

Pre-Commercial Procurement framework and European funding sources for European Research Infrastructure Consortia: Insights from the DiSSCo ERIC development

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Abstract

Mechanisms and sources of funding for European Research Infrastructure Consortia (ERICs) are diverse, complex and can be challenging to identify and to use. This paper provides a roadmap for Research & Development (R&D) within the pre-commercial procurement (PCP) framework and the landscape of funding for ERICs available from the European Union with a perspective on other tracks of funding. Our objective is to offer a starting point and underline opportunities and challenges, for existing and future ERICs. The work presented in this paper results from the research carried-out for the business model of the DiSSCo (Distributed System of Scientific Collections) ERIC, which is currently in its transition phase and will be constructed in the following years.

Keywords

European Research Infrastructure Consortia, ERICs, research infrastructures, Commercial Procurement, Pre-Commercial Procurement, Public Procurement of

Innovation, technology readiness Level, EU funding, Multiannual Financial Framework, Horizon Europe

Executive summary

This paper focuses on funding approaches, pre-commercial procurement (PCP) mechanisms and the European Union's (EU) landscape of funding, from the perspective of European Research Infrastructure Consortiums (ERICs). We analyse both the procurement framework options available and the most relevant sources of EU funding to support Research & Development. These analyses, conducted for the preparatory phase of the DiSSCo ERIC (Distributed System of Scientific Collections Project), constitute a fundamental source of information for existing and future ERICs.

Data regarding the PCP framework was collected as part of task 4.4 “pre-commercial procurement financial structure”, within Work Package 4 “business framework” in the DiSSCo Prepare project (DPP). We considered how procurement frameworks have been implemented in other relevant ERICs that provided insight into the opportunities and challenges that PCP can represent, with a perspective on other procurement types and the preparation phases to PCP.

Data regarding the EU funding landscape were collected as part of task 4.2 “Cost model for charging services” and 4.3 “National contributions to the DiSSCo RI”. Most data result from the consultation and analysis of the official websites of the European Commission. Further information was obtained from consultation of official ERICs’ websites and from interviewing representatives of existing ERICs.

PCP and Public Procurement of Innovation (PPI) are fundamental to help progress the domain of procuring research, development and innovation. In parallel, PCP & PPI enable suppliers of Research & Development (R&D) and Innovation to have a broader perspective on the market needs and to increase global competitiveness. When applying the PCP and/or PPI mechanisms, preparation, processing and tracking activities are required: we recommend considering upfront how PCP and PPI will be organised. When deciding on a procurement structure, we advise participants to consider the complexity and cost implications of each option to make an informed decision, based on the project or consortium's unique reality.

Concerning funding for ERICs, the EU 2021-2027 Multiannual Financial Framework, the European Investment Bank (EIB) and the Transnational Access Scheme (TNA) constitute the main EU instruments relevant for ERICs. Horizon Europe supports European R&D, while the EIB can provide financial instruments and the TNA can facilitate international exchanges and linkages. Non-EU funding is also worth exploring and can add visibility to the ERIC.

ERICs should, thus, be knowledgeable of the Commercial Procurements and EU funding landscape highlighted in this article, to maximise the chances of access for their members and institutions to these mechanisms and funding.

Introduction

The European Research Infrastructure Consortium (ERIC) legal framework was created by the European Commission (EC) to facilitate the establishment and support of Research Infrastructure (RI) in Europe. ERICs aim to unite research resources and capacities across European countries to advance Research and Development (R&D) and promote innovation for the benefit of society, including policy-makers, communities and other stakeholders. While most ERICs are publicly funded, they have the ability to collaborate with industry to support innovation processes, invest in new technologies and to partner with universities, public research institutions and innovation centres in the private sector. To this end, the mechanisms of Pre-Commercial Procurement and Public Procurement of Innovation can be leveraged.

Context

This article presents results from the DiSSCo Prepare project (DPP, <https://www.dissco.eu/dissco-prepare/>), that ran from February 2020 to February 2023. This project report was written as formal DPP's Work Package 4 deliverables (D4.2, Briffa et al. (2023), D4.3, Landel et al. (2023) and D4.4, Pijls et al. (2023)) that were previously made available to project partners and submitted to the EC. While the differences between these versions are minor, the authors consider this as the definitive version of the reports. DPP aimed to construct the first phases of development of the future ERIC DiSSCo (Distributed System of Scientific Collections, <https://www.dissco.eu/>), which will aim to digitally unify all European natural history assets and to ensure that collection data are findable, accessible, interoperable and reusable (FAIR). DiSSCo will transform a fragmented landscape of collections into an integrated knowledge base, enabling researchers to use and interconnect different collections. DiSSCo represents the largest ever formal agreement amongst natural history museums, botanical gardens and collection-holding research institutions and universities in the world. Achieving this ambitious goal will require substantial technological effort and innovation, partnerships, R&D and funding beyond the support of member institutions alone.

Based on the experience gained from the DPP, this paper evaluates and analyses the potential benefits of standard Commercial Procurement (CP), Pre-Commercial Procurement (PCP) and Public Procurement of Innovation (PPI) for ERICs and their possible sources of funding. The analysis draws on a variety of sources, including bibliographical resources, official technical publications from the EC, PCP and PPI model development, benchmark studies between DiSSCo and a series of existing ERICs and the analysis of ERIC statutes. A glossary is provided in Suppl. material 1 for the technical terms and acronyms used in this paper.

Scope

We aim to provide a comprehensive overview of procurements and funding opportunities for ERICs.

The core activities, products and services of ERICs have fixed costs. These are typically financed through the national contributions from the Member States, potential contributions from Observers and from Intergovernmental International Associations, variable incomes from projects and income from service users. To promote development and sustainability, ERICs are also encouraged to diversify their sources of incomes and working with external partners in the field of R&D and innovation via procurements is one way to achieve this. Having a clear procurement strategy for innovation, research and development is essential for ERICs to create and strengthen both internal and external partnerships. This report analyses and highlights the utility of PCP and PPI for ERICs and the potential benefits they represent. Substantial funding sources for ERICs also arise from their legal eligibility for public funding, particularly from the European Union (EU), as well as other sources. This paper presents the results of a study on the funding from the EC relevant to ERICs and suggests additional sources of funding, with key insights highlighted in tables throughout the text.

Understanding the ERIC framework

A legal status: the European Research Infrastructure Consortium (ERIC)

An ERIC is a distinct legal form enabled by the European regulation of the 25/06/2009 (Council Regulation (EC) No 723/2009 2009) and recognised throughout the EU. Awarded by the EC, it facilitates the establishment and operation of Pan-European RI and the creation of the European Research Area (ERA), aiming to promote and support the development of common research, strategy and innovation practices at the European level. A typical architecture of an ERIC and its elements are shown in Fig. 1.

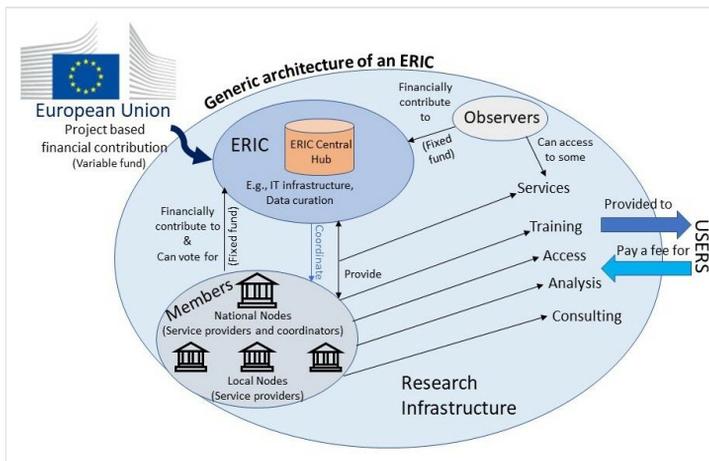


Figure 1. [doi](#)

Overview of the generic architecture of an ERIC, including the different components and bodies of the ERIC. For detailed definitions of the different elements of an ERIC, we refer to Landel et al. (2023).

ERICs result from a complex interplay between the EU and the Member States, in terms of collaboration, data and resources sharing and funding. An ERIC is based on a commitment from at least three countries (including at least one from the EU), over a period of at least three to five years, supported by a business plan and a provisional budget, which is considered as a commitment from the countries concerned (European Commission 2015). The main advantages of an ERIC are listed in Table 1.

| |
|--------------------------------------------------------------------------------------------------------------------------------------------|
| Table 1. |
| Box 1. Main advantages of an ERIC: |
| Legal capacity and status recognised in all EU countries; |
| Flexibility to adapt to specific requirements of each infrastructure; |
| Faster process than creating an international organisation; |
| Exemptions from VAT in the ERIC's country of registration and excise duty; |
| ERICs may adopt their own procurement procedures which have to respect the principles of transparency, non-discrimination and competition. |

ERICs financial framework

There are no financial rules dedicated solely to ERICs. The main and most reliable incomes of an ERIC come from the contributions paid by the ERIC's Members and Observers (Fig. 1) and intergovernmental international organisations. The ERIC regulation states that an ERIC shall carry out its activities according to sound budgetary principles for the exercise of its financial responsibility (Council Regulation (EC) No 723/2009 2009). The ERIC statutes allow privileged access to EU-funded calls for projects and benefits from VAT exemption in most EU member countries. ERIC activities should be operated on a non-economic basis, although ERICs can carry out economic activities related to their main task, such as commissioned services (Briffa et al. 2023), in order to develop their financial self-reliance. All items of revenue and expenditure of an ERIC shall be included in estimates to be drawn up for each financial year and shall be shown in the annual budget, where revenues and expenditure shall be in balance. The ERIC Practical Guidelines (European Commission 2015) further include the principle of transparency for establishing and implementing the budget and for presenting the accounts, particularly to prove that principles of sound financial management are implemented. The key financial rules of ERICs are presented in Table 2.

| |
|------------------------------------------------------------------------------------------------------------------------------------------|
| Table 2. |
| Box 2. The key elements on ERICs "financial rules": |
| Framework: describes the ERIC in the managerial summary. |
| Financial management principles: repeat those from the ERIC regulation, the Statutes and add others specific to the concerned RI. |
| Financial year dates |

| |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Currency |
| Request and dates for the annual contributions: when shall members pay their contribution, received in one or in several instalments and at which dates. |
| Interest rate to late contributions: how to deal with countries paying late or not at all. |
| Detailed formula for the mandatory annual contributions if not described in the statutes. |
| Rules to calculate membership fee for new members to join during the year: full membership fee or only parts, calculated from the month/quarter/half year. |
| References to statistical sources for the formula ingredients: put in all those references needed for the calculation of the membership share and how you use them. |
| Host country contribution/premium if not mentioned in the statutes: is it fixed by amount or percentage, how is it amended/evaluated? |
| Value and evaluation rules for in-kind contributions: in case in-kind contributions are available, describe the process how they will be estimated or calculated and how they are evaluated and decided if their value will be included in the accounts. |
| How the draft budget is assembled and approved: who does what in preparing the budget and the contribution. |
| Accounting principles and rules: do you follow international accounting rules (IFRS) or if national, why? |
| Financial audits: how is the process of financial audits set up and by whom? |
| Principles of loans and bank overdrafts: who can draft loans and overdrafts approved by whom. |
| Financial reporting: what shall be reported to whom and how; for more info check out the ERIC Forum Implementation Project Guidance document on accounting principles for ERICs. |
| Duration of record keeping beyond the national rules: what are the national rules and do you keep them longer? |

Aspects of ERIC contributions models

Based on the ERIC Practical Guidelines (European Commission 2015) and on ERICs' annual activity reports available from the website of each ERIC, two benchmarking exercises have been carried out as part of the DPP. The aim was to study the main variables which impact the national contribution models of existing ERICs (Landel et al. 2023) and to define the main aspects of their financial activities, as well as their rights to perform commissioned services (Briffa et al. 2023). Further details of the preparation of ERICs' statutes are also provided in Landel et al. (2023).

The ERICs studied varied in maturity, as they were created between 2011 and 2018 and belonged to a wide range of scientific fields, including social and cultural innovation, energy, environment, health and food. **Based on the information collected, annual contributions ranged between 220,000 and 2.2 million euros per year.**

ERICs can embed intergovernmental and international organisations, with no specific rule as to how to calculate their contribution to the ERIC. Participating institutions can

contribute in-kind, but the expected amount of in-kind contribution should be included in the service level agreements (SLAs).

ERICs are fully eligible to access loans, particularly with the EIB (see section on EIB), as long as the ERIC can demonstrate its bankability and as the GA approves the loan request.

