e-IRG White Paper 2022

Realisation and enhancement of coordination and collaboration in the e-Infrastructure landscape covering the full spectrum of e-Infrastructures (networking, computing, data) and related services

GUIDING QUESTIONS TO E-INFRASTRUCTURES

Aim and short introduction (see extended version at the bottom)

The e-IRG White Paper 2022 aims at contributing towards bridging the cooperation and coordination gaps across the major e-Infrastructure components, reflecting on several policy areas of cooperation (including governance, access and other policies, sustainability, etc.) and providing concrete advice and recommendations to all related stakeholders. Relevant e-Infrastructure stakeholders are GEANT, EOSC and the underlying e-Infrastructures EGI, EUDAT, OpenAIRE, as well as PRACE and EuroHPC mainly dealing with 'Horizon Europe', 'Digital Europe' and 'Connecting Europe Facility' programs.

Although significant exchanges between the major European e-Infrastructures actors are already taking place one way or another, e-IRG believes that a regular, well-framed and high-level coordination at strategy level would be beneficial for the ecosystem, as it would ensure a steady dialogue and flow of information and common understanding across all actors.

e-IRG, as an independent body of representatives from Member State and Associated Countries, aims at liaising as a neutral platform with the corresponding bodies, offering its expertise and high-level advice towards the alleviation of fragmentation and the envisaged integrated and holistic e-Infrastructure environment, facilitating the introduction of such a cooperation and coordination framework.

e-IRG organised a dedicated meeting on this specific topic of e-Infrastructure coordination with the EC services in its December 2021 meeting with representatives from both DG Connect and DG RTD. In the recent e-IRG open workshop under French EU presidency in May 2022, one of its sessions was dedicated to e-Infrastructures cooperation and coordination[1]. An additional session at the e-IRG workshop was jointly organised between e-IRG and the EOSC Steering Board on common EOSC policy areas and gaps[2]. As a follow up to its May workshop, e-IRG provides a set of guiding questions (in the form of an open-ended questionnaire guiding the required input) for e-Infrastructures to provide their feedback in an effort to find common ground and establish a cooperation framework.

e-IRG has recommended the creation of a Forum of e-Infrastructure providers at EU level almost since a decade ago as part of its vision towards 2020 and beyond (both in White Paper 2013 and Roadmap 2016), and with its current White Paper 2022 is coming back to this topic, as there have

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[1] e-IRG Workshop under French EU Presidency: Cross-e-Infrastructure collaboration and coordination
[2] e-IRG Workshop under French EU Presidency: Towards a sustainable EOSC - The role of e-Infras
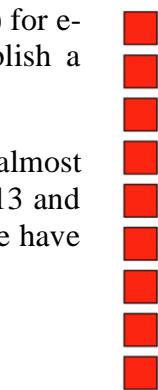
been several developments in the e-Infrastructure landscape and discussions are maturing. For example, as part of EOSC, a framework for the federation of both generic (horizontal) but also thematic (vertical) e-Infrastructure services has been established and is being implemented. The e-IRG White Paper is initially focused at the EU level, but it goes without saying, that it is also strongly linked at the national/regional levels, and also at community and thematic levels, as highlighted in the e-IRG past documents.

e-IRG is aware that Data Spaces as part of the European e-Infrastructure landscape are currently being built up and identified also for these components the need for coordination and cooperation. e-IRG considers addressing this topic later.

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e-IRG White Paper 2013[3]

Proposed approach

*"In the 2020 vision, providers have the freedom to innovate, and users enjoy the freedom to choose the services they need from a mix of public e-Infrastructure and commercial services. In order to enable this vision, we need an ecosystem of different organisations, at the national and international levels, each with their own focus but also **with effective coordination between them**."*

e-IRG believes this challenge can be met by maintaining a clear separation between the three core functions:

*1. Community building, **high-level strategy and coordination in Europe**: for each type of e-Infrastructure service, a single coordinating organisation with a central role for user communities. **These bodies**, in turn, **will need a forum for coordination between them across the different e-Infrastructure types.***

2. Service provision: flexible, open, and competitive approach to national, European, and global service provision; with advanced collaboration among the interested public and commercial service providers.

3. Innovation: Implementation of major innovation projects through the best consortia including e-Infrastructure suppliers, industry, users and academia with a dedicated management structure comprising the partners per project.

