the business model</i>	Cross-border pooling of resources (in-kind + MS/AC-EC contributions)
Short description <i>Short description of the business model</i>	<p>In this case, the in-kind contributions are also complemented by in cash contributions, such as grant(s), EC, national or other, such as the ones supported by the ESFRI Roadmap process that can fund ESFRI RIs or ERICs in different phases, such as design phase, preparatory phase, implementation phase, etc. This combines the advantages of the in-kind model (e.g., community pooling their resources into a "hub" that encourages fairness of resource sharing, increasing the likelihood that peak demands can be met with the resources available) with the advantages of the funded model (i.e., dedicated resources /personnel and concrete outputs, ultimately sticking to timelines for the construction/operation of the RI). Furthermore, in accordance with Article 7(3) of the ERIC Regulation, ERICs are recognised as international organisations for the purpose of the EU public procurement directives, and they can adopt their own procurement procedures. Thus, this model may be combined with the other relevant models on procurement (e.g., BM1-BM3). As identified in the High-Level Expert Group report assessing the progress of ESFRI and other world class RIs in 2020, "procurement processes are more complex and time consuming in Europe, hampering co-creation with the private sector", while ERICs may allow streamlined procurement as part of the ERIC network and partners.</p>
Example(s) <i>An example of the business model</i>	<p>The EOOSC overall framework and in particular the EOOSC Partnership is characterised by such a business model, of joint in cash and in cash contributions from EC and MS/ACs. Furthermore, the vast majority of Research Infrastructures use this mixed approach of in-kind and in-cash contributions for the construction and operation of their RI. Most of the projects part of the ESFRI Roadmap process, such as ESFRI Landmarks and/or ERICs or other legal types, belong to this category.</p> <p>Another concrete example is the EuroHPC Joint Undertaking where the EC and the Member States are sharing the costs, the EU being in cash and the Member States in kind or also in cash (especially for the supercomputing infrastructure). The EC and Member States share the infrastructure costs, (50-50% for the pre-exascale and 35-75% for the petascale) and get the corresponding share of the resource usage. For the in-kind resources appropriate guarantees are foreseen (e.g., audited, certified by appropriate certificates). There is currently less clarity on the obligations and benefits of private members (e.g., industry). In EuroHPC, the combined in kind/in-cash model is also complemented by relevant procurement schemes such as joint procurements by the EuroHPC Joint Undertaking and the hosting entity (country or consortium) mainly for the supercomputing infrastructure, supported by EU grants for competence centres/training/support/applications/innovation and partly also for operations (for pre-exascale systems only). Resource allocation will be based mainly on peer-reviewed open calls in</p>

	collaboration with PRACE, evaluated based on scientific excellence and societal impact criteria, along with industrial innovation and impact ones. Still, strategic initiatives may be allocated resources without being peer reviewed. Geographical balance will be also monitored over time.
Perspective/viewpoint <i>Define from which perspective this business model is developed, i.e., who is the "value provider"</i>	Viewpoint: the hub of a community-oriented approach that can be a legal entity, project or based on an MoU-like document including grant(s) from the EC or others.
Business model type/pattern (if applicable) - click the link for descriptions. <i>Type of business model (e.g., public to private) and related business pattern(s).</i>	Type: Mainly public to public, possibly also private to public ("corporate sponsorship" scenario).
Key partners (from business model canvas) <i>Key partners/ stakeholders involved in the business model. Who are the key providers/suppliers? Which key resources are we acquiring from partners? Which activities do partners perform?</i>	National research communities in MS/ACs (historically thematic/disciplinary ones) providing the motivation and potentially also metrics for assessing the fairness of sharing. Funding agencies in MS/ACs interested in improving academic metrics (publications)
Key activities (from business model canvas) <i>Key activities our Value Propositions require. Main actions to deliver the business model and the value which comes with it. Relationship with users: e.g., Support/training.</i>	Establishing the collaboration agreement and related terms of resource sharing Implementing the resource sharing and fine tuning the terms EU call for proposals Preparing grant proposals for different phases of the implementation of the collaboration (design, preparatory, implementation, other) Grant agreements Community building Supporting lobbying efforts in MS/ACs Monitoring and governing the resource sharing. Joint dissemination and lobbying activities
Key resources (from business model canvas) <i>Key Resources our Value Propositions require. The physical, intellectual (including publications, data, software, patents along with corresponding IP rights/licences) financial and human assets required to make the business model deliver.</i>	MS/AC partners' different installations/resources and personnel including access to the sharable resources (e.g., based on national allocations in computing centres, pooling of hobbyist resources or other formal or informal arrangements) Users that require/benefit from the services Software solutions (often community-specific and -based), data outputs and related publications/patents.