ERIC's commissioned services

ERICs have the right to provide services and charge for them while pursuing their principal task on a non-economic basis (Council Regulation (EC) No 723/2009 2009), that is to say that commissioned activities should not be profitable. Charging for services does not mean that the ERIC has a commercial activity or an economic basis, since an economic activity consists of offering goods and/or services to a given market. Conversely, the fact that a fee might be charged does not in itself render the activity 'profitable' if the access and related services do not correspond to what the market can provide.

Economic activities shall be limited and closely related to the principal tasks of the ERIC and do not jeopardise their achievement thereof. Any income generated by ERIC's activities that accrues to its budget shall be used for advancing the Work Programme and budgets must eventually be balanced. The economic activities of an ERIC must remain secondary and not prevail over the execution of its main task. If an economic activity becomes successful enough to be no longer considered as secondary, an ERIC may consider creating a spin-off company for example (Briffa et al. 2023).

Services users and charges

Policy regarding fees to access ERIC's services strongly vary across ERICs: most often, ERIC's members who pay an annual fee can access the services for free, while observers access the services for free or for a fee. Most times, external users pay a fee to access ERIC's services. For most ERICs, a not-for-profit rate applies to academic research for accessing the services. It is recommended that the services are provided for free to researchers. Full economic costs apply to industry users while access for the general public is granted for free, unless the services or resources are constrained by licensing conditions imposed by the owners. Access to data is generally free of charge.

Commissioned services are charged on a market-price plus a reasonable margin. An ERIC shall record the costs and revenues of its economic activities separately and shall charge market prices for them or, if these cannot be ascertained, full costs plus a reasonable margin. This margin may be referenced to margins commonly applied by undertakings for the same activity. In a similar way to that which the "reasonable margin" is allowed for economic activity charges, the European Charter for access to RIs states that "costs need to be covered and fees for Access, to the extent found necessary, should contribute to the financial sustainability of the Research Infrastructure".

Whatever decisions are taken at the end regarding charges and fees, the most important is transparency: costs for different services and their provision must be transparent.

Origin of ERIC's incomes

ERICs typically generate income from a variety of sources and it is generally recommended that funding diversification be pursued in order to ensure sustainability. An example of a successfully diversified ERIC is the SHARE-ERIC (Survey of Health, Ageing and Retirement in Europe). ERICs have access to a range of financial resources, although this is subject to certain limitations and conditions established by the General Assembly of each ERIC:

- Membership fees are the first and most secured source of income and commonly fund the ERIC's core management and services: IT, Stakeholder forum, central hubs etc;
- EU funding is often steady and used to fund targeted deliverables and specialised services;
- Host Member State and the hosting countries of Common Services can provide contributions (in cash or in-kind – contributions in-kind shall be evaluated and presented in the financial report on a cash basis);
- Private companies, industries and foundations can also contribute to ERIC's incomes. ERIC's interaction with the private sector can be a strategic question: contribution from private partners should be carefully considered as they may want to step in the management of the ERIC.

Procurement methods in support of Research, Development and Innovation

ERICs provide resources and services for research communities to conduct research and foster innovation in their fields. The EU provides support to Research, Development and Innovation under the form of its Research and Innovation (R&I) programme called the *Horizon Europe* programme. To increase the possibility of finding improved solutions, collaboration with entities outside of the research infrastructure should be considered. When doing so, it is advised to spread the quest for solutions across several routes, rather than placing all of one's eggs in one basket. These collaborations involve procuring goods and services that encompass a level of uncertainty. This is where the PreCommercial Procurement (PCP) and Public Procurement of Innovation (PPI) methods come into play. These mechanisms enjoy some level of funding support when applied within the Horizon Europe programme. More details on the Horizon Europe Programme can be found in the section concerning the European Commission funding opportunities.

The Organisation for Economic Co-operation and Development (OECD) has established that public procurement is at the centre of innovation policy initiatives (Salomó et al. 2013, OECD 2017). Governments have large purchasing power and can, therefore, motivate demand for innovation (Mazzucato 2019). For example, the EU has made procurement a cornerstone of its digital strategy, implementing many directives that relate to public

procurement. Guidance about EU public procurement and links to the relevant directives can be found on the YourEurope webpage ([Your Europe](#)).

At the time of writing this project report, the PCP and PPI schemes have not yet seen the uptake anticipated by the EC. To support the roll out of the Digital Strategy, steps have been taken to encourage experimentation with PCP and PPI in the public sector. To this end, the EC has published calls inviting publicly-funded bodies to engage. Examples of previous successful projects in the ICT domain exist ([EU funded projects implementing PCP or PPIs](#)) and future calls will be revealed in future Horizon programmes ([Horizon Europe funding for PCP and PPI](#)). However, it should be noted that these calls are domain specific and it cannot be guaranteed that future calls will accommodate every domain, similar to the non-ICT domain PCP and PPI calls, funded during H2020 (['Non-ICT' EU funded innovation procurement projects](#)).

A brief overview of procurement types

Standard public procurement

Procurement is an essential process for all legal entities. Standard (commercial) procurement processes are commonly used to purchase market-ready products and services. It can be used to fulfil a variety of needs, including purchasing materials, manufacturing goods or hiring a service; however, procurement entails more than a mere financial transaction. It requires a set of formal decisions to select what will be purchased and a predefined process to achieve the best value for money, amongst other things. Most commercial organisations follow a formalised process and all public entities and most publicly-funded entities are required to do so. This so-called public procurement process is the sequence of activities starting with the assessment of needs through awards to contract management and final payment, whereby public authorities - including government and public agencies - buy goods and services. In fact, procurement processes for public entities are mandated in EU and national laws and are governed by strictly enforced regulations ([Public procurement](#)). They make up a considerable proportion of the EU market.

There are specialised legal entities that provide advice regarding national implementations of the EU public procurement directives, one such entity being the online platform: the sustainable procurement platform where EU member state guidance can be found at this webpage: [Sustainable Public Procurement platform](#).

Pre-Commercial Procurement and Public Procurement of Innovation

To boost innovation in the EU single market, the concepts of PCP and PPI have been defined, developed and deployed, although ERICs are generally encouraged to develop partnerships with public and private entities to increase both their visibility, impact and sustainability. Every partner represents a separate voice in managing an ERIC (Briffa et al. 2023).

In the case of PCP and PPI, the partnership with external entities (private and/or public) is housed within the procurement framework, meaning that external partners will not enter into the ERIC. This provides a buffer between the intentions, impact and sustainability of an ERIC and that of its external partners. PCP is defined as procurement of Research and Development (R&D) services involving risk-benefit sharing under market conditions and competitive development in phases. Here, risk-benefit sharing under market conditions refers to the PCP approach in which procurers share with suppliers at market price the risks and the benefits related to the IPR resulting from the R&D. Competitive development in phases refers to the competitive approach to buy the R&D from several competing R&D providers in parallel and to compare and identify the best value for money solutions on the market to address the PCP challenge. To reduce the investment risk for the procurer, reward the most competitive solutions and facilitate the participation of smaller innovative companies, the R&D is also split into phases (solution design, prototyping, original development and validation/testing of the first products), showing similarities with a Technology Readiness Levels measurement system (Fig. 2), with the number of competing R&D providers being reduced after each phase. PCP focuses on the R&D phase prior to commercialisation. PPI is similar to PCP, but relates to scale-up activities for market-ready innovations rather than R&D risk-sharing. While in PCP, goods or services are not available in the market, a PPI starts in cases that are closer to the market. Therefore, although PCP and PPI must be applied in different circumstances, nevertheless they are complementary.

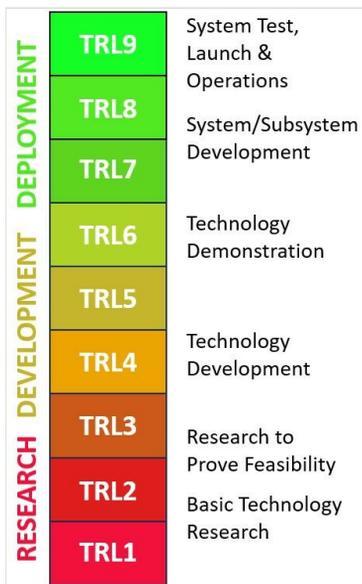


Figure 2. [doi](#)
 Graphic showing technology readiness levels.

The key points on PCP and PPI are outlined in Table 3. The purchase of innovative goods and services by public authorities can improve Europe’s economic competitiveness and

help solving societal and environmental problems, as well as deliver more efficient public services (Edquist and Zabala-Iturriagagoitia (2015) Rolfstam 2013 Turkama et al. 2012, Rigby 2013, Rigby 2016, Rolfstam 2013, Edquist and Zabala-Iturriagagoitia (2015), Milenkovic et al. 2022). Public procurement can also promote market uptake of innovative products and services and raise the quality of public services (Edler and Uyarra 2013).

Table 3.

Box 3: Key points on PCP and PPI

PCP addresses specifically the procurement of R&D services rather than actual goods and services and is relevant if no near-to-the-market solutions can be found and novelty through R&D is needed. In the PCP process, advantages and disadvantages of alternative competing solutions are compared and, in this way, the risks and benefits are shared (European Commission 2022). PCP thus induces a win-win within the relationship between commercial suppliers of R&D and public procurers thereof. In addition, it also provides a benefit for the broader society (Salomó et al. 2013, Cappellato et al. 2016) by fostering technological advancement.

PPI has been developed to enable the upscaling of innovative solutions. It is a public procurement procedure where contracting public authorities act as initial buyers or customers of innovative goods or services which are in a near-market phase or already available on a small-scale commercial basis (Edquist et al. 2015, OECD 2017). Hence, the important difference with PCP is that PPI can be used when challenges can be addressed by innovative solutions that are nearly or already, albeit in small quantities, on the market and do not need R&D (Milenkovic et al. 2022).

Both schemes reward publicly-funded entities for creating opportunities for R&D and innovation in the EU marketplace. Herein, innovative partnerships enable the contracting authorities to pull industrial R&D capacity towards its needs and foster innovation in the public sector (Sørensen and Torfing 2012, Carbonara and Pellegrino 2019). The EU has made public procurement a driver of its strategy to harmonise the European Single Market. To help publicly-funded organisations new to this way of working, the EU has launched funding schemes ([Horizon Europe funding for PCP and PPI](#)) designed to help them understand and practise PCP/PPI activities.

The PCP/PPI process is complicated, yet it is considerably more accessible and effective than using a standard public procurement for the same scope (Salomó et al. 2013, Milenkovic et al. 2022). Simplification has been made possible through the contexts explicitly described in the names themselves: Pre-Commercial and Innovation. The term pre-commercial defines an activity that is adjacent to marketplace activity, not within it. Innovation defines an application that is novel and seeking to enter a market. These justifications result in PCP and PPI not being classified as commercial activities; hence, there are no competitive elements to consider when judging fairness issues. Notwithstanding this observation, the PCP/PPI process can appear relatively complex at first and the rules that govern their use impose specific requirements (Milenkovic et al. 2022). Effectively, the rules of PCP and PPI define a process that begins with an idea and a novelty assessment, all the way to a current best available solution.

The full Procurement Process is illustrated in Fig. 3, including the PCP Process and PPI Model, which is further simplified to follow a PCP or run independently. Fig. 3 illustrates

how PCP and PPI represent additional opportunities on top of the standard Commercial Procurement process. These steps are only relevant if the market consultation proves that PCP or PPI are applicable. The successive key steps in the procurement process are outlined in Table 4 .

Table 4.

Box 4. Successive steps in the procurement process (Figure 3).

Administration and Strategy: The structures and processes that govern the short-, medium- and long-term and enable an organisation's strategy to function as a compass to filter ideas.

Capability Gap Analysis: Identifying the voids between a project needs and the organisational characteristics, capabilities and capacities.

Business Case: Describing the logic and motivation for a project, including a plan for addressing gaps and a description of the executional needs along with a credible implementation plan.

Market Consultation: If decided to proceed, a market survey using a prior information notice (PIN) determines if the identified gaps represent novel needs. If suitable mature products and/or services are found, then a standard procurement process is followed. If novel, immature products and/or services are found, then a PPI process should be followed. If no suitable products and/or services are found, then a PCP process can be followed to develop them. The outcome and gained perspective will contribute to the final tender specification.

PCP: The point of PCP is effectively to ask a range of entities to design and develop novel solutions.
Competition Design: The challenge is specified in the contract notice for potential competing innovators to build convincing tenders. Additionally, the process of the competition and its rules must form part of the call.
Call for Tenders: Once the competition is designed, the detailed tender specifications including the closing date for the tenders, must be verified with the board for approval of publishing the Call for Tenders.
Select Candidates: After the closing date, the tenders will be opened and reviewed. A sifting action by the project team will identify those that meet the tender specifications. From these, a sum of money to ensure a successful competition should be selected. Those will be formally notified and requested to confirm their interest in pursuing the competition.
Round 1 to n: After each round, select the proposals that best meet the success criteria, eliminate those that do not meet success criteria and fill the quota of that round. Continue until there are only solutions left that meet the success criteria. The entities behind the final solution(s) are the competition winner(s) and may be selected to develop their results into a market ready product or service.

