EGI Position Paper on Common Strategic Framework for future EU Research and Innovation Funding

EGI.eu welcomes the opportunity to comment on the Green Paper on a Common Strategic Framework for future EU Research and Innovation Funding. This position paper primarily deals with the questions related to the e-Infrastructures and the mechanisms by which e-Infrastructures can promote EU Research and Innovation through support at the EU level.

For the last decade, the European Commission's Framework Programme and national funding agencies have invested heavily in building Europe's e-Infrastructures. In the area of Distributed Computing Infrastructures (DCIs), early experiments took place in the European Data Grid (EDG) project, while the Enabling Grids for E-SciencE (EGEE) series of projects developed a production quality infrastructure. As a result, Europe's research communities have a pan-European e-Infrastructure that is available to communities ranging from astronomy and astrophysics, life sciences, computational chemistry, materials science, fusion, earth science and high energy physics. This European-wide e-Infrastructure is transitioning to a federation of national e-Infrastructures thanks to the EC funded EGI-InSPIRE project (European Grid Infrastructure: an Integrated Sustainable Pan-European Infrastructure for Researchers in Europe). Since May 2010, the European Grid Infrastructure (EGI) has been coordinated by a new dedicated organisation, EGI.eu, based in Amsterdam. EGI.eu plays this coordinating role on behalf of its stakeholders – the national and domain specific resource providers.

Today, EGI integrates over 300,000 processors and more than 100 PB of storage space located at 350 sites in 50 countries. This production quality platform provides a flexible solution for many distributed storage and computing use cases. EGI currently supports over 13,000 researchers in their intensive data analysis needs in almost every e-Science discipline, and can extend this support to other e-Science communities and beyond such as e-Government. EGI's innovative technology and procedures address many of the issues identified in the Digital Agenda for Europe. Through its European wide federation of national resource providers it is ideally placed to provide an e-Infrastructure (grids of computing storage and cloud resources) for the general benefit of society.

Critical issues needed to be addressed by CSF in e-Infrastructure landscape

The European Research Area is facing fundamental technical challenges – the increasing digitisation of research is literally leading to a data deluge as more and more disciplines adopt e-Science. These challenges will impact the ability of the ERA to deliver innovation to Europe unless they are systematically addressed. Many of these challenges have common elements:

- **Greater scale:** the volume of raw data generated by experiments and computing simulations can exceed 10 Petabytes a year (and is growing exponentially each year) which needs to be stored, shared and analysed (that is several times more than the space needed to

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store 10 billion photos on Facebook). Investment in the underlying physical infrastructure – networking, computing and storage – is needed to meet this scale.

- **Wider collaboration:** the know-how needed to turn this raw data into information and knowledge no longer exists within a single research group but resides jointly in research organisations across Europe and the_rest of the world. Eliminating the barriers to collaboration and accessing services across Europe through the free movement of knowledge is critical.
- **Multidisciplinarily:** the human collaboration needed to extract knowledge from data not only has to bridge geographical boundaries but must also integrate the work of different disciplines into a single workflow. Defining standards to enable the flexible composition of software services within a dynamic workflow is critical in integrating the knowledge provided by different disciplines.

The recent global financial issues have impacted the national funding streams available to e-Infrastructure providers and their user communities. E-Infrastructure is now an essential foundation for research and innovation and it is vital that Europe continues to invest in this area at National and European level.

It is critical that the EC retains and reinforces its commitment to a federated European e-Infrastructure composed of national resource providers when this achievement is nearly accomplished. EGI.eu recently conducted a survey amongst its participants (mainly NGIs)[1] that showed that these key stakeholders of EGI are concerned about their own sustainability, as many of them rely on increasingly fragmented funding. Half of the NGIs only have funding allocated only one or two years in advance, making strategic investment difficult despite its widely agreed importance. Co-funding of strategic investments in e-Infrastructures, by the EC and Members States, can be very effective in supporting the required developments and synergies. This model has proved successful through several previous Framework programmes.

Recommendations for a Common Strategic Framework for future EU Research and Innovation Funding

In response to Question 25 'How should research infrastructures (including EU-wide e-Infrastructures) be supported at EU level?'

EGI.eu would like to propose the following recommendations and actions in order that the development and innovation seen over the last decade in European e-Infrastructure can continue to be supported at a European level:

- Greater integration between e-Infrastructures and broader support to different usage models is a request frequently heard from the user community, and increasingly by national stakeholders. EGI provides the means to federate nationally provided resources –currently focussed on HPC and HTC resources – but intends to extend this to desktop grids and

[1] National Grid Initiatives or Infrastructures (NGIs) are organisations set up by individual countries to coordinate the computing and storage resources that they provide to the European e-Infrastructure (EGI) to meet the needs of their local user communities to collaborate internationally. NGIs are EGI's main stakeholders, together with CERN and EMBL (two European Intergovernmental Research Organisations or EIROs). Each NGI contributes a number of sites to the grid infrastructure. NGIs are responsible for the maintenance and running of the sites they operate.

virtualised resources if there is a clear user demand and commitment from our stakeholders. Exposing this capability to a user base beyond e-Science, into say e-Government and other domains is feasible with appropriate European and national support. The broader the supported user base the greater the need will become to tackle the potential integration of petascale computing, networking and data resources into the same integrated governance and policy structures.