<p>Value (from business case/pattern) or value propositions (from business model canvas) <i>Value delivered to the end users (what problem are we solving, what outputs are we offering to the end users, potential impact)</i></p>	<p>High potential output if a significant (e.g., across EU) collaboration and if successful. Free at the point of use. Common, discipline-specific practices across MS/ACs. Fairness of resource sharing can be based on higher level concepts than plain "number of core hours". Relatively straightforward to expand to global collaborations. Social capital (the networks of relationships among people who work in the collaboration, sharing a common goal, understanding, norms, values, and trust).</p>
<p>Assumptions and constraints (from Simplifiable business case model) <i>Assumptions and constraints/barriers (even if obvious)</i></p>	<p>Assumptions: Legal: A collaboration agreement or MoU for a common good is a prerequisite. This may be expressed as simply abiding to a set of Terms of Reference, Rules and Policies. A specific EU grant for (one or more phases of) the collaboration is also a prerequisite. Funding: National funding for the procurement of national resources Other: The research outputs are open and freely exploitable (reducing the pressure to define relative ownership shares using fixed methods). There is a commonly accepted concept of fairness of resource sharing. Shared vision and aligned business cases ("if one of us gets a Nobel, all of us will get tenure or additional postdoc") Constraints: Suited for research projects where the differences in national legal frameworks are not a major issue (open datasets, no obvious security implications, areas where interpretation of personal information differs between different countries...) The decision making/governance hierarchy needs to reflect the values of the related research community (e.g., co-chairs of collaboration elected on seniority or scientific track record, not on the share of resources national budget). A monitoring infrastructure is required including metrics/KPIs.</p>
<p>User Segments & Relations (Relations is optional -only if relevant) <i>Who are we creating value for? Most important users. User base type (mass market, segmented, diversified, multi-sided platform)</i> <i>What type of relationship does each of our User Segments expect us to establish and maintain with them? Which ones have we established? How are they integrated with the rest of our business model? How costly are they?</i></p>	<p>End users: relatively advanced specialists in the thematic area/discipline served. Thematic/Disciplinary research communities</p>

<p>Channels / Networks (Optional - only if relevant) <i>Through which Channels / Networks do our User Segments can be reached/ can work best.</i></p>	
<p>Evaluation: Strengths and Weaknesses (internal factors) Optional: Opportunities, Threats (external factors) from SWOT analysis or PESTEL analysis <i>A mini-SWOT analysis, complemented by elements of PESTLE analysis (only when relevant)</i> <i>Internal factors:</i> <i>Strengths</i> <i>External factors:</i> <i>Opportunities</i> <i>Threats</i> <i>Other external factors relevant (PESTEL including regulatory)</i></p>	<p>Strengths Great potential for excellent science delivering significant outputs benefiting also from the dedicated EU funding, especially if part of a concrete methodology (e.g., ESFRI Roadmap process), with dedicated resources /personnel and concrete outputs, ultimately sticking to timelines for the construction/operation of the RI. Common governance/management hierarchy. Agile service/technology development (direct link between science case and IT service) In kind collaborations are supported by grant(s) in different phases, which can help on getting dedicated resources/personnel and in structuring/boosting results/outputs. Free at the point of use and fair/agreed resource sharing (for users). Common, discipline-specific practices across MS/ACs. Relatively straightforward to expand to global collaborations.</p> <p>Weaknesses Legal structures around the collaborations, such as ERICs, may pose some limitations to participation. Hard to generalise (unless disciplines supported resemble each other) Harder to reach the critical mass and economies of scale (in the ICT solutions sphere) Inter-sectoral collaboration is likely harder (clash between academic and commercial business models)</p> <p>Opportunities Innovation opportunities based on the collaboration (spin-off, start-ups on the new methods, outputs produced). The lead buyer approach for ICT resources can be easy to accommodate due to flexibility of accounting practice (especially in a context where ICT is only a part of a major investment in a shared research infrastructure).</p> <p>Threats Skillsets and technical solutions may end up deviating from mainstream solutions to a degree that they represent a very small niche that will have difficulties in maintaining sufficient number of sufficiently skilled ICT specialists (e.g., due to difficulties in talent acquisition and retention).</p>