PPI: The developed solutions may be taken up into a PPI to develop the results into a market-ready product or service. PPI is, thus, complementary with PCP, as PPI can enable larger scale deployment of solutions that were, thus far, only developed in small quantities. PPI can also be used independently, to bring to the market innovative solutions that do not result from new, but already prior to the Market Consultation completed R&D or, for example, from organisational or process innovation.

Standard Purchase Process: Once the lead solution notifies the tendering organisation that their product/service is market ready, a standard commercial procurement process applies.

Funding Perspective

To leverage PCP and PPI during a Horizon Europe project, the proposal must identify the specific challenge that necessitates procurement of R&D and/or Innovation accompanied by relevant Key Performance Indicators (targeted quality/efficiency improvements). The EU

support comes under the form of guidance and funding actions, while additional guidance can be found at a national or regional level in some Member States (e.g. on this Flemish webpage: Vlaanderen.be). The funding can be split between the preparation stage and the execution stage. The EU considers some preparation and executing efforts as eligible activities to allocate to a PCP action (Fig. 4). Open market consultation is considered an eligible activity to allocate to the preparation stage of a PCP action, as the outcome and gained perspective will contribute to the final tender specification. If the proposal is accepted, at least 50% of the funding needs to be allocated to the actual procurement of R&D.

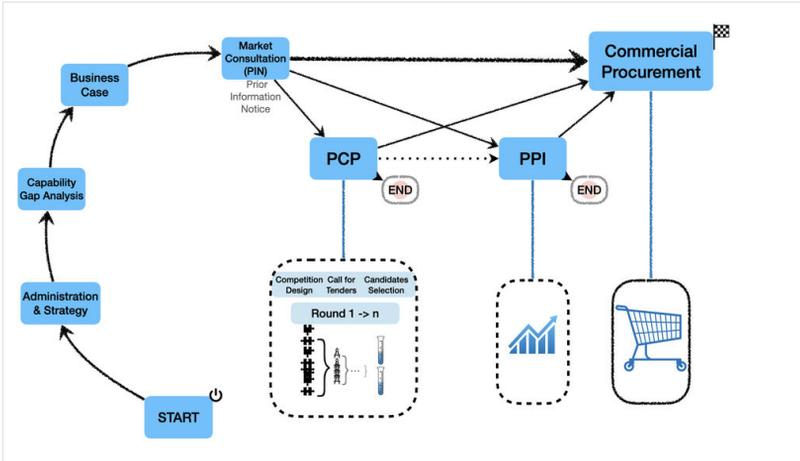


Figure 3. doi

Schematic overview of Commercial Procurement including PCP process and PPI.

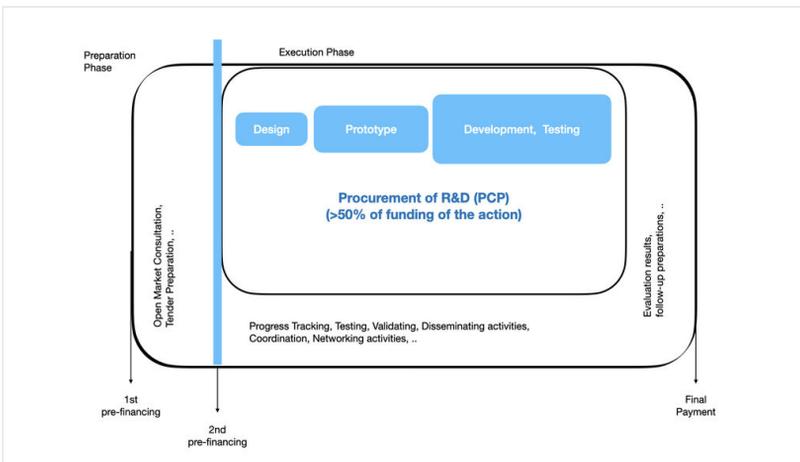


Figure 4. doi

Action funded (EU supported) activities in a PCP (based on: [How to prepare a successful innovation procurement proposal for Horizon Europe](#)).

For the procurement of the R&D services, the EU guidelines mention 15% of that portion of the budget to the Solutions Design, 30% to Prototyping and 55% to Original Development and Operational Testing.

The EU also considers efforts related to the procurement of R&D, track of the suppliers progress, evaluation of results, coordination, networking activities and dissemination as eligible activities to allocate to the execution stage of a PCP action.

Opportunities - Comparing possible procurement scenarios

Irrespective of the type of the procurement (Standard, PCP or PPI), the deployment of procurement services remains a challenge. Considering the nature of an organisation (regardless of its legal form), there will be some form of a central core or “central hub”, possibly with a number of member organisations around it. Within this context, we consider four possible models for a procurement office, although other models exist or can be developed.

Procurement activities can be organised through different models (Fig. 5), with the key deductions for each model presented in Table 5. Large commercial organisations typically organise procurement activities centrally and run as a cost centre within the business core. In a partner-led organisation, the centralised procurement function could be delegated to one of the partners, possibly on a rotating basis. It is also possible for procurement activities to be conducted in a distributed manner, where small entities with similar requirements for the product/service they want to procure join forces to save costs. However, such a distributed organisation can be difficult and time-consuming to manage, especially if partner requirements start to drift during the specification stage. The organisation of distributed procurement can be conducted on an ad hoc, project by project or contract by contract basis or it can be semi-formalised through the creation of a networked procurement “cluster”, where some level of structure is established.

Table 5.

Box 5: Key deductions from the different models (Figure 5).

Centralised Dedicated model

Procurement is executed as an integral part of the central organisation. It is composed of resources at the central hub, on the payroll or contracted. Inherently it subscribes to the strategy as it resides at the core. Information build-up leads to expertise growth in a formal structure.

Centralised Delegated

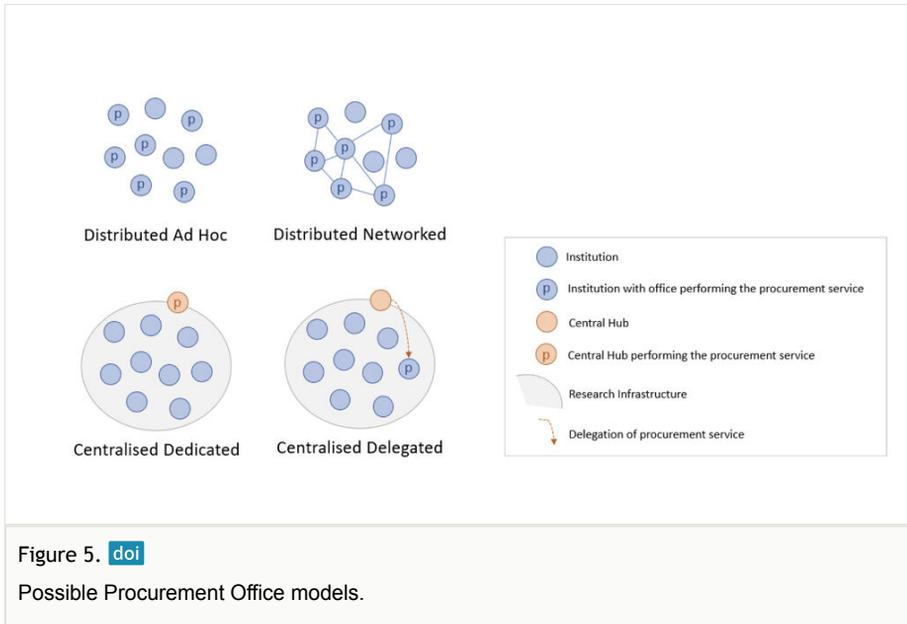
Procurement is executed as an outsourced part of the central organisation. It is delegated to procurement resources from a single member organisation. There is a mid-term horizon and, therefore, ideally some level of shared strategy. Information exchange leads to a period of expertise growth at the single member.

Distributed Networked

Procurement is executed by collaborating offices on a semi-formalised basis. It is a combination of different procurement teams in partner organisations. There is a level of ongoing collaboration and (at best) some strategic alignment. Limited information is exchanged as some fragmented (in)formal structures develop.

Distributed Ad Hoc

Procurement is executed by collaborating offices on a project by project basis. It is composed of ad hoc efforts by diverse procurement teams across members. There is no long-term collaboration and, therefore, no drive for strategic alignment. Information is exchanged on a needs basis and no (in)formal structures develop.



It is up to the institutes within the same Member State to appoint a national hub that reports into the central hub or for its institutes to report directly into the central hub.

Procurement Office Models differ in Cost and Complexity

There is an overall cost and complexity associated with each procurement approach and the significance of these will differ depending upon the point of view (central hub vs. member perspective). For this reason, we developed a simplified model that considers the cost and complexity associated with each procurement approach, from both perspectives (Fig. 6).

We plot the overall cost and complexity from the point of view of the whole. To combine the cost and complexity of the hub and the members, the amount of participating members and the amount of funding national nodes needs to be taken into account as a factor. For the DPP from which these insights stem, we had to consider the more than 170 members from at least 23 countries (<https://www.dissco.eu/dissco/network/>). This high number serves us well, as it magnifies the impact between central and partner costs and complexities, making trends more obvious, albeit extreme.

The principle-based model is not data driven as none was found during the DPP. Hence, we adopted an index approach, estimating values associated with each model relative to each other. The number represents a value above or below a normative value which is

determined to represent the value for the service in the reference scenario, being the distributed ad hoc approach: this value is represented as 100 and it can be exceeded or not reached. These indices are derived only from the experience and logic of the authors and verified with experts that supported us in the project. They are to be reassessed for use in other project configurations. The index values assume the distributed ad hoc procurement (Fig. 5) as baseline, as it is the organic or “default” mode if no proactive thought is put into organising procurement.

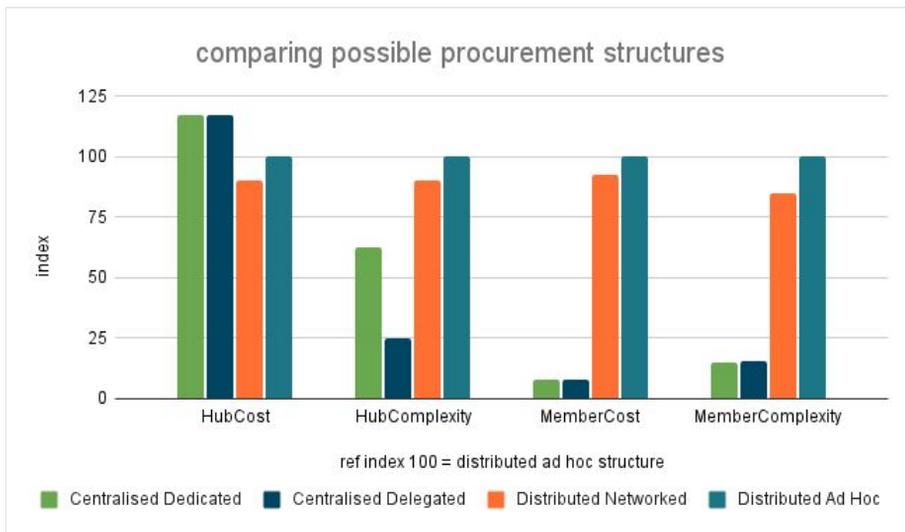


Figure 6. [doi](#)

Indicative relative comparison values for the procurement models shown in Figure 4 (index 100 = distributed ad hoc approach).

Cost is the spending of resources, time and effort. If a large amount of work needs to be done by the hub, this will translate into a larger cost. Complexity is understood as the state of having many parts and being difficult to understand or find an answer to. If an effort is large, but clear, with little chance of reloops and little need for micro management, the complexity is lower. To illustrate, a dedicated resource, while costly yet hard working, will reduce the complexity, as the level of expertise and confidence is high. For a distributed ad hoc approach, the total effort will be larger, as the expertise and confidence are reduced, so while the overall cost is distributed across all members, the overall complexity is significantly higher, which, in turn, can add to the amount of effort.

The Assumptions

To be able to make an analysis, we have to make some starting assumptions with regards to who covers the procurement resources and what impact this represents.

These assumptions are:

For Centralised Dedicated: The Hub dedicates resources. This enables expertise to build up over time and a Single Point of Contact for awareness of where to go for the members. Advantages are found in having someone present in the hub, such as the strategy awareness, responsiveness and approachability (note: any organisational burden of an extra Full Time Equivalent (FTE) is to be considered, even if outsourced, albeit in another topic than procurement). The complexity for the hub consists of contacting all members, retrieving input and following up on it, as well as compiling the required documents and executing steps. The complexity for all members is reduced to providing input upon request.

