The EGI Compendium

of National Grid Infrastructures in Europe

2012 Edition

The data provided in this document indicate the situation on 31st December 2012.

FOREWORD

Welcome to the second edition of the **EGI Compendium of National Grid Infrastructures in Europe 2012**. This year's edition continues the spirit of collecting and analysing structured information about EGI's key stakeholders: National Grid Infrastructures (NGIs) and European Intergovernmental Research Organisations (EIROs).

A key factor in bringing new researchers into EGI will be to successfully marshal the distributed assets (e.g. technical expertise, software, resources) that exist within EGI to meet their needs. Expanding our knowledge base to include information about the assets within the NGIs and collaborating projects (i.e. a service portfolio) will help us to understand what we, as a community, are capable of doing in the short, medium and longer term.

I am most grateful to all NGIs and EIROs, particularly to ones who gathered, submitted, clarified and checked the data included in this publication. Because of this effort, readers will receive a wealth of detail regarding the 'state-of-the-art' of grid infrastructures in Europe as well as an inside look to how NGIs and EIROs are evolving from an organisational view point, building relationships with user communities and developing in areas of advanced services and technology for distributed computing across Europe and beyond.

The EGI compendium helps EGI.eu and the EGI community understand the diversity of EGI and its activities and serves as a benchmark to track the independent evolution of NGIs and EIROs since 2011. It also increases transparency and improves clarity among the EGI community, which will, in turn, be basis of our strategic planning activities.

A special thanks is also extended to the members of the EGI.eu Strategy and Policy Team in leading its development.

We hope that the second 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

CONTENTS

KEY FINDINGS

The following sections provide an overview of the key findings from the areas of strategy and policy, governance, sustainability, cost, user communities, infrastructure, and technology.

Out of the 38 NGIs, 17 responded to the 2012 EGI Compendium survey: Armenia, Bulgaria, Croatia, Cyprus, Czech Republic, Finland, France, Germany, Greece, Israel, Latvia, Lithuania, Moldova, Netherlands, Poland, Slovakia and Turkey.

NGI Strategy and Policy

NGI maturity has led to the continued advancement of the overall EGI infrastructure, steered by NGI strategies and supported by defined vision, mission and core values. Some of these reoccurring key terms for mission and core values were **scientific research, communities, reliability and openness**.

NGIs have also worked in reviewing both their current policies and potential policy changes to be better positioned in the future. Five NGIs (33.3%) have placed additional policies in order to support specific areas (e.g. acceptable use policy, security, and different policies required by law of a country of origin). Most policies are related to the users and their specific needs (77.8%) and security (77.8%), followed by Operations (55.6%) and Technology (44.4%). Other new areas are being investigated in collaboration with participating NGIs in areas such as Federated Resource Allocation Modes.

Major changes occurring during 2012 have been **major technology upgrades, increase in number of resources and users, new hardware, cloud and virtualisation services in production.**

Governance Opportunities

Over the last decade, the EGI community has been evolving towards an open, sustainable ecosystem that meets the needs of research communities. This is achieved through a combination of different roles, services, capabilities and values that are independently delivered across the EGI ecosystem. These roles are:

- **National coordinating body:** All sixteen NGIs (100%) play this role.
- **Resource infrastructure provider:** Fourteen NGIs (87.5%)
- **Resource Centre:** Nine NGIs (56.3%)
- **Technology Provider:** Seven NGIs (43.8%)
- **Platform Integrator:** Six NGIs (37.5%)
- **Platform Operator:** Seven NGIs (43.8%).

Each NGI is also free to establish their governance structure according to their individual needs. Common types of governance structure are 'group of interest' or non-legal entity (50.0%), non-profit legal (43.8%), and one NGI is coordinated by a for-profit legal international entity.

Many of the NGIs have diverse stakeholders and advisories that comprise academic and research institutions (93.8%), national government (31.6%) and resource centres (18.8%). Three NGIs (18.8%) have representatives from Industry and two NGIs (12.5%) have user communities as a stakeholder. **This trend shows an increase of stakeholders from government, research institutes, industry, and user communities.**

Sustainability Prospects

Looking at the **funding sources**, for NGIs as a legal organisation the biggest source has been national public funding (e.g. state, universities) for ten NGIs (76.9%), while nine NGIs (69.2%) are funded, at least partially, by the European Commission, through the EGI-InSPIRE project.