<p>Funding/financial analysis (from Simplifiable business case model, also taking some elements from business model canvas if applicable) <i>Funding and financial aspects, including elements such as budget sources and viability, and if applicable expenditures, income/revenue)</i></p>	<p>Budget typically a part of the overall disciplinary research budget from MS/ACs, plus dedicated grant from EC or other pots</p>
<p>Overall assessment and recommendations <i>Outlook of the business case on how effective and viable it is, given the SWOT and other analyses, and also outlook on a way forward including recommendations to key partners and roadmap/next steps/ /milestones.</i></p>	<p>Overall, this business model combines the effective way of accessing cross-border resources via collaboration agreements for a common good with dedicated funding such as EU/national grants, which in turn leads to dedicated personnel and resources, and thus can provide concrete outputs and effectively increase the chances of the RI being implemented in time. The funding may come from specific processes such as ESFRI Roadmap process with a series of grants (design studies, preparatory phase, implementation phase or other supporting actions) which again contribute to the delivery of the RI outputs. On the other hand, setting up some specific EU legal structures (such as ERICs) may require relevant expertise, increasing complexity and pose some limitations in participations from non-EU Member States. As in the previous case, there is also a risk of formation of disciplinary silos, while this model can also be combined with procurement-based models (e.g., BM1-BM3) initiated by an RI or ERIC.</p>
<p>Relevance to EOSC <i>Relevance of the business model with the EOSC context, either directly (e.g., procurement foreseen in EOSC) or indirectly (e.g., business models relevant to EOSC-related projects such as on Research Infrastructures or business models relevant to national/EU stakeholders, such as in-kind/in cash contributions for Research Infrastructures).</i></p>	<p>The EOSC overall framework and in particular the EOSC Partnership is characterised by such a business model, of joint in cash and in cash contributions from EC and MS/ACs. Furthermore, such a mixed in-kind and in-cash model is relevant to EOSC mainly because of the high number of Research Infrastructures using this model that are or will be federated to EOSC. This model applies to the majority of Research Infrastructures, ESFRI or others, either legal entities such as ERICs or other.</p>

Business Model 7

Business model (full) name <i>Full name of the business model</i>	Public-to-public cooperation with cost recovery that falls outside the scope of the EU public procurement rules (horizontal case, i.e., public bodies are not directly related/belong to each other).
Short description <i>Short description of the business model</i>	This business model refers to public-to-public service provision in the form of cooperation between two or more public-sector bodies without a direct relationship to each other (horizontal case) that includes cost recovery for the public body acting as supplier. According to 2014/24/EU procurement directive, this case is exempted from tender if certain conditions apply, namely: <ol style="list-style-type: none"> (1) the agreement establishes or implements a broader (than the specific provision) cooperation on a common objective between the participating entities (2) the implementation of that cooperation is governed solely by the public interest; and (3) the participating entities perform on the open market less than 20% of the activities concerned by the cooperation. This model includes a cost-recovery mechanism for the provider procuring the resources.
Example(s) <i>An example of the business model</i>	A concrete example of this model is the ELIXIR use case (can be found in more detail in the EOSC Hub briefing paper and D12.2). In its mandate to offer services to its community, the ELIXIR Research Infrastructure discussed its needs and collaboration opportunities with four publicly funded national e-infrastructures: INFN (Italy), SURF (Netherlands), CESNET (Czech Republic) and CSC (Finland). As the exemption rules may apply, this opportunity for public-to-public cooperation with cost recovery has been investigated.
Perspective/viewpoint <i>Define from which perspective this business model is developed, i.e., who is the "value provider"</i>	Viewpoint: of the service provider procuring resources on behalf of its research community (e.g., ELIXIR on the demand side in corresponding use case).
Business model type/pattern (if applicable) - click the link for descriptions. <i>Type of business model (e.g., public to private) and related business pattern(s).</i>	Type: Public to public Pattern(s): Aggregate demand for economies of scale. Simplify/streamline the procurement process.
Key partners (from business model canvas) <i>Key partners/ stakeholders involved in the business model. Who are the key providers/suppliers? Which key resources are we acquiring from partners? Which activities do partners perform?</i>	Users: Universities, Research institutes, members of R&E community. Service providers (e.g., e-Infrastructures) cooperating to provide the required services.

