

THE EGI COMPENDIUM

of National Grid Infrastructures in Europe

2011 Edition

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FOREWORD

Welcome to the **2011 EGI Compendium of National Grid Infrastructures in Europe** – an essential body of structured information about EGI's key stakeholders: National Grid Infrastructures (NGIs) and European Intergovernmental Research Organisations (EIROs).

This first edition provides a wealth of detail regarding the 'state-of-the-art' of grid infrastructures in Europe and will be used as a benchmark to track the independent evolution of NGIs and EIROs in the coming years.

As a structured collection of information describing NGIs and EIROs and their relationships with user communities, the compendium will help EGI.eu and the EGI community understand the diversity of EGI and its activities. This will increase transparency and improve clarity among the EGI community, which will, in turn, inform our strategic planning activities.

I am most grateful to all NGIs and EIROs, particularly to ones who gathered, submitted, clarified and checked the data included in this publication. Special thanks also are extended to the members of the "EGI Compendium" Virtual Team for their tireless effort to compile this initial volume and the work of the EGI.eu Strategy and Policy Team in leading its development.

We hope that the first edition of the EGI Compendium will prove to be valuable for you. You are welcome to provide us your feedback in order to improve future editions of this annual report through policy@egi.eu!



Steven Newhouse

KEY FINDINGS

The EGI Compendium report is an authoritative reference on the development of National Grid Infrastructures (NGIs) in Europe, working together to enable digital research within the European Research Area.

Out of the 38 NGIs, 28 NGIs that responded to EGI Compendium survey: Armenia, Croatia, Cyprus, Czech Republic, Estonia, France, Ireland, Israel, Italy, Lithuania, Luxembourg, Moldova, Montenegro, Portugal, Turkey, Finland, Germany, Greece, Hungary, Latvia, Macedonia, Netherlands, Romania, Serbia, Spain, Switzerland and United Kingdom. These NGIs provided answers to at least 20 questions out of the 86 total questions that made up the EGI Compendium survey.

NGI Strategy and Policy

- **Strategy:** Six NGIs (25%)¹ have defined a strategy document for grid and distributed computing. These documents are typically written in the national languages and in some cases they are part of more general strategy, not specifically focused only on distributed computing.
- **Vision:** Fifteen NGIs have defined their vision for grid and distributed computing. Some of the mentioned key terms are: Research, Services, Infrastructure, Computing, Support and National.
- **Mission:** Twenty-one NGIs provided a mission statement. Some of the mentioned key terms are: Research, National, Grid, Computing, Resources, NGI etc
- **Core Values:** Thirteen NGIs have defined a list of their core values. The most recurrent core values are: Reliability, Innovation, Integration, Coordination, Leadership and Openness.
- **Business Model:** Three NGIs (12%, Croatia, Italy and Spain) have defined a business model.
- **Policies:** The majority of NGI policies are related to the users and their specific needs (71.4%), followed by Operations (57.1%), Security (57.1%) and Technology (28.6%) Green IT as a policy area is not addressed by any of NGIs. Seven NGIs have a webpage with the list of policies/procedures that apply to them. Fifteen NGIs do not enforce additional restrictions on the infrastructure in addition to EGI policies. However, five NGIs have placed additional policies in order to support a specific areas related to operations, security and middleware deployment, specific national Operational Level Agreement (OLA) adjustment, different policies required by law of a country of origin, etc.
- **Resource Allocation Model:** The process by which an existing/new user community can apply for new resources in the NGIs is quite diverse. For example, some NGIs provide quotas for free CPU hours per annum, certain percentages of the resources are reserved, new resources are allocated on the base of declared interest in the form of an application proposal, or the resource allocation model is based on fair share model, agreements or best effort. In addition, some of the NGIs specified an approach to recover costs.

¹ Percentages refer to the proportion of respondents to each question (not the percentage of the total NGIs).