The e-IRG sees a clear need for a single e-Infrastructure umbrella forum for community building, high-level strategy setting and coordination for the entire e-Infrastructure. This umbrella forum is not a separate organisation, but a forum in which the user communities and the strategy and coordination bodies for the different parts of the European e-Infrastructure work on a common strategy.

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[3] e-IRG White Paper 2013 - https://zenodo.org/record/4049675

e-IRG Roadmap 2016[4]

"*..an emphatic co-operation among all main stakeholders is required: the providers (the e-Infrastructure developers and operators), the users (the scientific communities, both big users including Research Infrastructures and the long tail), and the funders (the EC and the national governments and their agencies). A joint EU e-Infrastructure ERIC still seems to be far away, and thus the only way forward is good coordination through a formal coordination platform among all stakeholders in-line with the Commons, implementing a distributed multi-stakeholder model of governance*".

Recommendations

7.2.2 (European and national) e-Infrastructure providers

.. "One of the steps forward is assurance of a good coordination through a formal coordination platform among all stakeholders inline with the Commons, implementing a distributed multi-stakeholder model of governance. It may allow a staged approach towards a common ERIC.

***e-IRG concludes that a coordination platform among all stakeholders inline with the Commons, along with a distributed multi-stakeholder model of governance is needed.** One of the proposed solutions and step forward could be the introduction of interoperable service of catalogues. Only then users may be able to enjoy a single point of access and as widely as possible common access and security policies, as well as long-term sustainable services.*

7.2.4 European Commission

*.. "**Provide input for the European strategy setting and coordination bodies and their umbrella forum**";*

*"**e-IRG recommends that in future Work Programmes the EC provides strong incentives for cross platform innovations, thereby further supporting the need for coordination and consolidation of e-Infrastructure service development and provisioning on the national and the European level**"*

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[4] e-IRG Roadmap 2016 - https://zenodo.org/record/4048805

Guiding Questions

1. **Administrative**
   Name of your organisation:
   Contact details (name, email):

2. **Topic: Governance of European e-Infrastructures**
   a. e-IRG recommended ***an e-Infrastructure umbrella Forum for community building, high-level strategy setting and coordination for the entire e-Infrastructure landscape.*** *This umbrella Forum is not a separate organisation, but a forum in which the user communities and the strategy and coordination bodies for the different parts of the European e-Infrastructure work on a common strategy based on common understanding among each other. The ultimate beneficiary of this effort will be the end users providing integrated user-friendly services easing the work of researchers and providing to them added value.*

      i. *How does the European e-Infrastructure organisation/initiative you represent perceive this idea? Is your organisation/Initiative willing to discuss the framework for such a Forum?*

      The idea of an eInfrastructure forum is an idea OpenAIRE would like to pursue. We find that it is of key importance to work with other eInfrastructures to a. find touching points among our service delivery (business models, complementarity), b. approach researchers in a more holistic way and serve emerging or underrepresented communities, c. find common ground towards the development of the next eInfrastructure generation, scouting opportunities for innovation, d. bring our national nodes closer towards building the national eosc/open science initiatives.

      ii. *Which generic (horizontal) European e-Infrastructure bodies would you like to see in such a Forum? (keeping in mind that the e-Infrastructure landscape is spanning networking, computing, data components and related services). Do you believe that EU e-Infrastructure stakeholders from all layers should participate? Note that in the e-IRG terminology the term electronic (or digital) Infrastructure (e-Infrastructure) includes data infrastructures, although there has been some confusion in some documents in the recent years). Please justify your answer.*

OpenAIRE represents the Open Scholarly Communication eInfrastructure, which is instrumental in the planning-curation-publishing of research results. Scholarly communication in the data intensive environment includes all types of preliminary, intermediate and final results, which may be of different types:reports, datasets, software, publications, etc., coming in many forms and sizes. We believe that all these elements are essential components in the research life-cycle and should be included in the e-IRG "data" terminology, following EOSC's example which clearly states that the "data" entails all the above. On the contrary, in the past e-IRG has been focusing on data mainly in the sense of infrastructure for data analysis and production and lesser on the curation, publishing, sharing.
We strongly believe that an e-Infrastructure Forum must have a holistic approach of research, covering the whole research life-cycle, including Open Scholarly Communication. If this is not the

case, the envisioned e-Infrastructure Forum will address the needs of a few, leaving behind universities and RPOs.

      iii.   *Besides generic (horizontal) e-Infrastructure providers in this Forum do you also envisage some form of user/thematic communities' representation? And what about EU funding agencies or policy makers? Comment on the potential roles of each of these.*