For Centralised Delegated: The cost of resources at the appointed member will be carried over to the Hub, while the cost for the members remains the same as in the centralised dedicated approach. Efficiency gains through temporary expertise building and temporary Single Point of Contact for both the hub and the members. Here it is the Delegated Single Point of Contact that will be contacting all members for input and following up on it, as well as compiling the required documents and executing steps. The complexity for the hub consists of connecting to the delegated Single Point of Contact. The complexity for all members is reduced to providing input upon request.

For Distributed Networked: Several members provide and fund recurrent resources to maintain the network. No Single Point of Contact available yet some expertise building albeit at a slow rate. A structure is formed that results in efficiency gains through an active network. The complexity for the hub consists of contact with a group of individuals and following up on the required documents and executing steps. The complexity for all members benefits from leveraging the strengths of specific members for specific tasks in the process (multi-national).

For Ad Hoc Distributed: The decision of who shares in providing and funding the ad hoc resources that are to be delivered is on a case-by-case basis. The level of expertise will vary and the level of expertise build up will likely be outrun by the changes in the concerning rules and regulations. The complexity for the hub consists of contact with all members and following up on the required documents and executing steps.

As touched upon previously, a PCP goes through well-defined stages (Fig. 7). The preparation consists of four defined stages, the first two are the Needs Assessment and Prior Information Notice (PIN), these requiring input from all the members yet can be coordinated centrally or distributed. The remaining two preparation stages, being Open Market Consultation (OMC) and Innovation Gap, do not require input from all the members. Whether the members need to provide input or not has an impact on the complexity of a stage.

Cost indication on the different approaches

Based on our assumptions, we estimate that the centralised dedicated, centralised delegated and distributed networked approaches represent respectively, 12%, 12% and

92% of the preparation costs of the Ad Hoc model which serves as a reference frame (Fig. 8). Key cost drivers are highlighted in Table 6.

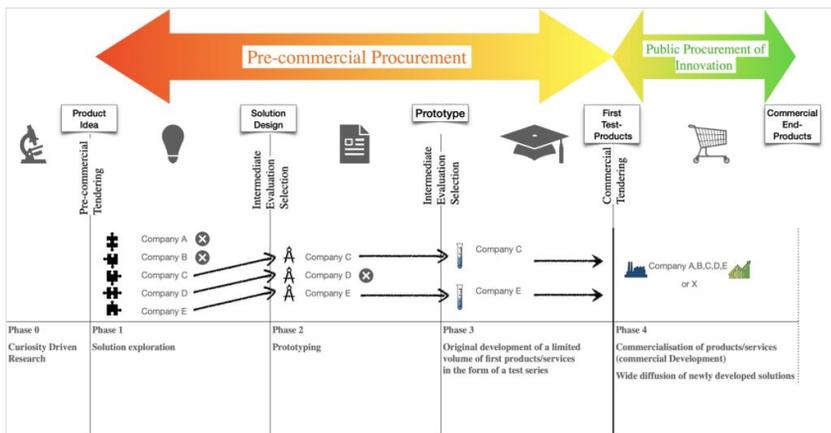


Figure 7. [doi](#)
Stages in the Pre-Commercial Procurement process.

Table 6.
Box 6: Key Cost Drivers.

The overall cost is a consequence of the cost spent by the Hub, which is funded via Member countries (in this model assumed 23), combined with the cost made at the large amount (in this model assumed 170+) executing members. So while for the hub the centralised approach represents the largest cost, in the bigger picture, a centralised action represents a more cost-efficient approach (Figs 9, 10).

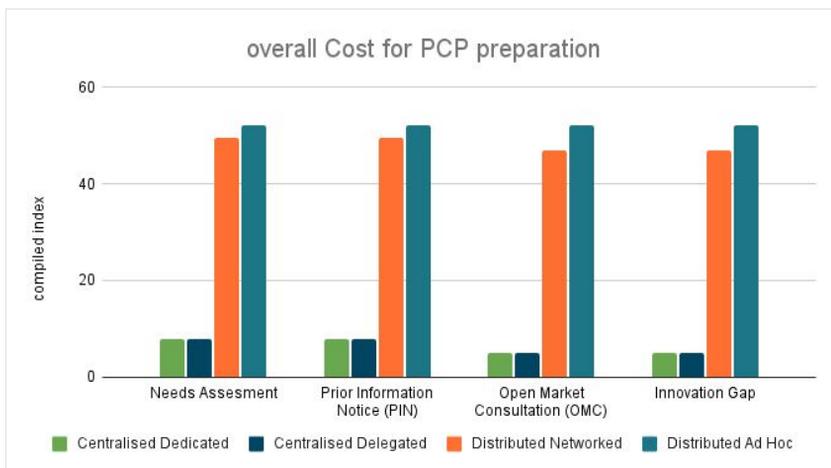
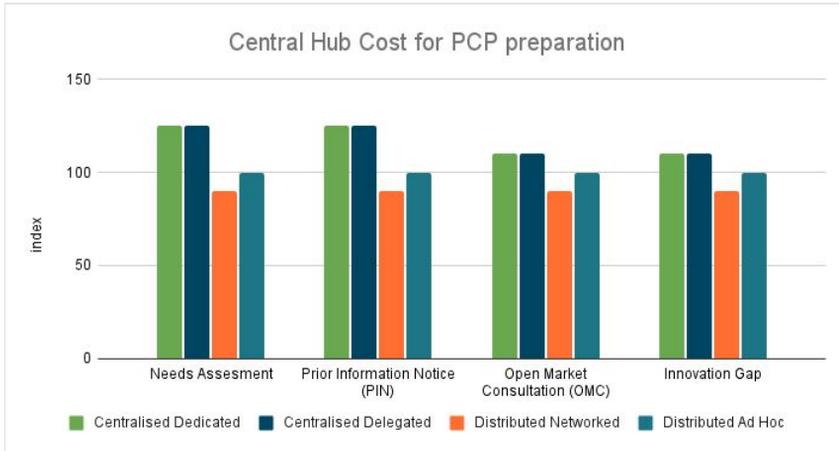
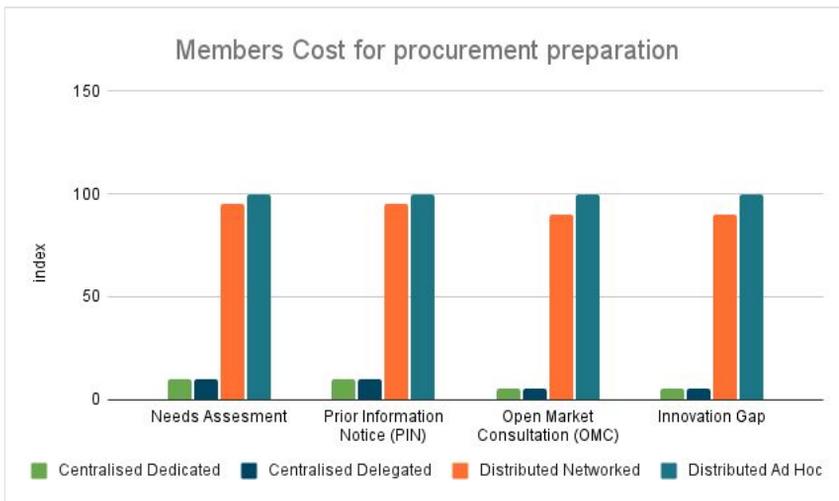


Figure 8. [doi](#)
Indicative overall cost perspective of the preparatory procurement stages.

Figure 9. [doi](#)

Indicative cost for the central hub.

Figure 10. [doi](#)

Indicative cost for the Members.

Complexity Indication on the different approaches

The start-up phase typically benefits from a lower complexity. As an organisation grows into maturity and its activity increases, so will the complexity. The complexity is impacted by the amount of executing members; therefore, while the first principles hold up, the numbers of executing members impact the relative differences.

Based on our assumptions, we estimate that the centralised dedicated, centralised delegated and distributed networked approaches represent respectively an index of 15, 16

and 85 of the preparation complexity (Fig. 11), where we keep the Ad Hoc model as reference frame at 100. Key complexity drivers are highlighted in Table 7.

Table 7.

Box 7: Key Complexity drivers.

The overall complexity is a consequence of the complexity at the central hub combined with the complexity at the large number of (in this model 170+) executing members. So, while for the hub the centralised dedicated model represents the greatest complexity, overall, a centralised action represents a simpler, more transparent and more efficient approach (Figs 12, 13).

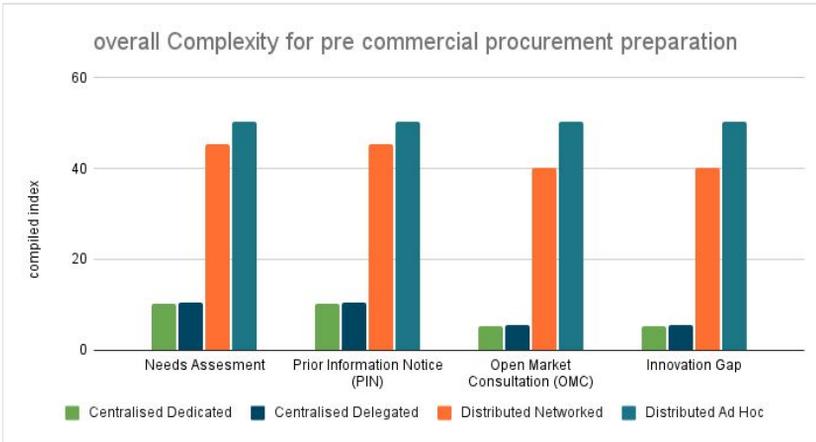


Figure 11. [doi](#)

Indicative overall complexity perspective of the preparatory procurement stages.

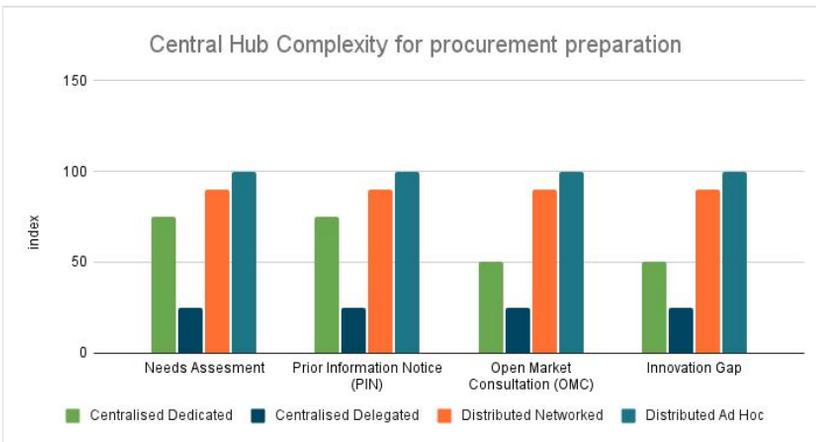
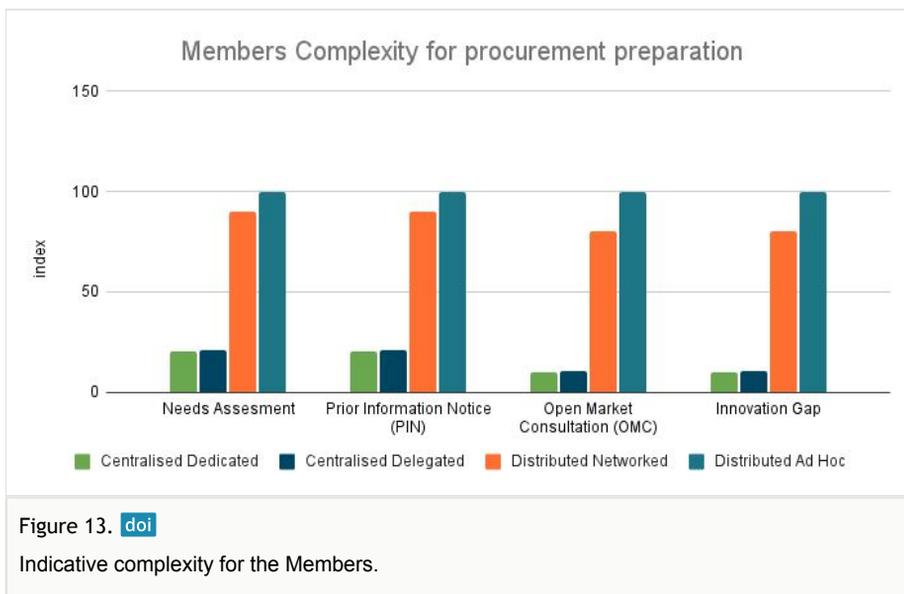


Figure 12. [doi](#)

Indicative complexity for the hub.



European Commission funding opportunities

A common characteristic of ERICs is their need for funding to support international and interdisciplinary projects and users, as well as their need to sustainably develop their activities and capacities.