- **Major changes occurring in NGIs during 2011:** Ten NGIs (66.6%) went through major changes such as technology upgrades (e.g., deployment of academic clouds, virtualisation platforms), increase of active users, secured funding, beneficial impact of using Structural Funds and state recognition as a large infrastructure. Concerning the foreseen changes for the coming year, a number of NGIs are expecting that 2012 will be a very important year of transition. Some NGIs have started using virtualisation and private cloud solutions or foresee a change in the user base, thus, plan to work on a more scalable user support policy.

Governance Opportunities

- **Coordinating body:** Fourteen NGIs are organised as a group of interest, thus, they have not established a dedicated legal entity. Ten NGIs are coordinated by a dedicated non-profit legal national entity. Only one NGI (Turkey) is coordinated by a for-profit legal national entity. Some NGIs are planning to establish a dedicated legal entity, however, the majority do not plan to set up a dedicated organisation while representation in the EGI Council is delegated to a partner. Therefore, significant numbers of NGIs are represented in the form of a consortium of legal entities or in one case as a Joint Research Unit (Italy).
- **Roles:** Twenty-three NGIs have roles of national coordinating body (95.8%), while 20 NGIs have a role of Resource infrastructure provider (83.3%). Eleven NGIs perform the role of Resource Centre (45.8%), ten NGIs perform the role of Technology Provider (41.7%), ten NGIs perform the role of Platform Integrator (41.7%) and nine NGIs perform the role of Platform Operator (37.5%).
- **Stakeholders & Governing body:** Twenty-two NGIs have academic institutions (95.7%) as a stakeholder in its governing body, while 16 (69.6%) have research institutes as well. Six NGIs (26.1%) have the national government as a stakeholder while five NGIs (21.7%) have resource centres. Three NGIs have Industry (13.0%), two NGIs have VOs (8.7%) and only one NGI has user communities (4.3%) as stakeholders. In most cases (85.0%), the lead organisation in the NGI also represents the NGI in the EGI Council. The average number of members in an NGI partnership is 11, while the median is eight
- **Stakeholders & Advisory board:** Nine NGIs (36.0%) have an advisory board. User communities are stakeholders in 90.0% of the cases, followed by 40.0% with resource centres, 30.0% with technology providers and 10.0% with industry. In two cases (Croatia, Turkey) government and university representatives also have their place in the advisory board.
- **Relationship with the government:** Four NGIs (16.7%) have a direct hierarchical subordination to their national ministry, while eight NGIs (33.3%) have a formalised relationship with their government, either through having a delegated responsibility from a ministry or having a ministry representative as a board member. Ten NGIs (41.7%) have an informal, indirect and looser relationship with their government. Only one NGI does not have any kind of relationship with its national government (Hungary).

Sustainability Prospects

- The EGI Compendium makes a distinction between an NGI as a *legal organisation* (that coordinates all activities) and an NGI as an *infrastructure* (all the hardware, software, networks, facilities, etc. that are required to develop, test, deliver, monitor, control or support applications and IT Services).