User/thematic communities such as RIs also build and operate e-Infra services (they are building digital infrastructures after all). Having a representation of user groups is fine, as long as the forum is built in such a way that this representation comes as input/feedback/sounding board. The question is why stick to thematic user group representation and not include (a) national and institutional one perspectives (the majority for research and scholarly comms users come from universities and RPOs), and (b) industry (they have a major role in funding and performing research).

      iv.   *e-IRG can facilitate the process for the establishment of such a Forum as a neutral body/platform. How does your organisation perceive this idea?*

OpenAIRE has always viewed e-IRG as a neutral body, but not engaged with our work and therefore not completely sure what the mode of operation is, or the impact of the white papers. In short, we are not sure who the e-IRG audience is. Especially as the newly formed EOSC Strategic Board seems to be taking over in many aspects the role of e-IRG.

On top of this, our perception is that e-IRG has been mainly representing "hard core" computing/networking eInfrastructures, as also its members, and is missing the scholarly communication aspect which is the core business of OpenAIRE. (As a validation of this statement is the current questionnaire in which most questions are about HPC and HTC).

On the other hand, we feel that eInfrastructures are mature enough as organisations to self regulate their interactions and create a forum to be operated on self commitments and well defined plans.

      v.   *[optional] Do you believe that besides a strategy / governance forum a technical / operational forum across all e-Infrastructures would be beneficial?*

Crawl, walk and then run.

      vi.   *What is the expected impact on your governance due to increased coordination between e-Infrastructures?*

We would envision an internal OpenAIRE WG (with direct links to our Executive Board) to liaise to the coordination body. We assume that this would not have any affect in our strategic priorities, but more on the operation of our services.

    b.   Other points/ideas you would like to raise on the topic of governance.
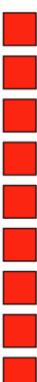
3. Topic: Compatible policies/interoperable services/operational aspects

a. *In the last years the EOSC stakeholders have been working on rules of participation, common or compatible policies and interoperable services in EOSC to enable the federation of e-Infrastructures providers and their services (e.g. EGI, EUDAT, OpenAIRE) and thus facilitate data-driven science ~~to tackle the global scientific and societal challenges~~. EOSC is working towards the development of an ecosystem of portals at EU/regional/national and in some cases institutional levels to provide added-value services to end users, facilitating also cross-disciplinary research/science, which is required to address the scientific and societal challenges. Work is also underway towards a personalised and smart (AI-based) dashboard for researchers/scientists that will include relevant data/services/workflows/software and other artefacts to ease their work. EuroHPC has been doing similar work to federate the EuroHPC centres and define the rules of participation and sharing of resources among its members.*

    i. *Do you believe that the EOSC and EuroHPC (federation and sharing) paradigms should be expanded to federate data/services across all major European e-Infrastructures?*
       Note: This does not mean that one of them should integrate the other, rather coordinate their strategies and harmonise their policies (as peers) to be able to federate and share the data/services/software etc. for the benefit of the users.

Not sure what the question is about, since the federation of data or the access to the data has started. This is EOSC. It is showcased by the RI and cluster portals (catalogues of data), the national portals, and via OpenAIRE EXPLORE / OpenAIRE Research Graph and OpenAIRE Guidelines these are linked together. FAIRCORE4EOSC project already has in its plans the data crosswalks, which are essential in this. Next calls in the EC INFRAEOSC programme tackle other key components of the federation. National programmes are also tackling this (see NFDI).

The AI (intelligent) federation is a must, but unfortunately it has still a long way to go, until a a critical mass buys into this.

    ii. *Federation of all e-Infrastructures would require compatible policies and interoperable services, so that they can be integrated in a federated portal ~~of portals~~ and ultimately in the personalised dashboards of end users. Do you believe that this can be done in the coming years or should priority be given first to each of the areas, e.g. EOSC and EuroHPC, before attempting to work together at such (technical) level?*

Compatibility in policies is a tricky aspect. Not sure at which depth we can apply.

At the technical level interoperability has started in EOSC Future, even though it is lightweight in terms of metadata and high level access protocols. Which might be a good beginning for the personalised dashboards. WHat is missing is the deep integration, which, although may have some technical challenges, it's mostly about business model compatibility.

e-IRG
e-Infrastructure
Reflection Group

If we start with data and its openness/fairness being the common elements both in EOSC and HPC, we think we have a starting point to work with.