Due to the broad diversity in the missions of ERICs and their variety of access and service provision, the needs in terms of funding for projects supported by ERICs are highly variable, so that there is no single applicable funding scheme for all ERICs. Funding mechanisms must, therefore, be carefully adapted to each ERIC. An additional source of income for ERICs concerns EU funding opportunities, for which the legal statutes of ERICs make them fully eligible. If the services are predominantly for research-related activities, it can apply to the Horizon Europe Programme and potentially even leverage the Pre-Commercial Procurement or Public Procurement of Innovation available within Horizon Europe. Overall, an ERIC is not limited to funding for R&I. Depending on its activities, an ERIC could apply to other types of EU funding, as detailed in this section.

While it can be a role for ERICs to help their members and associated institutions to obtain EU funding in their domain, ERICs have to be attentive to not enter in competition with their own members, who already pay a membership fee or contribute in-kind to the ERIC. To avoid conflicts of interests and unhealthy competition, ERICs should find the right balance between helping their institutions to obtain EU funding and applying themselves, as legal entities, to EU funding. Beyond funding, it is fundamental for ERICs to have good knowledge and optimal use of the funding instruments at several levels to enhance the visibility of ERICs within the research community.

General information on EU funding

ERICs are eligible for several EU funding, including: grants, financial instruments, subsidies, trust funds, prizes and procurements. The implementation rules for all types of funding are governed by the Financial Regulations (European Commission 2018).

Types of EU funding

Several types of funding with different rules (not necessarily including providing money in cash), different purposes and different time-scale of investment (e.g. short-term needs or long-term social benefits), can be provided (Table 8).

| |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Table 8.</p> <p>Box 8. Key information on EU funding.</p> |
| <p>Grants: Direct financial contributions from the EU budget awarded by way of a donation to third party beneficiaries engaged in activities that serve EU policies. Non-profit funding opportunities that provide financial assistance towards the achievement of specific project objectives.</p> <p>Two grants broad categories:</p> <ul style="list-style-type: none"> i) To help achieve an objective that is part of an EU policy; ii) To finance the operating expenditure of a body pursuing an aim of general European interest or an objective that forms part of an EU policy. |
| <p>Financial instruments: Financial support provided on a complimentary basis from the budget, in order to address specific policy objectives of the EU. Can be combined with grants.</p> <p>Types of financial instruments include:</p> <p>Equity and debt, loan guarantees and venture capital, capacity building and risk-sharing facilities.</p> <p>Financial instruments can achieve:</p> <ul style="list-style-type: none"> i) Financial leverage - multiplying scarce budgetary resources by attracting private and public funds to support EU policy objectives; ii) Policy leverage - incentivising entrusted entities and financial intermediaries to pursue EU policy objectives through alignment of interest; iii) Institutional leverage - benefiting from the expertise of the actors involved in the implementation chain. <p>These instruments, implemented in partnership with public and private institutions, address market failures in the provision of external financing and avoid any crowding-out of private financing.</p> |
| <p>Trust funds: Pool funding mechanism, in which several donors jointly finance an action on the basis of commonly-agreed objectives and reporting formats. Each EU trust fund has its own governing board, which decides on the use of the pooled resources.</p> |
| <p>Prizes: Financial contribution given as a reward following a contest. ERICs are eligible to almost all EU opportunities, including prizes, but they should avoid competition with its own Member institutions.</p> |
| <p>Subsidies: Subsidies aim to reduce economic and social disparity in the EU's poorest regions. Subsidies are awarded to help pay for infrastructure projects and protect the environment.</p> |
| <p>Public procurement contracts: Purchase of goods, services, supplies or works by a contracting authority (EU Institution or local administration in the Member State) via a public contract to meet a need the EU would have.</p> <p>As a general rule, a public contract is clearly different from a grant:</p> <ul style="list-style-type: none"> i) In the case of a contract, the contracting authority obtains a product or service it needs in return for payment; ii) In the case of a grant, it contributes either to a project carried out by an external organisation or direct to that organisation because its activities contribute to EU policy aims. |

Management modes of the funding

While the EU provides the funding for a specific programme or project, it is not always directly involved in the day-to-day management. There are three types of implementation modes for the programmes funded by the EU: **Direct management**, **Shared management** and **Indirect management** (Table 9).

Table 9.

Box 9. Key information on management modes.

Direct management: The EC is directly responsible for all steps in a programme's implementation from launching the call and selecting the applicants down to making the payments. These tasks are carried out by the EC's departments, at its headquarters, in the EU delegations or through EU executive agencies; there are no third parties.

Shared management: Both the EC and national authorities in Member States, such as ministries and public institutions, are in charge of running a particular programme and to jointly manage the funding.

Indirect management: Funding is managed by partner organisations or other authorities inside or outside the EU. Some funding programmes are partly or fully implemented with the support of entities external to the EU, for example national authorities or international organisations. Under this management mode, the EC delegates budget execution tasks to different types of implementing partners, for example:

- Third countries or the bodies they have designated;
- International organisations such as the United Nations, the World Bank, the International Monetary Fund;
- The EIB and the European Investment Fund (EIF);
- Decentralised agencies, such as the European Centre for Disease Prevention and Control, the European Food Safety Authority or the European Border and Coast Guard Agency;
- Public-private partnerships;
- Member States Bodies such as Erasmus+ national agencies.

The EU Multiannual Financial Framework 2021-2027

The new EU's long term funding scheme for the period 2021-2027 is gathered within the Multiannual Financial Framework (MFF). The MFF ([MFF 2021-2027](#) and European Commission 2021) is made up to fund R&I programmes in Europe, grouped into seven headings (Fig. 14), that correspond to the spending categories of the MFF, dedicated to specific policy areas.

The MMF constitutes a supporting tool to secure the resources for the European political priorities, such as digitalisation and green deal, providing particular opportunities to research programmes and RIs. It is seconded by the instrument NextGenerationEU ([NextGenerationEU](#)) supporting the post-COVID19 recovery plan for Europe. The funding programmes provided via the MFF can be accessed through different entry points (Fig. 14) by: Headings or Spending categories, Topics, National Single Portals, EU programmes and Funds via Agencies. Key information on the 2021-2027 MFF entry points are provided in Table 10.

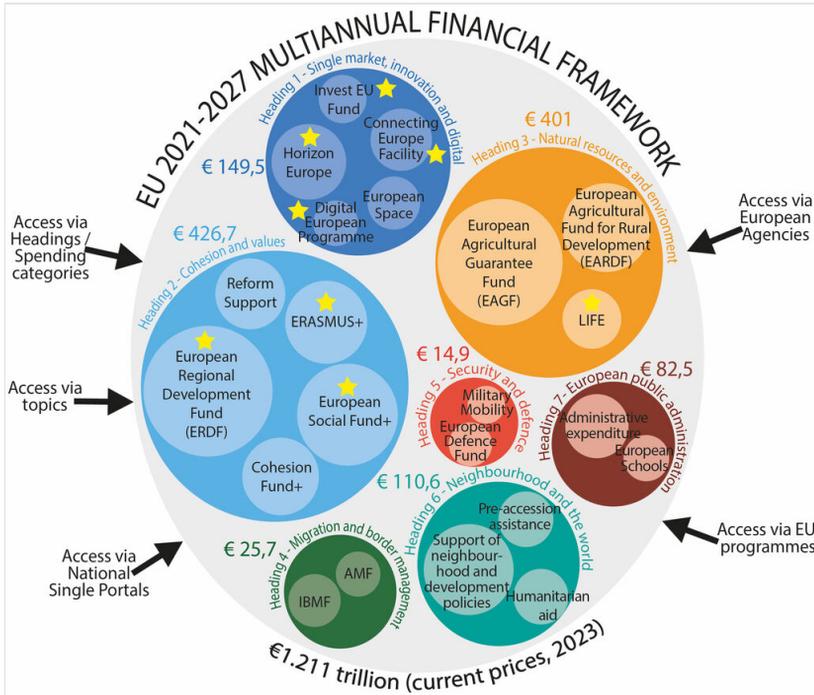


Figure 14. [doi](#)

Overview of the funding programmes of the MMF 2021-2027 and of the entry points to the MFF. Yellow stars emphasise the sub-programmes that are presented in detail in the text of this section.

Table 10.

Box 10. Key information on 2021-2027 MFF entry points.

MFF funding by headings: Headings represent the subdivision, or the spending categories, of the EU MFF. There are seven headings (Fig. 14) more or less relevant for ERICs depending on their main tasks and objectives. According to our analysis, Headings 1, 2 and 3 appear to be the most relevant for ERICs.

MFF funding by topics (Find calls for funding by topic): List of the major EU topics and areas of action available on the website of the EC. Information about other funding opportunities (e.g. public procurement) can also be found there. The topics for action are highly relevant to ERICs and include: Energy, digitisation, environment, infrastructure, education and training, R&I.

MFF funding by National single portals – sorted by State Members (National single portals): The national portals are websites set up by Member States of the EU to inform citizens about the implementation of Union funds in their countries. Each country has its own national website portal, which covers implementation of some funds of the MFF. The management of these funds is done in collaboration with the EC and national public authorities. The national portals constitute national single-entry points for EU funds, also providing access to all programmes in a country. Information on upcoming funding opportunities are also available: which regions are covered by funding calls, who can apply, the amount of funding allocated to a call, programme and EU policy objectives and timeline.

MFF funding by Groups of funding: Some European funds are gathered within groups of funding that cover specific areas of research and development, for example, the EU structural funds ([European structural funds](#)) that were run during the 2014-2020 predecessor of the current MFF programme and will come to an end in late 2023 or the EU education programmes ([Education](#)) that continues during the 2021-2027 MFF.

MFF funding through European Agencies ([EU institutions and bodies profiles](#)): There are currently 76 European institutions and bodies that may represent potential long-term partners for ERICs. European agencies can provide advice, training, funding and other types of support to both ERICs and ERICs' users.

Most relevant EU financial sources for ERICs

This section presents the three main streams through which the EC can provide funding and support to the development and deployment of ERICs, namely (Fig. 15): the MFF 2021-2027, the EIB and the Transnational Access Scheme (TNA).

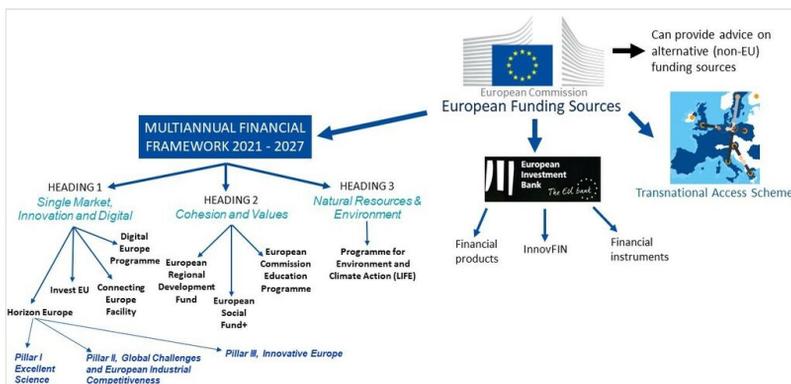


Figure 15. [doi](#)

Summary of the main streams through which the EC can provide funding and support to ERICs. The funding sources and services provided by the MFF, the EIB and the TNS are summarised on this figure and presented in detail in this chapter.

These streams are subdivided into sub-programmes and instruments that are detailed in this section. Amongst the many sub-programmes included in the MFF (Fig. 15), some of them (see yellow stars in Fig. 14 and Fig. 16), including Horizon Europe, may represent the main and most relevant funding sources for ERICs and are particularly emphasised in this document. Other MFF's sub-programmes (e.g. European Agricultural Guarantee Fund or Military Mobility) seem to be less relevant for ERICs, but could be of interest for a specific ERIC depending on its main activities. Additional details on MFF's sub-programmes not presented in this present document can be found in Landel et al. (2023).

EU Multiannual Financial Framework

Heading 1: Single Market, Innovation and Digital

Within Heading 1, the EU wants to step up investment in R&I, digital transformation, strategic infrastructure and the Single Market, as they are considered to be key to

unlocking future growth. Heading 1 supports the society to tackle common challenges such as decarbonisation and demographic change and boost the competitiveness of Small and Medium Enterprises (SMEs).

| FUNDING | TYPE OF FUNDING | | | | MANAGEMENT | | | ELIGIBILITY FOR ERICs ¹ | | | | RELEVANCE FOR ERICs |
|------------------------------------|-----------------|-----------------------|--------|-----------------------------|------------|--------|----------|------------------------------------|----------------|-------------|-------|---------------------------------------|
| | Grants | Financial Instruments | Prizes | Public Procurement Contract | Direct | Shared | Indirect | Central Hub | National Nodes | Local Nodes | Users | |
| Horizon Europe | Orange | | Orange | Orange | Blue | | | Green | Green | Green | Green | HIGH |
| Invest EU | Orange | Orange | | | Blue | | | Green | Green | | | MODERATE |
| Connecting Europe Facility | Orange | Orange | | | Blue | | | | Green | Green | | MODERATE |
| Digital Europe Programme | Orange | | | Orange | Blue | | Blue | Green | | | Green | HIGH |
| European Regional Development Fund | Orange | Orange | | Orange | | Blue | | | Green | Green | | HIGH (for ERICs in concerned regions) |
| European Social Fund+ | Orange | Orange | | Orange | | Blue | Blue | | Green | Green | | HIGH (for staff) |
| Erasmus+ | Orange | | Orange | Orange | Blue | | Blue | | Green | Green | Green | MODERATE |
| Environment and Climate Action | Orange | | Orange | Orange | Blue | | | Green | Green | Green | | HIGH |

Figure 16. [doi](#)

Summary of the MFF programmes and their relevance for ERICs funding.