	NGI as a Legal Organisation	NGIs as an Infrastructure
Sources	<ul style="list-style-type: none"> The biggest funding source for 11 NGIs (90.9%) comes from national public funding (e.g. state, universities). Six NGIs are funded at least partially by the European Commission (54.5%), principally through the EGI-InSPIRE project and in some cases funded through Structural Funds. Five NGIs (45.5%) are funded by institutes, while three NGIs are funded by users (Finland, Switzerland and Turkey). For two NGIs, funding comes from membership fees (Czech Republic and Switzerland). None of the NGIs is funded through donations and royalties. 	<ul style="list-style-type: none"> For the creation and operation of NGIs infrastructure, 19 NGIs (90.5%) receive funding from national public funding (e.g. state, universities). The second biggest funding source for 17 NGIs is the European Commission (81.0%), principally through the EGI-InSPIRE project and in some cases projects funded by Structural Funds. Eleven NGIs or 52.4% of NGIs are funded by institutes, while only 9.5% of funding coming from membership fees. One NGI (Netherlands) is partly funded through private investments, while one NGI (Switzerland) is funded through user payments. None of the NGI's infrastructure is funded through donations and royalties.
Models	<ul style="list-style-type: none"> 60.0% of NGIs receive funding as a recurrent line item, which is a recognition from their national funding agencies. 60.0% of NGIs receive funding on a project basis meaning many are supplementing and/or enhancing their organisational resources for specific objectives. One NGI (Turkey) is funded on a usage-basis. None of the NGIs have subscription fee funding scheme. 	<ul style="list-style-type: none"> 84.2% (16 NGIs) receive funding as a recurrent line item 57.9% (11 NGIs) also receive funding on a project basis. Only one NGI is funded on usage-based type No NGI has a subscription fee funding type and only one of the NGIs is in process of having recurrent funding.
Levels	<ul style="list-style-type: none"> The average annual budget for 2011 was around 1.7M€, while for the 2012 it is around 2M€, an increase of 17%. 	<ul style="list-style-type: none"> On average, 2.34M€ is dedicated to operate/upgrade the infrastructure part of EGI.
Duration	<ul style="list-style-type: none"> Three NGIs have guaranteed funding for three or more years. Two NGIs have funding guaranteed only on a year-by-year basis or every two years, while for some NGIs the funding situation is unclear. In the most critical situations, some of the NGIs do not have a fixed budget and are only being funded on-demand for specific activities, or they have applied for national funding and are awaiting a decision. In most cases a funding scheme is not defined and funding beyond 2014 is not certain. 	
Staffing	<ul style="list-style-type: none"> In 2011, 10.1 FTEs were dedicated to running the average NGIs infrastructure. However, because of different size of NGI infrastructure the number of FTEs varies from 1 to 35. In 2011, 46.3% of FTEs are dedicated to operations, while 17.1% is dedicated to middleware development and 16.8% to user support. The rest is divided between user application development (9.4%), management (7.7%), administration (6.1%), training (6%) and dissemination (5.3%). On average, an expected increase of FTEs dedicated to e-Infrastructure activities within the NGIs in the 2012 is 20.7%, for 2013 is 22.0% and for 2014 is 19.7%. None of the NGIs expects a decrease in staff. 	

Serving the user communities

- **Outreach:** Thirteen NGIs (46.0%) publish a regular newsletter, annual report, case studies or booklet. Twenty NGIs (71.0%) run regular events. The majority organise events in the form of annual scientific events, annual assemblies together with training days, summer schools or user conferences. Twelve NGIs run their project websites while three NGIs (UK, Italy and Ireland) are active in social media.
- **NGI Certification Authorities:** Concerning the NGIs internal Certification Authority, 18 NGIs (78.2%) have an internal Certification Authority to issue certificates for users and for servers. Only six NGIs (27.7%) issue certificates for code signing, while two NGIs (9.5%) rely on other organisations within the country. Other NGIs delegate certification authority on a regional level.
- **Services to the users:** Twenty NGIs (90.9%) provide data management and job management services to the users. Following this, the majority of NGIs provide the users with VO membership service (81.8% or 18 NGIs), digital certificates services (72.7% or 16 NGIs) and VO monitoring (54.5% or 12 NGIs). Six NGIs (27.3%) provide science gateways to the users (Finland, Germany, Ireland, Italy, Netherlands and UK).
- **Training days and events:** In 2011, the average number of training days for grid end-users or grid operators was 8.4 days. The biggest number of training days was done by Spain (60). On average, 63 grid end-users or operators attended training events during 2011. Spain has the biggest number of trained grid end-users or grid operators – 400.
- **End-Users and Virtual Organisations:** On average, each NGI has 448 grid end-users with valid credentials released by the NGIs at the end of 2011. The average number of VOs supported by an NGI is 18. The top VO by usage (logical CPU walltime) is ATLAS, followed by Alice in second place and CMS in third.
- **Research Areas:** The research area in which the NGIs are mostly involved is 'Multidisciplinary' with 84.4% or 27 NGIs. Twenty-six NGIs support High-Energy Physics (81.3%), while 24 NGIs support Life Sciences (75.0%). Following this, 17 NGIs support Astronomy, Astrophysics and Astro-Particle Physics (53.1%), Computer Science and Mathematics (53.1%), Earth Sciences (53.1%). Sixteen NGIs support Computational chemistry (50.0%) while seven NGIs (21.9%) support Fusion. Half of the NGIs (16) support other research areas e.g. Humanities, Social Sciences, Arts, Biomedical Sciences, Computational Fluid-Solid State Dynamics, Climate/Weather Modelling, Materials.
- **Projects:** Nine NGIs were involved in other projects either directly or indirectly. Six NGIs (Czech Republic, France, Germany, Italy, Netherlands and Spain) were involved in ESFRI projects during 2011.