  - **ACTION**: EC support is needed to achieve an integrated European e-Infrastructure across different resource types (grids of HTC, HPC, petascale, virtualised, data and networking resources) in order to provide a coherent technical and policy structure. Such a coherent structure is currently lacking, as it spread between different projects and governance mechanisms, but if achieved would establish European e-Infrastructure as a truly enabling capability for innovation across the world.

- E-Infrastructures need different mechanisms to engage with user communities and these need to be supported through appropriate instruments. Mature communities able to use the e-Infrastructure services as they are need to be able to pay for the services they consume if it is desirable to provide a truly user-driven infrastructure. For many communities, the core e-Infrastructure services need to be accessed through a domain specific e-science environment and the development of these environments needs to receive continued supported (c.f. the recent e-science environments call). Finally, support needs to be given to new user communities with new fundamental e-Infrastructure requirements to develop these in close collaboration with the e-Infrastructure provider. This was the model used successfully in the EGEE series of projects to develop the e-Infrastructure we have today, and while the user communities may change, the model is vital to foster new developments.
  - **ACTION**: The EC needs to provide instruments that give user community oriented projects the flexibility to pay for the services they obtain from e-Infrastructure providers, to continue initiatives such as the recent e-science environments call, and to encourage and support direct engagement between end-users and e-Infrastructure providers to develop new innovative services within an integrated project.
- The emergence of European level legal entities (e.g. ERIC) or organisations with pan-European stakeholders (e.g. EGI.eu) provides an opportunity to simplify the administrative burden of e-Infrastructure projects. E-Infrastructure projects (such as EGI-InSPIRE) are genuinely pan-European with over a 140 partners participating in the project. While the Joint Research Unit (which can reduce projects such as EGI-InSPIRE to 50 partners) provides some simplification they do little to reduce the amount of administrative effort required for establishing the grant agreement or in running the project. To support projects that embrace partners across Europe this problem needs to be addressed.
  - **ACTION**: The EC can reinforce the importance of the top-level European legal entities to flexibly distribute work within the consortium recognising that they provide access to flexible, skilled workforce. Allowing this flexibility would encourage partners/countries to commit to these structures and see the benefits that could be derived from them.
- Global standards are critical for e-Infrastructures and Europe must invest in their political and technical development, but by following a collaborative rather than a competitive approach as Europe cannot afford to work in isolation. Standardised interfaces to European service are essential, but not sufficient on their own if they are done in isolation. European e-Infrastructures work in a global context and their services need to interoperate with other providers so that an integrated set of services are provided for end-users. Projects such as OGF-Europe and the SIENA initiative provide valuable community building work but lack

the technical resources to underpin the standards discussions with substantial technical activity.

- **ACTION**: A clear commitment by the EC at both a policy and a technical level for long-term (3-5 years) support in collaboration with funders in the USA and Asia Pacific for the full standards development life-cycle. This would allow the e-Infrastructure community to remove the remaining interoperability barriers to provide a seamless set of interoperable services that can underpin the Digital Agenda in Europe.

Conclusions

Through its network of federated data centres, EGI aims to provide its user communities with the means to deploy the software environments they need flexibly – where they need them and when they need them. Virtualisation technologies will provide the foundation for this operational model, enabling the research community to access a cloud environment that is tuned to their ever changing requirements for data-intensive analysis. The EC support can provide the means to accelerate the move towards an e-Infrastructure that is able to flexibly and responsively meet the needs of diverse user communities by addressing the following issues described in detail earlier:

- Support the closer integration of different e-Infrastructure providers to simplify funding, policy making and to provide integrated services to end-users.
- Support the direct engagement with user communities in the development of new innovative e-Infrastructure services, in the development of new innovative applications that use e-Infrastructure services to support e-Science, and the provision of a user-driven e-Infrastructure through service charging.
- Reinforce the existence of the legal entities governing European e-Infrastructure by using them as a flexible vehicle to support innovation taking place within the community. Forcing the reuse of national or local entities can undermine the existence of these European constructs.
- Support the long-term development of standards for e-Infrastructures in Europe within a global context so that the seamless service landscape that is foreseen within Europe extends worldwide.

Accelerating the development of e-Infrastructures in Europe will enable them to be a key enabling factor in making the Europe 2020 Strategy for Europe a reality. They will also be able to provide an environment where many of the innovations in ICT that can benefit society can be developed and deployed. E-Infrastructures can provide an open platform for innovation from the technology they deploy; from the software, services and business models built upon the deployed technology; and the research innovation that takes placing using these services; can all take flight. These innovations will help the European research community to derive the knowledge it needs from the data deluge to tackle the societal challenges facing Europe both now and in the future, while contributing to the of key actions of the Digital Agenda for Europe, Innovation Union and other key flagship initiatives.