Relevance for ERICs: Heading 1 hosts the funding programmes dedicated to Research and Innovation and is, thus, particularly relevant for ERICs at all levels: central hub, national and local nodes. ERICs can be partners of the grants and participate in the calls or host a grant obtained by any individual user, including from outside the EU.

- Research and innovation

Horizon Europe

Objectives: Horizon Europe (Fig. 17) is the EU framework programme for R&I. It supports the creation and better diffusion of excellent knowledge and technologies, it promotes excellence in research and provides essential support to top researchers and innovators to drive the systemic changes needed to ensure a green, healthy and resilient EU. It aims to tackle climate change, to help to achieve the UN’s Sustainable Development Goals and to boost the EU’s competitiveness and growth.

Relevance for ERICs: ERICs can apply to calls either as coordinators, beneficiaries or third parties. Depending on the call, the ERICs can be the coordinator and develop their own capacity, services and network or be the instrument used by the research community to develop its own research programme.

Eligibility: Scientists and academics, research organisations, universities, industry, SMEs, students. Legal entities from the EU, such as ERICs and associated countries can participate.

Types of funding: Grants, prizes and procurement, as well as funding to develop RIs and foster mobility within the EU. It also supports partnerships between Member States, industry and other stakeholders to work jointly on R&I.

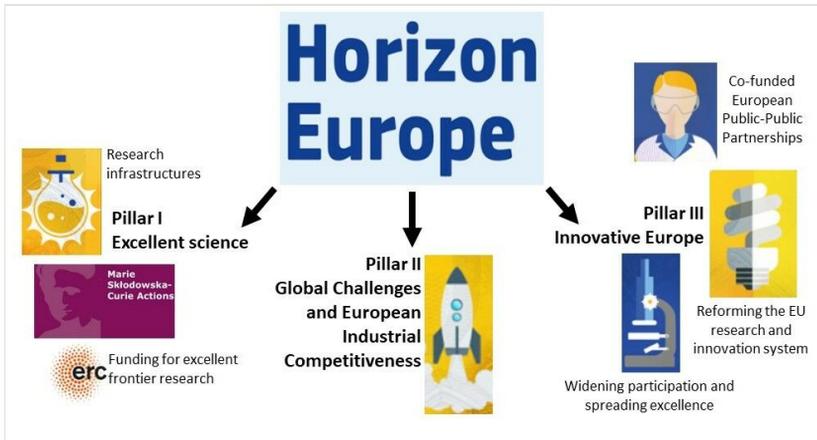


Figure 17. [doi](#)

The three pillars of Horizon Europe that are relevant for ERICs. Details for each programme are presented in the text.

- Pillar I, Excellent Science: RIs, Marie Skłodowska-Curie Actions, and European Research Council;
- Pillar II, Global Challenges and European Industrial Competitiveness;
- Pillar III Innovative Europe: European Innovation Council, European Innovation Ecosystems, European Institute of Innovation and Technology.

Horizon Europe, Pillar I: Excellent Science

Research infrastructure

Objectives: To enable new discoveries and keep Europe's RIs at the highest level of excellence and to provide users of RIs with research services, particularly in some priority domains: health, green transition, knowledge.

Relevance for ERICs: Relevant for different levels of ERICs (central hub, national or local nodes and users), depending on the calls.

Funding opportunities for RIs include:

- **INFRADEV:** Developing, consolidating and optimising the European RIs landscape ([INFRADEV](#));
- **INFRAEOSC:** Enabling an operational, open and FAIR EOSC ecosystem ([INFRAEOSC](#));

- **INFRATECH**: Next generation of scientific instrumentation, tools and methods and advanced digital solutions ([INFRATECH](#));

- **INFRASERV**: Develop and fund transnational users' access to European RI's services ([INFRASERV](#)).

Marie Skłodowska-Curie Actions

Objective: To fund R&I projects to boost top researchers' careers through mobility and innovative doctoral and postdoctoral training.

Relevance for ERICs: For users, national and local nodes.

Eligibility: Postdoctoral Fellowships: individual researchers and host organisations; Doctoral Networks and Staff Exchanges: academic and non-academic international networks of organisations; Co-funding of regional, national and international programmes: organisations funding or managing doctoral or postdoctoral programmes; MSCA and Citizens.

European Research Council (ERC)

Objective: ERC is the premier European funding organisation for excellent frontier research. It funds creative researchers of any nationality and age, to run projects based across Europe.

Relevance for ERICs: Applications to funding by ERICs' users. Awards can be used by researchers to finance access to ERICs' facilities and services. ERICs' national and local nodes and member's institutions could serve as host for the award.

Eligibility: The ERC offers four main grant schemes: i) Starting Grants, ii) Consolidator Grants, iii) Advanced Grants and iv) Synergy Grants. Research grants can be used to finance access to ERICs' facilities and services, but it requires ERICs to be eligible as large access facilities, as well as ERICs improving their visibility amongst the research community to attract researchers to apply to ERC with an ERIC as a host/partner.

Limitation: A weakness exists for distributed ERICs that have faced administrative challenges when there is a simultaneous implication in the project of an ERICs' headquarters (coordination/core team/Central Hub) and one or more of its national nodes. This adds significant hurdles to the execution of the projects and also has an impact on ERICs' visibility as a single entity. In addition, ERICs currently experience reduced visibility as potential hosts for ERC's awards.

Horizon Europe, Pillar II: Global Challenges and European Industrial Competitiveness

Objective: Pillar II includes six clusters: i) Health; ii) Culture, Creativity and Inclusive Society; iii) Civil Security for Society ; iv) Digital, Industry and Space; v) Climate, Energy and Mobility; and vi) Food, Bioeconomy, Natural Resources, Agriculture and Environment.

The objective is to maximise integration and synergies across the six clusters while securing high and sustainable levels of impact for the Union in relation to the resources that are expended.

Relevance for ERICs: Relevant for different levels of an ERIC depending on the clusters and calls within the clusters.

Eligibility: Universities, research institutes, research centres; Local, regional and national public administrations; Museums, cultural institutions and the cultural tourism industry; SMEs in the field of digital technologies.

Horizon Europe, Pillar III: Innovative Europe

Objective: Support the development of disruptive and market-creating innovations and enhance European innovation ecosystems to foster sustainable economic growth and employment. Pillar III features three distinctive and complementary instruments: i) European Innovation Council, ii) European Innovation Ecosystems and iii) European Institute of Innovation and Technology. They aim to reinforce close cross-border collaboration amongst academia, the public sector, industry and individual entrepreneurs.

Relevance for ERICs: Relevant for ERICs' users and to create bridges between ERICs, start-ups and SMEs, through developing new technologies emerging from research and development.

Eligibility: Single company classified as SME, or as a small mid-cap (up to 499 employees) and established within a Member State or an Associated Country or natural persons and legal entities.

Horizon Europe, Actions: Widening participation and strengthening the European Research Area

Reforming and enhancing the EU research and innovation system

Objective: Training researchers for successful participation in R&I activities, while enhancing networking, gender equality, ethics and integrity.

Relevance for ERICs: National and local nodes, potentially users.

Eligibility: Universities, research centres, NGOs, governmental organisations, civilian volunteer organisations, civil society organisations, citizens associations. Every consortium must assign a project coordinator who will be the main contact throughout the project.

Widening participation and spreading excellence

Objective: To build R&I capacity for countries that have reduced opportunities to develop such capacities. They will be able to strengthen their potential for successful participation in transnational research and innovation processes and promote networking.

Relevance for ERICs: National and local nodes located in eligible countries.

Eligibility: All organisations eligible in Horizon Europe can participate, but only organisations based in Widening Countries can participate as coordinators. As for 2023, the list of eligible Widening Countries is: Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia, Slovenia.

Areas of intervention:

 **Teaming:** Support/create centres of excellence as role models to stimulate excellence, new investments and reforms of national R&I systems.

 **Twinning:** Develop excellence in chosen R&I domains, increase visibility of the research institutions and universities and develop the skills of its staff.

 **ERA Chairs:** Support universities or research organisations to attract and maintain high quality human resources and help excellent scientists and their teams.

 **European Cooperation in Science and Technology (COST),** a cross-border scientific network helping excellent researchers and innovators gain access to the European and international networks.

Horizon Europe, Actions: Co-fund

Co-funded European Public-Public Partnerships

Objectives: To link European research institutions together. Co-funded European Partnerships are based on a grant agreement between the Commission and a consortium of partners. The grant agreement is signed following a call for proposals for a programme co-fund action in Horizon Europe. This co-funding instrument supports cross-border countries and regions to link their research programmes with those of other Member States and participate in joint activities.

Relevance for ERICs: Relevant for ERICs users and Member State's institutions.

Possible Activities to be funded include: Networking and coordination; research; innovation; pilot actions; innovation and market deployment; training and mobility; awareness raising and communication; dissemination and exploitation. Co-fund may also provide financial support, such as grants, prizes and procurement, as well as Horizon Europe blended finance or a combination thereof.

Limitation: A limitation can arise from the national rules of the Member States, since some are in contradiction with ERICs mechanisms (e.g. Co-fund may require that research is undertaken in specific institutions that receive the funding).

- European Strategic Investments

Invest EU ([InvestEU](#))

Objectives: To boost innovation and job creation in Europe by investing in sustainable infrastructure, R&I, digitisation, SMEs and midcaps and social investment and skills.

Relevance for ERICs: Central hub, potentially national nodes, useful to associate partners (Private companies, Banks, Financial institutions) to the ERICs' activities.

Eligibility: Public and private investors and project promoters, SMEs and mid-caps, service providers and recipients of microfinance.

Types of funding: The EIB will provide guarantee to support financing and investment operations and advisory support for the development of investable projects and access to financing. Project promoters should apply directly to the EIB.

Connecting Europe Facility (CEF) ([Connecting Europe Facility](#))

Objectives: To accelerate investments in Europe's transport, energy and digital infrastructure networks. To support the digital transitions, by contributing to the infrastructure targets. CEF promotes growth, jobs and competitiveness through targeted infrastructure investment. It supports the development of high performing, sustainable and interconnected trans-European networks in the fields of transport, energy and digital services. CEF makes travel easier and more sustainable and it facilitates cross-border interaction between public administrations, businesses and citizens.

Relevance for ERICs: CEF is relevant to National and Local nodes and to develop public-private partnerships within ERICs. The Health and Digital Executive Agency ([Health and Digital Executive Agency](#)) manages the digital part of the Connecting Europe Facility and is particularly relevant for ERICs that involve digital data.

Eligibility: Industry, SMEs, research organisations, other public and private entities established in a Member State or in a non-EU country associated with the programme or created under EU law and international organisations.

Types of funding: Grants, with different co-financing rates depending on the project type, to three main sectors: transport, energy and digital. CEF also offers financial support to projects through innovative financial instruments, such as guarantees and project bonds. These instruments create significant leverage in their use of the EU budget and act as a catalyst to attract further funding from the private sector and other public sector actors.

Digital Europe Programme ([Digital Europe Programme](#))

Objectives: To drive the EU's digital transformation, to build the EU's strategic digital capacities and facilitate wide deployment of digital technologies, to be used by EU citizens, businesses and public administrations. The digital Europe programme supports the strengthening of digital capacities for high-performance computing, artificial intelligence and cybersecurity, along with advanced digital skills and accelerating the adoption and best use of digital technologies.

Relevance for ERICs: Relevant to all ERICs managing online data and providing e-services, at all levels of ERICs (From central hub, to users), with the conditions that data must be hosted in Europe.

Eligibility: Public and private organisations, industry and SMEs, scientists and academics, universities etc.

Types of funding: Grants and procurements under the direct management scheme or under indirect management for the high performance computing and cybersecurity actions, by the European High-Performance Computing Joint Undertaking and the European Cybersecurity Competence Centre.