For NGIs as an Infrastructure, 12 (85.7%) NGIs receive funding from national public funding (e.g. state, universities) with the second biggest funding source for 10 NGIs (71.4%) being the European Commission, principally through the EGI-InSPIRE project and, in some cases, projects funded by Structural Funds. Seven NGIs or 50.0% of NGIs are funded by institutes, while 7.1% of funding coming from membership fees.

Over the last year, half the NGIs reported having some form of recognition in their national government, which is essential for ensuring future support.

In terms of **funding models**, **a recurrent line item is received by 54.5% of NGIs, while 81.8% of NGIs receive funding on a project basis**, meaning many are supplementing and/or enhancing their organisational resources for specific objectives. One NGI (Turkey) directly charges services to users. None of the NGIs has a subscription fee funding scheme, either from user communities or from resource centres.

The average national funding received for the operation and replacement of the physical resource infrastructure is 1.2 million euros. The average national and European funding supporting technology innovation projects with involvement of the NGI is 0.2 million euros.

Looking into the future, three NGIs have guaranteed long-term funding with an indefinite period. Two NGIs have funding guaranteed for four years, while the rest has funding for three years or less. For two NGIs there is no guarantee to be funded at all beyond 2012. The Full-time Equivalents dedicated to the national coordination of the NGI in 2012, the average number in 2012 is 2.2. The average national funding for the staff needed to provide technical outreach is 0.5 million euros.

The NGI infrastructures were run by on average 10.1 dedicated FTEs. The average of female FTEs is 12.7%. **NGIs estimate that if the infrastructure were outsourced to a public cloud, on average 29.2% of the staff would be retained.**

On average, NGIs expect an increase of FTEs dedicated to e-Infrastructure activities of 4.6% in 2013, 10% in 2014, and 12.2% in 2015. None of the NGIs expects a decrease in staff.

Cost of the Infrastructure

Major efforts have been ongoing over the last year to better understand the cost of the infrastructure to ensure increased efficiency in both expenditures and resources.

The average acquisition cost per logical CPU, based on information provided by four NGIs, was €370. Concerning the cost of disk storage, the average spent on 2012 by five NGIs was €272/TB. None of the three responding NGIs reported acquisition expenses for tape storage.

The average useful life of CPUs in years is 5.3 years. The average useful life of disk storage in years is five years. Finally, the average useful life of tape storage in years is 6.8.

Interconnect equipment costs as percentage of hardware acquisition costs is in average 11.7%. The estimated support contract cost as percentage of hardware acquisition cost is in average 17.3%. Concerning auxiliary equipment such as UPS, air-cooling, liquid cooling, power generators, power transformers, fire detection, estimated cost of these equipment as percentage of the cost of computing and storage infrastructure is on average 14.3%.

The average total cost per FTE in 2012 (e.g. gross salary, fringe benefits) is €30,606.7.

The average area dedicated to host computing resources was 149.7 m2 in 2012. The total yearly electricity consumption for hosting in 2012 in MWh (including servers, storage, networking, cooling, lighting, UPS systems) is 1359.2 MWh on average. The total yearly electricity consumption for IT in 2012 in MWh (IT includes only servers, storage and networking) is 1466.8 MWh. The average Power Usage Effectiveness (PUE) in 2012 is 1.3.

Serving the user communities

NGIs undertake a variety of outreach activities covering peer-reviewed papers, promotional material and websites, events and trainings. In terms of **peer-reviewed scientific publications** recorded that **benefited from the NGI/EIRO infrastructure, the average of** eight NGIs is **161 publications**. 26.7% publish a regular newsletter, an annual report, case studies or booklet. Eight NGIs (61.5%) run at least one regular event. The majority organise events in the form of **annual scientific events, annual conferences together with training days, summer schools or users' conferences**. Six NGIs (42.9%) publish online news feed while 69.2% of NGIs (9) published outreach materials in 2012. Nine NGIs (64.3%) run their project websites. Seven NGIs (28.6%) are active in social media.