<p>Key activities (from business model canvas) <i>Key activities our Value Propositions require. Main actions to deliver the business model and the value which comes with it. Relationship with users: e.g., Support/ training.</i></p>	<p>The public research institution interested in acquiring the services identifies a specialised need for the benefit of its users, which cannot be met internally. For this purpose, it looks for cooperation with other public institutions with the aim of ensuring that the services they have to perform are provided with a view to achieving objectives they have in common.</p> <p>The research institution then reaches out to potential cooperating entities and starts a negotiation with those interested. The negotiation must be based on genuine cooperation for achieving objectives they have in common, and not merely limited to a simple reimbursement of costs.</p> <p>If complementarities in the cooperation are identified and common objectives identified, then the cooperation may be crystallised. The cooperation can take any legal form –it does not need to be a contract or a joint venture. It should be based on a cooperative concept and not require all parties to assume the performance of main contractual obligations, but to commit to contribute to the cooperative performance of the common objectives.</p>
<p>Key resources (from business model canvas) <i>Key Resources our Value Propositions require. The physical, intellectual (including publications, data, software, patents along with corresponding IP rights/licences) financial and human assets required to make the business model deliver.</i></p>	<p>Service providers infrastructure/installations/services Service providers personnel offering the services, possibly along with related support (training, helpdesks, etc.) Users that require/benefit from the services Financial resources to reimburse the costs of the service provider(s) within the cooperation. Accounting/Monitoring infrastructure to monitor consumption</p>
<p>Value (from business case/pattern) or value propositions (from business model canvas) <i>Value delivered to the end users (what problem are we solving, what outputs are we offering to the end users, potential impact)</i></p>	<p>Users can access the required resources from the service providers and perform their research. Users can also receive added value services such as training and support to better use the resources and optimally perform their research</p>
<p>Assumptions and constraints (from Simplifiable business case model) <i>Assumptions and constraints/barriers (even if obvious)</i></p>	<p>Legal: Based on the 2014/24/EU directive, for the cooperation and tender exemption 3 requirements need to be met (see Short Description).</p> <p>Financial: Cost recovery of the service providers needs to be agreed (e.g., via a contract, however this is not mandatory).</p> <p>Service Level Agreements and/or an accounting/monitoring infrastructure are desirable including metrics/KPIs to monitor the service provision.</p> <p>Users need to comply with their service providers access policies.</p>

<p>User Segments & Relations (Relations is optional -only if relevant) <i>Who are we creating value for? Most important users. User base type (mass market, segmented, diversified, multi-sided platform)</i> <i>What type of relationship does each of our User Segments expect us to establish and maintain with them? Which ones have we established? How are they integrated with the rest of our business model? How costly are they?</i></p>	<p>End users: individual researchers of the public sector or SMEs using the service “free at the point of use”. Researchers are part of universities, research centres, industry/SMEs, etc. <i>Relationships with user segments and how to maintain them.</i> In several cases the entities behind a service (e.g., ELIXIR in the D12.2 and briefing paper use cases) may be transparent to the users. E.g., university users accessing national research networks or the pan-European research network GÉANT may not be aware of the entities behind (NRENs, GÉANT). Still, there may be portals/marketplaces where users can provide feedback, helpdesk functions where users can ask for support or training sessions for better exploiting the services and for users upskilling.</p>
<p>Channels / Networks (Optional - only if relevant) <i>Through which Channels / Networks do our User Segments can be reached/ can work best.</i></p>	<p>Depending on the cooperation, corresponding networks can be used at EU, regional, national, campus levels, e.g., European university or researchers or librarian networks, NRENs, segmented campus networks. Example of horizontal (generic) or thematic (e.g., ESFRI or ERIC-related) e-infrastructure (e.g., ELIXIR) network is the network of national nodes of the generic (e.g., NREN, NGI) or ESFRI or ERIC infrastructure (e.g., ELIXIR National Nodes).</p>
<p>Evaluation: Strengths and Weaknesses (internal factors) Optional: Opportunities, Threats (external factors) from SWOT analysis or PESTEL analysis <i>A mini-SWOT analysis, complemented by elements of PESTLE analysis (only when relevant)</i> <i>Internal factors:</i> <i>Strengths</i> <i>External factors:</i> <i>Opportunities</i> <i>Threats</i> <i>Other external factors relevant (PESTEL including regulatory)</i></p>	<p>Strengths Users: Free at the point of use offered by a public research provider (this may be reconsidered in the long run). Providers at the demand side (e.g., ELIXIR on D12.2 use case) Simplify/streamlines the procurement process avoiding tender bureaucracy and costs. Demand aggregation can be achieved via the cooperation for achieving economies of scale. Providers at the supply side - suppliers (e.g., CESNET, CSC on D12.2 use case) Suppliers can invoice and be reimbursed for (part of) their unused resources. Weaknesses Users: Usually limited to the available funding /resources offered; cannot scale further. May require training and support to be able to access the services (including studying access providers policies) Providers at the demand side Normally VAT applies to the suppliers’ invoices (unless exempted). Limitations on the amount of resources acquired via the cooperation may apply, leading to the need of using multiple suppliers with different provisions/laws/policies, raising the complexity of the cooperation. Internal constraints due to different national laws, funders restrictions or internal access policies may apply.</p>