(*) Not sure what is the landscape of computing, even though most are now following the industry standards as requested by users.

iii. *[optional] Authentication and Authorisation Infrastructures (AAI), including blueprint architectures, have been developed (e.g. GEANT and EGI) and there has been significant effort to make them interoperable and use them across horizontal and thematic e-Infrastructures. Do you find this as an example of collaborative operational work and interoperable policies that can be expanded to other e-Infrastructures and more communities?*

OpenAIRE has been on the recipient side of AAI: we have an AAI service for our services and users, for the only reason that we could not decide which is better. The resulting federation may be ok to operators of cloud and perhaps to some expert users, but the resulting services and interfaces are cumbersome for users.

What we would like to see is the AAI to be simpler and to have a good way for all infras to deal with authorisation within and across.

iv. *Resource access models and policies differ between HPC (more based on call for proposals with peer-review evaluation committees for longer time, e.g. 1 year) and HTC (faster process and cycles based on policies and more opportunistic, e.g. policy-based access to support national access to EU thematic collaborations such as ESFRI projects or ERICs). Furthermore, resource ownership models are different, e.g. EuroHPC owns up to 50% of the EU access capacity of EuroHPC systems, while in HTC the vast majority of resources and their access are national. The above may hinder interoperability and cross e-Infrastructure usage (i.e. HTC-HPC). Do you see space for cooperation/coordination in this area? If this is the case, which of your organisation's policies need to be adapted.*

The following is a view from our members, who are not so much engaged in HPC:

HTC's approach is more convenient, but perhaps the reason is the need to cover diverse needs. HPC community has been working like this for a long time. Not sure if determining a common resource access model would be easy or that it will resolve any important problem in the e-infra usage.

v. *There is a plan to update the EU Charter of Access to Research Infrastructures (including e-Infrastructures). Do you see a role of the future e-Infrastructure Forum at strategy or technical levels in this update?*

Yes we do. OpenAIRE for example would participate in the Open Science parts.
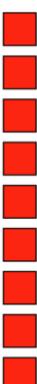
vi. *What about ~~federation~~ coordination with similar industrial efforts (e.g. GAIA-X) and industrial e-Infrastructure/service providers (EU and non-EU) or other thematic data spaces in the super portal mentioned above? There are ongoing efforts in some of these, such as the integration of commercial services/resources, in-line with the e-IRG vision of 2013 so that "users enjoy the freedom to choose the services they need from a mix of public e-Infrastructure and commercial services". Do you see this as a priority for the coming years?*

Yes. Focusing on data, it is important to share common practices, standards and tools. To learn from each other. Areas of priority are the EIF, AAI, architecture (how does for example IDS or emerging SIMPL apply to both domains), practices and tools for sensitive data, data security aspects (including authorisation for who has access to what and when), certification of trusted repositories/data sources, and last but not least business models both for services but also for data.

vii. *Are there in your opinion other important operational aspects that need to be harmonised to facilitate a well-coordinated federated European e-Infrastructure?*

Need for a cross eInfra helpdesk and training capacity.

viii. *What is the expected impact on operational aspects due to increased coordination between e-Infrastructures?*

Not sure.

4. **Topic: Cost and Business Models, Funding/Sustainability**
   a. Understanding costs and having business models for e-Infrastructures is important for planning their operation and their sustained funding, including renewing (procuring) the actual infrastructure over the years. A joint group between the EOSC Steering Board and e-IRG have identified a gap in this area that needs to be developed in the future, especially given the transition of EOSC Core and part of EOSC Exchange towards an operationalised framework (based on procurement vs. short lived projects).

   i. Does your infrastructure have a cost model and methodology to track its costs? If federated, is there a common cost model/methodology across the national components?

   OpenAIRE has many services of different types. Which are in most cases different levels of deployment or mode of operation. We have employed the VA/Unit cost methodology in the past 2 years during the OpenAIRE-Nexus reporting, but we don't feel we are quite there yet.

   ii. If not, do you see the need for an establishment of lightweight methodologies and cost models for the different layers (networking, computing, data) for better understanding the costs of e-Infrastructures (both CAPEX and OPEX), across EU

e-Infrastructures and also across national entities? See as an example the e-FISCAL methodology/model[5] for computing costs.

Yes. Not sure about the e-FISCSL methodology since it was mainly adressing computing needs. Again, OpenAIRE has different types of services and these require in many cases different approaches.

    iii.   Do you believe that collecting and sharing different approaches (around methodologies and cost models) across Europe could provide value to the EU or national actors?