Heading 2: Cohesion and Values

Heading 2 aims to strengthen the cohesion amongst EU Member States, to reduce disparities in EU regions, within and across Member States and to promote sustainable territorial development. In addition, through investment in young people, health and actions to protect the EU's values, Heading 2 seeks to make Europe more resilient to the various challenges that our continent is and will be facing in the future.

Relevance for ERICs: Heading 2 hosts funding programmes dedicated to cohesion and territorial development in the EU. These programmes are particularly relevant for distributed ERICs.

- Regional development and cohesion

European Regional Development Fund (ERDF) ([ERDF](#))

Objectives: To strengthen cohesion in the EU by reducing economic, social and territorial disparities between its regions and supporting the full integration of less-developed regions within the EU's internal market. ERDF supports investment in innovation and research, the digital transition, the environment and the net-zero-carbon economy. It also addresses economic, environmental and social problems in urban areas, with a special focus on sustainable urban development. In addition, it supports cooperation activities between regions in different Member States (see **Interreg**).

Relevance for ERICs: ERDF allows for capital investment in ERICs, for building and equipment, for the construction and upgrading of facilities and, in certain cases, to access the services proposed by ERICs. ERDF is relevant for National and Local nodes of ERICs in disadvantaged regions. It includes specific funding possibilities for: Online training, research projects, new academic chairs, equipment and buildings.

Eligibility: Regional public and private entities, networks of universities, research institutions, with special attention paid to disadvantaged regions and areas, notably rural areas and areas suffering from natural or demographic handicaps and outermost regions; and, indirectly, EU citizens, public or private organisations, SMEs and businesses.

Types of funding: Grants, procurements and financial instruments. ERDF finances programmes in shared responsibility between the EC and national and regional authorities in Member States. The Member States' administrations take responsibility for day-to-day management. Productive investments in enterprises, infrastructure and public policies across a range of topics; consultancy services and advice; studies.

European Territorial Cooperation - Interreg ([Info regio - Interreg : European Territorial Co-operation](#))

Interreg is part of ERDF and supports cooperation and collaboration across regions and countries, to develop joint services and strengthen solidarity. Funding for projects between Member States, their outermost regions, the EU acceding countries and the neighbourhood countries. Interreg supports cross-border mobility and efforts to develop environmental protection, emergency services, skilled jobs and access to public services. There are several levels of cooperation within Interreg: Interreg A, B and C.

Interreg A - Cross-border operation: Supports cooperation between NUTS III regions ([NUTS Maps](#)) from at least two different Member States lying directly on the borders or adjacent to them.

Interreg B - Transnational cooperation: Allows for cooperation over larger transnational territories or around sea basins. It involves national, regional and local programme partners in Member States, but also in some programmes, non-EU countries (third countries such as Iceland or Lichtenstein), Enlargement and Neighbourhood partner countries and the Overseas Countries and Territories, with a view to achieving a higher degree of territorial integration. Interreg B supports a wide range of project investments related to innovation, the green and digital transition, accessibility, digitalisation, education, capacity building and governance, public sector innovation and interoperability, Cultural heritage and sustainable tourism development.

Interreg C - Interregional cooperation: Aims at boosting the effectiveness of cohesion policy by promoting exchange of experiences, innovative approaches and capacity building between regions.

- Investing in people, Social Cohesion and Values

European Social Fund+ (ESF+) ([European Social Fund+](#))

Objectives: ESF+ is the main instrument for investing in people, with the aim of building a more social and inclusive EU. Provides important contributions to the EU's employment, social, education and skills policies. ESF+ will also support economic, territorial and social cohesion in the EU – reducing disparities between Member States and regions.

Relevance for ERICs: Relevant for ERICs' education and skills aspects, particularly for national and local nodes. ESF+ can be used to recruit technicians, staff in human resources and staff to support the high-technology training that can be proposed by ERICs.

Eligibility: EU public and private organisations, non-governmental organisations, EU citizens, young people and children, people from vulnerable groups.

Types of funding: Support under the ESF+ is implemented under shared management and indirect management. Funding is disbursed in the form of grants, procurements and financial instruments.

ESF+ supports: social innovation; investments in young people, training and lifelong learning; investments in capacity building and transnational/cross-border cooperation. Studies, actions and training aimed at investing in people, creating and protecting jobs, promoting social inclusion, fighting poverty and developing the skills needed for the digital and green transitions.

ESF+ also includes the **ESF Social Innovation+** ([ESF Social Innovation+](#)), which aims to facilitate the transfer and upscaling of innovative solutions to the societal challenges of today. Through supporting transnational cooperation, the initiative aims to expand best practices in fields including employment, education, skills and social inclusion across Europe.

European Commission Education Programme ([Education](#))

Description: Range of educational and training opportunities available throughout Europe for students of all ages, including information on studying abroad, vocational training, recognition of qualifications and skills. This includes the **ERASMUS+** programme, the funding scheme to support activities in education, training, youth and sport.

ERASMUS+ ([Erasmus+](#))

Objectives: To promote learning mobility for individuals and groups, along with cooperation, quality, inclusion and equity, excellence, creativity and innovation. It promotes non-formal and informal learning mobility and active participation in education amongst young people.

Relevance for ERICs: Relevant for ERICs' national and local nodes and users to promote and implement the training provided by ERICs in the domains of their dedicated tasks and activities. The Erasmus+ programme is a particularly relevant funding scheme to support ERICs activities in education, training and outreach activities with youth.

Eligibility: Students, researchers and academics, universities and other organisations working in the field of higher education in the EU and the partner countries. As a general rule, organisations participating in Erasmus+ projects must be established in an EU Member State or third country associated with the Programme. Some Actions are also open to participating organisations from third countries not associated with the Programme, notably in the field of higher education, vocational education and training and youth.

Types of funding: Direct and indirect management with the support of the Erasmus+ EU national agencies. Funding is disbursed in the form of grants, prizes and procurements. Erasmus+ projects are submitted and managed by participating organisations. If a project

is selected, the applicant organisation becomes a beneficiary of an Erasmus+ grant, grant agreements are not signed with individual participants.

Heading 3: Natural Resources and Environment

Heading 3 is designed to be a driver of sustainability and aims to invest in sustainable agriculture and maritime sectors, climate actions, environmental protection, food security and rural development. Part of the programmes support Europe's farming, agricultural and fisheries sectors and seek to make them more competitive. Other programmes are dedicated exclusively to the EU's environmental and climate objectives.

Relevance for ERICs: Heading 3 of the EU MFF hosts funding programmes dedicated to climate actions and is particularly relevant for environmental ERICs.

- Environment and Climate Action

Programme for Environment and Climate Action (LIFE) ([LIFE](#))

Objectives: To achieve the shift towards a sustainable, circular, energy-efficient, renewable-energy based, climate-neutral and resilient economy; to protect, restore and improve the quality of the environment, including the air, water and soil; to halt and reverse biodiversity loss and to tackle the degradation of ecosystems.

Relevance for ERICs: ERICs' central hub, National and National Nodes.

The LIFE programme's financial allocation is implemented through four sub-programmes: i) nature and biodiversity, ii) circular economy and quality of life, iii) climate change mitigation and adaptation and iv) clean energy transition.

Eligibility: EU national or local authorities, private commercial organisations and private non-commercial organisations (e.g. non-governmental organisations). Individual persons are not eligible to apply.

Types of funding: Funding in the form of grants, procurements and prizes through direct management. The programme supports demonstration, best practice, coordination and support actions, capacity building and governance projects. This includes projects that support the implementation of environmental and climate plans, as well as programmes and strategies developed at regional, multi-regional or national level.

European Investment Bank (EIB)

The EIB ([European Investment Bank](#)) offers loans, guarantees, equity investments and advisory services (Fig. 18). The EIB works closely with other EU institutions to support EU policies in over 140 countries around the world. The EIB has equity to directly finance a panel of companies, institutions, SMEs and projects.

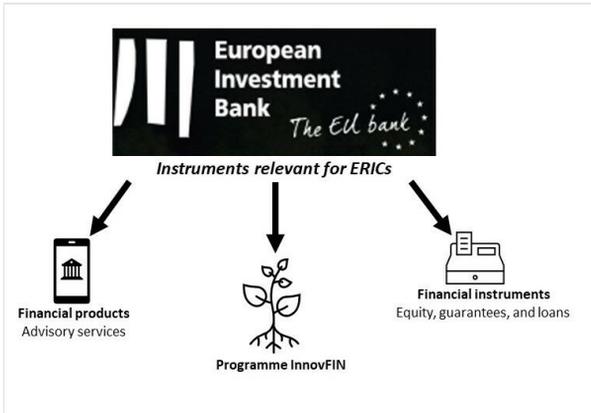


Figure 18. [doi](#)

Services of the EIB relevant for ERICs.

Relevance for ERICs: EIB’s advisory services are relevant financial products for ERICs. The programme InnovFIN is particularly relevant for RIs. Equity, guarantees and loans constitute additional financial instruments for ERICs.

Access to the services are restricted to projects in concordance with EIB’s priorities (Fig. 19).

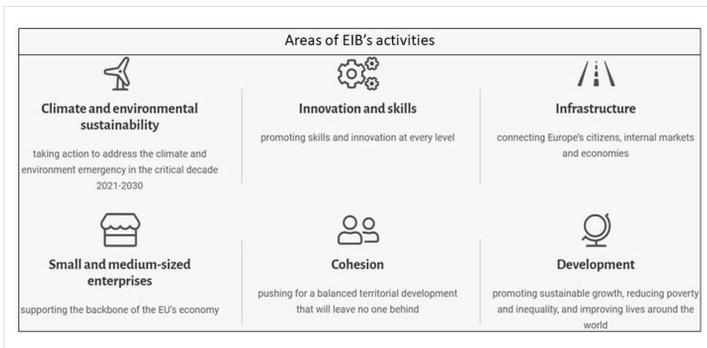


Figure 19. [doi](#)

EIB’s areas priorities (source: [EIB's priorities](#)).

EIB financial products relevant to ERICs

Through their Member States and national agencies and/or ministries, ERICs may benefit from advisory services ([EIB's Advisory services](#)) in three categories:

- *Strategic development:* support to realise projects both inside the EU and worldwide;
- *Market development:* to help defining the parameters and specific needs of a sector, a region or a specific investment programme;

- *Project development*: to support projects that are then funded by the EIB or by other financiers.

Services are available for public and private project promoters and to improve access to finance and the business environment in general. Services include market and sector studies, to help ERICs conceive their strategy and hone their skills. EIB's guides projects through the steps needed to secure financing, mobilising where necessary complex or ad-hoc financial solutions.

EIB InnovFIN programme

EIB's InnovFin Advisory ([InnovFin Advisory](#)) helps R&I projects that face difficulties in securing finance, despite being fundamentally good projects. InnovFin Advisory guides its clients on how to structure their R&I projects in order to improve their access to finance. The service helps them to capitalise on their strong points and adjust elements such as their business model, governance, funding sources and funding structure to improve their access to finance. In the long run, InnovFin Advisory increases their chances of being implemented. The programme also provides advice to improve investment conditions through activities which are not project-specific. This includes things such as developing a business case for new financing mechanisms and preparing studies on increasing the effectiveness of financial instruments to address specific R&I needs.

Relevance for ERICs: EIB's advisory services of the InnovFIN programme can provide support to ERICs for finding and securing funding.

Eligibility:

- Public sector (EC, Member States, government agencies etc.);
 - Public-private and semi-public (research institutes, foundations, NGOs etc.);
 - Private sectors (large and small corporates, RDI clusters, industry associations, financial market associations etc.).
- **To be eligible for InnovFin Advisory, a project must:** require a minimum of €15 million for R&I investment; Fit the policy objectives of Horizon Europe; and not yet be mature for financing appraisal. **For application:** send request to innovfinadvisory@eib.org, including a detailed description of the project.

Financial instruments: equity, guarantees and loans

EU funding is available through a range of financial instruments ([Financial instruments](#)) implemented in partnership with public and private institutions.

Relevance for ERICs: ERICs can request financial support to the EIB through different types of instruments that are listed below.

Types of financial instruments: Equity and debt, Loan guarantees and venture capital, capacity building and risk sharing facilities.

The EU provides loans to businesses of all types for investment in R&I. It also provides guarantees to help beneficiaries to obtain loans more easily or at better conditions from banks and other lenders. The EU may also financially participate in a project by owning parts of it. Financial instruments can be combined with grants.

Financial instruments are implemented in partnership with public and private institutions, such as banks and venture capitalists. These financial institutions determine the exact financing conditions – the amount, duration, interest rates and fees.