	<p>Cost calculations may not be straightforward for checking the suppliers' invoices. Monitoring/accounting infrastructure (metrics/KPIs) may not be straightforward if not available (including project management overhead)</p> <p>Providers at supply side - suppliers Prepayment issues (may come late) Cost calculations may not be straightforward for the invoicing of services provided.</p> <p>External factors: Opportunities Providers at the demand side and suppliers at the supply side can both benefit from the cooperation coming up with new/innovative services for the benefit of their users.</p> <p>Threats Providers/Suppliers If tender exemption requirements are not clearly demonstrated, there is the risk of an external provider (e.g., commercial) suing the public entities. <i>Other external factors relevant (PESTEL including regulatory)</i></p>
<p>Funding/financial analysis (from Simplifiable business case model, also taking some elements from business model canvas if applicable) <i>Funding and financial aspects, including elements such as budget sources and viability, and if applicable expenditures, income/revenue)</i></p>	<p>The budget for the provider on the demand side may come from an EC or national grants or from the budget of the corresponding national nodes (either horizontal or thematic). Suppliers can benefit from the revenue of supplying the services (e.g., from their unused resources).</p>
<p>Overall assessment and recommendations <i>Outlook of the business case on how effective and viable it is, given the SWOT and other analyses, and also outlook on a way forward including recommendations to key partners and roadmap/next steps/ /milestones.</i></p>	<p>The horizontal case of public-to-public cooperation (the two public bodies do not have a direct relationship, rather work on a common goal driven by public interest) is a useful exemption from the application of Directive 2014/24/EU on public procurement that can be used by collaborating research institutions (that fall under the definition of a "contracting authority") to enter into an arrangement without the need to incur the additional administrative burden and costs associated with the conduct of a competitive tender process.</p> <p>Despite the fact that a similar model has been used in EC grants where third parties supported a main grant beneficiary in its tasks (usually under a common umbrella or goal, e.g., via an MoU), outside grants this is a relatively new model. Thus, it is proposed that the EOSC governance develops guidelines to promote this scheme as one of the available options to maximise cross-border interoperability with cost reimbursement among public institutions. The EOSC governance can also develop contractual templates for this kind of public-to-public cooperation between research facilities.</p> <p>The EOSC portal could also publicise such opportunities for public-to-public cooperation.</p>

<p>Relevance to EOSC <i>Relevance of the business model with the EOSC context, either directly (e.g., procurement foreseen in EOSC) or indirectly (e.g., business models relevant to EOSC-related projects such as on Research Infrastructures or business models relevant to national/EU stakeholders, such as in-kind/in cash contributions for Research Infrastructures).</i></p>	<p>This model may be relevant to EOSC, as several RIs that are or will be federated to EOSC can use it to get services from public e-Infrastructure providers, which can be reimbursed for their service provision. This may complement other models, e.g., public procurement, in which public bodies may not be able to participate, especially the ones not having relevant expertise or legal restrictions. It should be checked whether and to what extent this model can apply between the EOSC Association and its members.</p>
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Business Model 8

<p>Business model (full) name <i>Full name of the business model</i></p>	<p>Public-to-public cooperation with cost recovery that falls outside the scope of the EU public procurement rules - in house procurement (vertical case, i.e., public bodies are directly related/belong to each other).</p>
<p>Short description <i>Short description of the business model</i></p>	<p>This business model refers to public-to-public service provision in the form of cooperation between two or more public-sector bodies with a direct relationship to each other, i.e., one belonging to another (vertical case). According to 2014/24/EU procurement directive, this case is exempted from tender if certain conditions apply, namely:</p> <ul style="list-style-type: none"> (1) The contracting authority exerts a control on the "supplying authority" similar to that which it exercises over its own departments. (2) More than 80% of the activities of the supplying authority are performed for the buying authority or by other bodies controlled by it, and (3) There is no direct private capital participation in the 'supplying authority'. <p>It is unlikely that the vertical case that requires such conditions and relations apply across EU countries (unless there are several EU legal offices of the same entity. However, such relations usually apply within countries in the public sector. It should be checked whether umbrella research organisations around Europe benefit from such exemptions (CNRS, Franhofer, Helmholtz, UKRI, etc.)</p>

*The rest of the cells not completed as this model is similar to BM7.