Yes.

    iv.   Does the e-Infrastructure you represent have a business model and sustained funding to facilitate a sustained operation?

Getting there.

    v.   *What is the expected impact on your funding/business model due to increased coordination between e-Infrastructures?*

Potentially better outreach/understanding of Open Science and Scholarly Communication from MS and national infrastructure providers.

5. **Topic: Other**
   a. Any other topics or points in this area of e-Infra cooperation/coordination that you would like to discuss in a potential future Forum or any comments.

    i.   What are the main or potential obstacles for the end users to conduct cross e-Infrastructure research activities that you are aware of? Lack of awareness (of services availability), administrative burden, ease of use and added value, fragmented environment (multiple e-Infras, multiple EU funding programmes, coordination among EU and national players), different priorities, different policies (access, resource usage, etc). How can the identified or potential obstacles be overcome?

Fragmented environment, addressing different actors (from network, to hard core computing, to scholarly communication, ease of use, different or lack of common/coordinated business models.

    ii.   e-IRG has recommended increasing coordination efforts between the e-Infrastructures for a long time now, what would be the business areas mostly affected from such increased coordination in your e-Infrastructure organisation?

Overhead of getting dedicated people to facilitate this coordination. Which by the way has started to happen organically in EOSC Future.

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[5] Methodology | e-FISCAL project (efiscal.eu)

Background

(from e-IRG White Paper 2022 introduction)

Besides the networking layer that was already rather advanced since more than 10 years ago, considerable progress has been achieved in the electronic Infrastructures (e-Infrastructures) in the last 5-7 years across all layers and in particular in the computing and data layer. Two significant initiatives have been launched and by now are well underway towards implementation, namely the European Open Science Cloud (EOSC) and the EuroHPC one.

EOSC is aiming towards a federated environment for hosting and processing research data via the appropriate tools and services to support EU science[6]. In terms of e-Infrastructures, it builds on the High Throughput Computing (HTC) EU infrastructures mainly federated in the EGI infrastructure (https://www.egi.eu) and the data and scholarly communication infrastructures accordingly mainly federated in EUDAT (https://www.eudat.eu) and OpenAIRE (https://www.openaire.eu). These e-Infrastructures are based on national or regional components and support structures and are contributing towards the realisation of EOSC as a system of systems. The process to create the EOSC was initiated by the European Commission in 2015 and its first phase was concluded at the end of 2020. EOSC is now in its second phase in an effort to consolidate national[7], regional and European components, as well as both generic (discipline-agnostic) and thematic (disciplinary) ones, along with related policies and strategies, ultimately aiming at easing researchers in their data-driven cross-disciplinary research. In terms of governance in its current phase, EOSC has been organised as a co-programmed European Partnership[8], between the EC and the newly formed EOSC Association[9]. The Partnership Board includes representatives of the Member States (MS) and Associated Countries (AC) in a Steering Board, in essence forming a tripartite collaboration[10] among the EU represented by the Commission, the EOSC Association, and the MS/ACs to guarantee resources and support to EOSC.

On the other hand, EuroHPC is building a set of word-class High Performance Computing (HPC) systems across Europe. These are organised at multi-country level with an agreed location for each of the systems, and in some cases national components. In terms of organisation a Joint Undertaking (EuroHPC JU[11]) has been established to lead this effort and the majority of European countries have joined the EuroHPC initiative as members. In this way, the EU (50% in cash via the EC) and participating countries (50% in cash or in kind) pool their resources together to deploy these petascale or even exascale supercomputers and related technologies/applications. The EuroHPC systems are also in the process of implementation, with the majority of the systems having been procured and working towards operation. EuroHPC JU systems have made it to high-ranked positions in the Top500 and Green500 ones, given the increasing importance of energy efficiency and green approaches. Respective policies for the access and use of the systems are also being developed with a first set already being agreed[12]. It is important to note that EuroHPC is also aiming

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[6] European Open Science Cloud (EOSC) | European Commission (europa.eu)

[7] In several countries National Open Science Clouds (NOSCs) initiatives are well underway

[8] Partnership | EOSC Association

[9] Association | EOSC Association

[10] Tripartite Collaboration | EOSC Association

[11] https://eurohpc-ju.europa.eu/

[12] https://data.consilium.europa.eu/doc/document/ST-13567-2020-INIT/en/pdf EuroHPC JU Documents

to serve industrial users, and this makes it a particular case compared to the other e-Infrastructures that focus on the mainstream of research and academia, although they are able to serve industrial research.