Transnational Access Scheme

Objectives: Enable scientists from European countries and beyond to use technological resources and expertise to enrich their projects with equipment and knowledge from specialised research sites, laboratories and observatories encompassed within ERICs ([Access to European RI](#)). TNA covers access costs and most research costs. Travel and accommodation costs are also eligible. TNA can fund scientific and technological development. **TNA is a true catalyst for ERIC Member State contribution to ERIC's central budgets.**

Relevance for ERICs: Relevant for ERICs' central hub and users' projects to cover access costs, research costs, scientific and technological development, funding of central budget by State Members. TNA constitutes an attractive alternative source of funding for ERICs and ERICs' users, especially TNA provides crucial supplementary funding for continuous sustainable development of ERICs (more services, access to new communities etc.). TNA is essential for ERICs to provide services to the research community for little or no cost; it can support the early stages of service provision; it can become a stable instrument for sustainable transnational access for European researchers.

TNA can fund ERIC's users to access their services. TNA also promotes cross-RI mobility, the use of services by industry and expansion of access to RI's services to other countries beyond the EU. A joint approach of ERICs and funding bodies through TNA has the potential to boost ERIC's visibility and attraction for potential users.

Limitation: Member States of ERICs in development (without yet a common budget for the implementation of user projects) often experience a financial bottleneck with the Transnational Access Scheme.

Additional and non-EU funding sources

According to the ESFRI White Paper (2020), a joint effort combining European, national or other funding sources is vital for the healthy development of the pan-European Research Infrastructure ecosystem.

For ERICs to remain relevant throughout their entire lifecycle, scientific excellence and adequate human resources become crucial when it comes to long-term persistence in the operational phase. Effective governance and sustainable long-term funding (public and private) are other key elements for ensuring long-term sustainability of ERICs at every stage in their lifecycle. There is, therefore, a need for ERICs to find alternative sources of income (Fig. 20).

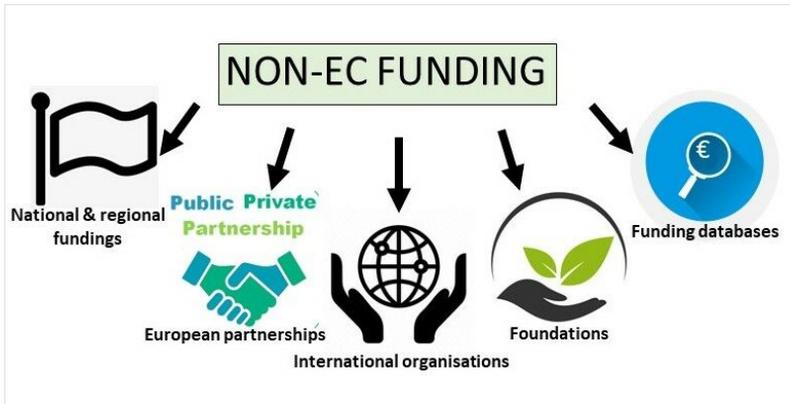


Figure 20. [doi](#)

Non-EC funding sources relevant for ERICs.

Several well-established ERICs are developing a sustainability plan, i.e. strategies and activities to support the long-term sustainability of the ERIC (Briffa et al. 2023). Sustainability plans can include: implementation of user strategy (access fee and commissioned services), training, the interaction with the private sector and the added value for society. Beyond securing more sustainable funding, interactions with national and private networks are also beneficial to improve the visibility of ERICs by developing relationships with all partners of the society, that will, in turn, strengthen the relationships between the ERIC and local/national communities.

Additional information on possible sources of non-EU funding that may be relevant for ERICs can be found in Annexe 1 (Suppl. material 2).

Conclusion

We presented guidelines to take into consideration for Pre-Commercial Procurement and for exploring European and additional sources of funding when forming an ERIC. These guidelines result from the experience gained during the DPP, aiming to set up the future DiSSCo ERIC.

Our analysis highlights that there are no common rules for all ERICs and that the commercial procurement structure and the targeted sources of funding should be adapted to each ERIC's specific reality. Nevertheless, the overview of the commercial procurement

mechanisms and of the landscape of funding sources summarised in this document offer a fundamental source of information for the development of future ERICs.

All innovations need a market entry, including ERICs and their R&D activities, therefore, research, development and innovation procurement is a topic of cross-cutting importance for all the pillars of the Horizon Europe programme. PCP and PPI constitute additional support within Horizon Europe, to help reinforce scientific leadership, address key challenges, foster industrial competitiveness and unleash SME's potential. PCP and PPI are mechanisms that enable the sharing of risk and benefits when procuring novel solutions and pre-market innovations. By enabling multiple solutions to be developed and considered in parallel, PCP and PPI provide a significant aid to progress in the uncertain domain of procuring research, development and innovation. This progress, in turn, leads to better products at better value, tuned to actual needs at a reduced risk. Consequently, PCP and PPI help suppliers of R&D and Innovation to have a broader perspective on the market needs and to increase their global competitiveness including for SMEs, startups and ERICs.

When applying the PCP and/or PPI mechanisms, preparation, processing and tracking activities are required. For ERICs specifically, it is important to consider upfront how PCP and PPI will be organised, as different organisational structures can be considered, each with their own opportunities and challenges. When deciding on a structure, it is advised to consider the complexity and cost implications of each option to make an informed decision.

Concerning funding opportunities for ERICs, multiple opportunities exist from the EU, but also from additional and alternative sources. Three main EU instruments are highly relevant for ERICs: the EU 2021-2027 Multiannual Financial Framework, the EIB and the TNA. The pillars and actions gathered within Horizon Europe have been specifically designed to support European R&D and are the most relevant sources for ERICs. Other programmes detailed in this project report have a lot of potential for funding ERICs, while the EIB can provide financial instruments to ERICs and the TNA can facilitate international exchanges and linkage between ERICs and between European research institutions.

Additional more specific EU funding programmes than those presented in this report exist in the 2021-2027 MFF (e.g. Funding for military and defence purposes) and are worth considering depending on the aim of the ERIC to be developed. Similarly, non-EU funding is worth exploring and can bring visibility to the ERIC at other levels than the European one, for example, at (inter)national level, and outside academia and the research community.

ERICs should, thus, be knowledgeable of the Commercial Procurements opportunities and EU funding landscape highlighted in this document. This will maximise the chances of access for their members and institutions to these mechanisms and funding. However, ERICs should avoid competing with their member institutions for EU funding and some EU funding opportunities may be better suited for individual institutions. ERICs should thus preferably prioritise direct applications to EU funding from their member institutions over their own.

We found that interactions with staff and members of currently existing ERICs were the most powerful source of information when developing an ERIC and considering Commercial Procurements and EU funding. We therefore want to conclude by advising you to establish contacts with available experts and we will welcome, as authors, any question for sharing perspectives.

Funding program

[H2020-EU.1.4. - EXCELLENT SCIENCE - Research Infrastructures](#) Main Programme

[H2020-EU.1.4.1.1. - Developing new world-class research infrastructures](#)

Grant title

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Author contributions

GL and SP wrote the first draft of the document, designed the figures and edited the text throughout the writing process. SP led the writing on section 'Procurement methods in support of Research, Development and Innovation', GL led the writing on section 'European Commission funding opportunities', GL and SP wrote the other sections together. GL submitted the document to the journal and made the editions recommended by the reviewers. FL and PM contributed with SP on the early version of section 4, edited and made comments to the text and figures of all sections during the writing process.

Conflicts of interest

The authors have declared that no competing interests exist.

References

- Briffa D, Giuliano A, Lymer G, Robertshaw S (2023) D4.2 - Future opportunities for DiSSCo's financial sustainability. DiSSCo Prepare. <https://doi.org/10.34960/vk0e-6t03>
- Cappellato L, Ferro N, Fresa A, Geber M, Justrell B, Lemmens B, Prandoni C, Silvello G (2016) The PREFORMA Project: Federating Memory Institutions for Better Compliance of Preservation Formats. *Communications in Computer and Information Science* 86-91. https://doi.org/10.1007/978-3-319-41938-1_10
- Carbonara N, Pellegrino R (2019) The role of public private partnerships in fostering innovation. *Construction Management and Economics* 38 (2): 140-156. <https://doi.org/10.1080/01446193.2019.1610184>

- Council Regulation (EC) No 723/2009 (2009) Community legal framework for a European Research Infrastructure Consortium (ERIC). URL: <http://data.europa.eu/eli/reg/2009/723/oj>
- Edler J, Uyarra E (2013) Public procurement of innovation, Handbook of innovation in public services. Edward Elgar Publishing. <https://doi.org/10.4337/9781849809740.00025>
- Edquist C, Zabala-Iturriagoitia JM (2015) Pre-commercial procurement: a demand or supply policy instrument in relation to innovation? R&D Management 45 (2): 147-160. <https://doi.org/10.1111/radm.12057>
- Edquist C, Vonortas NS, Zabala-Iturriagoitia JM, Edler J (2015) Public Procurement for Innovation, Eu-SPRI Forum on Science, Technology and Innovation Policy series. ElgarOnline, 352 pp.
- ESFRI White Paper (2020) A new ambition for Research Infrastructures in the European Research Area. URL: https://www.esfri.eu/sites/default/files/White_paper_ESFRI-final.pdf
- European Commission (2015) ERIC practical guidelines – Legal framework for a European Research Infrastructure Consortium. Directorate-General for Research and Innovation, Publications Office. URL: <https://data.europa.eu/doi/10.2777/72348>
- European Commission (2018) Financial regulation applicable to the general budget of the Union. Directorate-General for Budget, Publications Office. URL: <https://data.europa.eu/doi/10.2761/816722>
- European Commission (2021) The EU's 2021-2027 long-term budget and NextGenerationEU – Facts and figures. Directorate-General for Budget, Publications Office of the European Union. URL: <https://data.europa.eu/doi/10.2761/808559>
- European Commission (2022) Pre-Commercial Procurement. URL: <https://digital-strategy.ec.europa.eu/en/policies/pre-commercial-procurement>
- Landel S, Lymer G, Pasterk M, Worley K, Guiraud M (2023) DiSSCo Prepare Deliverable D4.3 - Report on recommendations for the most suitable model. DiSSCo Prepare. <https://doi.org/10.34960/55r6-bn19>
- Mazzucato M (2019) Governing missions in the European Union. Independent Expert Report. URL: https://www.kowi.de/de/Portaldata/2/Resources/Horizon2020/mazzucato_report_2019.pdf
- Milenkovic M, Rasic M, Jovancevic R (2022) Public Procurement of Innovative and Technological Solutions in the EU. 2022 45th Jubilee International Convention on Information, Communication and Electronic Technology (MIPRO) <https://doi.org/10.23919/mipro55190.2022.9803368>
- OECD (2017) Public Procurement for Innovation. OECD Public Governance Reviews <https://doi.org/10.1787/9789264265820-en>
- Pijls S, Leliaert F, Mergen P, Robertshaw S (2023) DiSSCo Prepare Deliverable D4.4 - Roadmap for the partnerships project within the EU PCP framework. DiSSCo Prepare. <https://doi.org/10.34960/vf2c-6g52>
- Rigby J (2013) Review of Pre-commercial Procurement Approaches and Effects on Innovation. NESTA Compendium. URL: https://www.research.manchester.ac.uk/portal/files/38487826/FULL_TEXT.pdf
- Rigby J (2016) The impact of pre-commercial procurement on innovation. Handbook of Innovation Policy Impact <https://doi.org/10.4337/9781784711856.00019>

- Rolfstam M (2013) Public procurement and innovation. Edward Elgar Publishing. <https://doi.org/10.4337/9780857930521.00009>
- Salomó MH, Carneiro S, Berdún J, Romagosa J, Ferreira L, Quinlan L, Mulry MR (2013) Roadmap for the pre-commercial procurement of ICT-based fall prevention and effective intervention solutions for elderly people. URL: <https://cordis.europa.eu/docs/projects/cnect/7/325137/080/deliverables/001-ENOFALLSD33.pdf>
- Sørensen E, Torfing J (2012) Introduction: Collaborative innovation in the public sector. The Innovation Journal 17 (1): 1-14. URL: <https://www.proquest.com/docview/1362242870>
- Turkama P, Zálišová I, Rolfstam M, Ikävalko S, de Oliveira Á, Nina M (2012) Policy recommendations for advancing pre-commercial procurement in Europe. URL: <https://vbn.aau.dk/en/publications/policy-recommendations-for-advancing-pre-commercial-procurement-i>

Supplementary materials

Suppl. material 1: Glossary [doi](#)

Authors: Stefaan Pijls

Data type: Text

Brief description: Glossary for acronyms and technical terms used in the paper.

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Suppl. material 2: ANNEXE 1: Additional and non-EU funding sources [doi](#)

Authors: Gaël Lymer

Data type: Text

Brief description: In Annexe 1, we present additional information on possible sources of non-EU funding that may be relevant for ERICs, namely: National and regional funding, European partnerships/public-private partnerships, international organisations, foundations and funding database. We provide this information in the annexe because non-EU funding is beyond the scope of this paper and the information we provide is a non-exhaustive list of ideas for additional funding, that must be adapted to each ERIC.

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