Appendix III. Interview Questions

Questions for all:

1. What is your view on the proposed approach by the European Commission to deliver the EOSC-Core and EOSC-Exchange services via public procurement (rather than via grants), as drafted in the Horizon Europe Research Infrastructures Work Programme 2021-2022 (HE RI WP 2021-2022). An excerpt is included as an Appendix at the end.
2. Does the proposed approach guarantee the appropriate consideration of requirements capture for both EOSC-Core and Exchange?

Questions for case study representatives (WP2/WP12-demand and supply side):

1. Are the business models linked to your case study well-defined and sound? How can they be improved?
2. Are there any Business Models relevant for the future of EOSC (EU or national) overlooked?

Questions for procurement experts (from research organisations as buyers or bidders):

1. Considering the scenario of the EC procurement, what is your advice on the optimal organisation of the EC public procurement? E.g., what to consider, what are the barriers, risks, how to adapt to new or evolving requirements? What are the mechanisms to introduce agility and bring new providers?
2. Following the general question 1 where the EOSC-core/exchange will gradually move from grants to public procurement, can and should the EOSC Association perform further acquisitions (e.g., as a CPB) to complement the EC procurement if needed?
3. Are there specific issues that non-profit organisations, as potential bidders, face in the tendering process? For example, can organisational bylaws, financial penalty clauses or bid/performance bonds act as showstoppers? Any recommendations to balance the level playing field (tendering that does not discriminate against non-profit organisations) and accommodating specific constraints of the non-profit sector?
4. What is your opinion on the Intellectual Property Rights approach in tendering? Should the IPR in EOSC stay with the EU/Member states or with the contractors? (see article from EC [EU recommends Member States to leave IPR ownership in public procurements with contractors | Shaping Europe's digital future \(europa.eu\)](https://ec.europa.eu/eu-research/en/eu-recommends-member-states-to-leave-ipr-ownership-in-public-procurements-with-contractors-shaping-europe-s-digital-future)))

Questions for policy makers/funders/e-Infrastructure providers (from Member States):

Context point: This also depends on whether EOSC services are mainly for researchers or also for industry/SMEs.

1. Are the relevant (research) organisations involved in EOSC able and willing to submit bids to tenders for the EOSC-Core/Exchange (at the national or European levels)? Is it common that a research-performing organisation (that may be co-funded through grants) is also acting as a bidder competing for the provision of services on a commercial basis? Are there specific policies (e.g., limitations on proportion of the overall turnover) that would need to

be considered if a research-performing organisation would be required to submit bids for tenders in the EOOSC context?

2. Are there limitations on the number of services that can be provided through a tendering process? For example, if there is a limit on the research e-Infrastructure resources' use by "industry", would services provided to EOOSC (by such an e-Infrastructure with a limit) through a procurement mechanism be included in this "quota"? In other words, is the definition of the "industrial use" based on the actual end user (in which case EOOSC services would be "research use" independent of the type of contract) or the contract type (fixed max percentage of resources provided through service contracts, independent of the end user type).
3. Member States are planning to provide in-kind contributions to EOOSC. What is the approach foreseen in your country to procure services for EOOSC at the national level? (e.g., what type of organisations will receive the money to perform the procurement? Is the intention to buy infrastructure as CAPEX and operate/deliver services as in-kind or to buy services?)
4. Is any of the defined business models capturing what is the intended procurement model at national level?

Questions for user communities' representatives (for EOOSC Exchange procurement):

1. Following the general question 1, how would you see your role in feeding your specific community requirements to the overall procurement process?
2. Do you believe that separating the EOOSC Exchange operational part (services) from the EOOSC Exchange contents that may change more frequently would be beneficial? (possibly in separate tenders also? E.g., EOOSC Core and EOOSC Exchange operational parts go together in the same tender and EOOSC Exchange contents in a separate one)