In parallel, GEANT https://geant.org/ has been steadily providing high-speed and high-quality connectivity and related services interconnecting the vast majority of European National Research and Education Networks (NRENs) around Europe and beyond, expanding towards all continents around the world. Besides the operational services offered at production level, new and innovative services are continuously being introduced and gradually move in production. GEANT has been for more than 20 years providing the "glue" between the EU NRENs, who in turn interconnect their research and academic institution, completing the chain of campus-national (sometimes regional) and European research networking ecosystem. GEANT, besides offering advanced middleware services (such as Authentication and Authorisation Infrastructure – AAI), it has also expanded towards the computing layer, offering for example cloud services via an integrated pan-European framework agreement program (https://clouds.geant.org).

Besides the progress made in each individual area in these major EU infrastructures (networking, computing, and data), there is still a lot to be done in terms of cooperation and coordination across these major infrastructures, especially towards providing integrated user-friendly services easing the work of researchers and providing to them added value. In particular cooperation and coordination between EOSC and EuroHPC is still in very early stages of discussions and of position statements formulations, while work in this area is being planned as part of the EC Work Programmes for 2021-2022 and the next one (2023-2024) currently being consolidated. Although GEANT is transparently offering its services to its users without any major issues, the example of the high-speed interconnection of the EuroHPC systems and related procurement, caused demanding discussions between the EuroHPC JU and its members (and corresponding NRENs) with regards to the participation of NRENs in the interconnection solution. *Thus, proper planning for cooperation and coordination, looking ahead is required among all these major stakeholders.*

The need for coordination across e-Infrastructures is also confirmed at the highest political level, the EU Competitiveness Council, with top-down initiatives and statements for many years now, resonating and complementing the bottom-up requirement from the e-Infrastructure community for integrated services. In particular, in its conclusions on the New European Research Area (ERA)[13] in the December 2020 Council "encourages the Commission and Member States ***to increase the level of national and European coordination***, *in particular on research infrastructures and e-infrastructures"*. A similar message is part of the Council Recommendation (EU) 2021/2122 of 26 November 2021 on a Pact for Research and Innovation in Europe *to develop better "connection of existing and new European and national research infrastructures, including e-infrastructures"* and on the Future governance of the ERA[14], with its new ERA Policy Agenda and ERA Actions. In particular, under ERA Action 8 on Research Infrastructures, there is a clear call for *"increased **cooperation between research infrastructures, e-infrastructures and stakeholders, including through EOSC"**.*

The e-IRG White Paper 2022 aims at contributing towards bridging the above cooperation and coordination gaps across the major e-Infrastructure components, reflecting on the above

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[13] https://data.consilium.europa.eu/doc/document/ST-13567-2020-INIT/en/pdf
[14] https://data.consilium.europa.eu/doc/document/ST-14308-2021-INIT/en/pdf

issues and providing concrete advice and recommendations to all related stakeholders. This covers GEANT, EOSC and the underlying e-Infrastructures EGI, EUDAT, OpenAIRE, PRACE? and EuroHPC mainly dealing with "Horizon Europe" and 'Digital Europe'. **e-IRG, as an independent body of representatives from Member State and Associated Countries, aims at liaising as a neutral platform with the corresponding bodies, offering its expertise and high-level advice towards the alleviation of fragmentation and the envisaged integrated and holistic e-Infrastructure environment, facilitating the introduction of such a cooperation and coordination framework**.

e-IRG organised a dedicated meeting on this specific topic of e-Infrastructure coordination with the EC services in its December 2021 meeting with representatives from both DG Connect and DG RTD. **In the recent e-IRG open workshop under French EU presidency in May 2022, one of its sessions was dedicated to e-Infrastructures cooperation and coordination**[15]. An additional session was jointly organised between e-IRG and the EOSC SB on common EOSC policy areas and gaps[16]. All these efforts are in line with the 2018 Competitiveness Council Conclusions on EOSC referring among others to "*e-Infrastructures and RIs to get organized so as to prepare them for connection to the EOSC*", calling for the EC to make optimal use of initiatives such as ESFRI and e-IRG.[17]

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[15] e-IRG Workshop under French EU Presidency: Cross-e-Infrastructure collaboration and coordination
[16] e-IRG Workshop under French EU Presidency: Towards a sustainable EOSC - The role of e-Infras
[17] https://data.consilium.europa.eu/doc/document/ST-9029-2018-INIT/en/pdf