Infrastructure and Technology Status

- **Resource Centres:** There is total of 310 recorded Resource Centres (RCs) through the EGI Compendium survey. The most RCs coordinated by one NGI is 53 (Italy), followed by Spain (24), UK (22) and France (18). The median number of RCs is six per NGI.
- **CPU, GPU and Storage:** The total logical CPUs (cores) available via the NGIs at the end of 2011, was 278,504 of which 15 NGIs reported 16,976 cores being used to run virtual machines. The percentage of utilisation of the logical CPU (core) capacity in 2011 is around 66%, on average. The total GPUs available via the NGIs at the end of 2011 is around 30 (11 NGI responded). Most of the NGIs (75%) do not have GPU related statistics. The median logical CPUs (cores) available via the NGIs is 2126. The total size of disk storage available via the NGIs at the end of 2011 is 123,490 (TB). The total size of tape storage is 126,719 (TB).

- **Availability and ownership of NGI resources:** New EGI end-users can make use of logical CPUs and Disk Storage resources, but no Tape Storage is available. Total CPUs available to new users is 4,344 CPUs (12 NGIs respondents) and 215 TB of Disk Storage (nine NGIs respondents). Seven NGIs stated that they do not have available Tape Storage. The average NGI pool of resources is 362 CPUs and 23.89 TB of Disk Storage. Regarding whether the resources for new users to try-out are owned by the NGIs as a legal entity and/or offered through affiliated resource centres, 57.1% is owned by affiliated resource centres/institutions (eight NGIs), 28.6% is owned by NGIs (four NGIs) and 28.6% of resources are of mixed ownership (four NGIs).
- **Middleware components:** EMI components from gLite are by far the most common category of middleware components being deployed by 94.6% of NGIs (35 NGIs). The second most deployed middleware component is dCache with 37.8% (14 NGIs), followed by EMI components for ARC with 24.3% (nine NGIs), Globus with seven NGIs (18.9%) and EMI components from UNICORE and StratusLab at the same percentage at 5.4% (two NGIs). The least deployed middleware components are EDGI with only one NGI (France).

Recommendations

- **Develop an NGI strategy document:** Many NGIs have yet define their strategic path within the EGI ecosystem and on a national level. All NGIs are encouraged to develop a strategy document with vision, mission, core values and strategic goals.
- **Develop a sustainability plan:** NGIs, as EGI's main stakeholders, are encouraged to develop sustainability plans, as well as business plans and models.
- **Develop national policies:** NGIs may need to address specific local issues by defining additional policies in the various fields, e.g.: users, security and technology. Local NGI policies and procedures (in addition to EGI's) should be published and their stakeholders should be made aware of them, especially RCs and VO managers.
- **Improve outreach:** NGIs are encouraged to work more on publishing and disseminating their results (through newsletters, blogs, social media, online magazines) by the use of case studies in order to gain the visibility necessary for further expansion of their user base and to improve the reliability of their funding.
- **Investigate what roles within EGI ecosystem should be embraced:** Even though every NGIs is unique, NGIs are encouraged to investigate which roles are suitable for them within EGI ecosystem (e.g. National coordinating body, Resource Infrastructure Provider, Resource Centre, Technology Provider, Platform Integrator and Platform Operator). Sometimes, embracing different roles can result in more interactions and added value delivered for different kind of actors across the EGI ecosystem.
- **Widen NGI stakeholder base:** Encouraging diversity and inclusion of different stakeholders within a governing body can increase recognition and publicity and bring more benefits to NGIs. For example, having a more user-community-centric approach in strategic e-Infrastructure governance is desirable.
- **Engage more with ESFRI projects:** In future years, more involvement with ESFRI projects will make a real impact in NGI activities.