The NGIs have also progressed in terms of defining the services available to users, which comprise:

- **Data management and job management services** (87.5%)
- **VO membership service** (81.3%)
- **Digital certificates services** (68.8%)
- **VO monitoring** (62.5%)
- **Science gateways** 37.5%
- Next to these services six NGIs provide other services including **community tailored services and tools, cloud interfaces** and **virtual environment, client support on request, helpdesk, BDII, MyProxy, CVMFS and technical coordination between these services** and runs networking activities **(user support, training, dissemination)**.

NGI Certification Authorities: Fourteen NGIs (100% of respondents) have an internal Certification Authority to issue certificates for users while twelve NGIs (85.7%) issue certificates for servers. One NGI (7.1%) issue certificates for code signing, while two NGIs rely on other organisations within the country (e.g. TERENA).

NGI/EIRO support researchers to use commercial cloud services: Only three NGIs (Lithuania, Moldova and Poland) have supported researchers in using commercial cloud services in 2012 including Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS). Poland is supporting researchers free of charge for IaaS and SaaS. Lithuania listed as an example of Open Nebula.

End-Users and Virtual Organisations: On average, each NGI has 316.5 grid end-users with valid credentials released by the NGIs at the end of 2012. The average number of VOs supported by an NGI is 34.1. The usage of the NGI/EIRO infrastructure by non-LHC VOs (percentage on total logical CPU wall time) is on average 51.3%.

Research Areas: The research areas in which the NGIs are mostly involved are: **Computer Science & Mathematics and Life Sciences** with 85.7% (twelve NGIs), Multidisciplinary with 78.6% or eleven NGIs, **Computational Chemistry and High-Energy Physics** both with 71.4% or ten NGIs, **Earth Sciences** with 57.1% or eight NGIs, **Astronomy, Astrophysics and Astro-Particle Physics** with 50% (seven NGIs). Finally, other research areas, such as Complex systems, Engineering, Computational Fluid-Solid State Dynamics, Climate/Weather Modelling, Materials, Medical Sciences, Metallurgy, Acoustics, Nanoscience, Material science, Energetics, etc. are supported by 42.9% of NGIs (six NGIs) and Fusion with 14.3% or two NGIs. A new scientific discipline classification is currently being implemented across EGI tools for 2013.

Resources for EGI Try-Out: New EGI end-users can make use of logical CPUs and Disk Storage resources, but not Tape Storage. The total CPUs available to new users are 2,566 CPUs (eight NGIs) and 66 TB of Disk (five NGIs). Four NGIs stated that they do not have Tape available. The average NGI pool of resources for new users is 320.7 CPUs and 13.20 TB of Disk compared with 362 CPUs and 23.9 TB of Disk in 2011. Concerning the amount of resources, the NGI/EIRO is willing to allocate to new users through the EGI federated resource allocation process in 2013, a total of logical CPUs (cores) of 274 from four NGIs, 64 TBs of Disk Storage from four NGIs. Given the resources available to new users, 50% are owned by affiliated resource centres/institutions (five NGIs), 60% are owned by NGIs (six NGIs) and none of resources are of mixed ownership.

Infrastructure and Technology Status

According to the data collected in the EGI Compendium survey, the European Grid Infrastructure comprises a total of **287 Resource Centres (RCs)**. Italy coordinates the most RCs (54), followed by IBERGRID (27), UK (24) and Germany (19). The average number of RCs per NGI is 8.96.

The total **logical CPUs (cores)** available via the NGIs infrastructure at the end of 2012, was 349,720. Of these, nine NGIs reported an average number of 156.5 cores being used to run **virtual machines**. The average percentage of use of the logical CPU (core) capacity in 2012 is 63.8%. During 2012, the NGIs infrastructure provided a median number 7,912,853 compared with 7,350,657 logical CPU hours (**wall clock time**). The total **GPUs** available via the NGIs infrastructure at the end of 2011 is 374, distributed by ten NGIs. Most of the NGIs do not collect GPU-related statistics.

The average number of logical CPU (core) installed in the considered sample at the end of 2012 is average sample of 7426 logical CPUs. The average size of disk storage (TB) installed in the considered sample at the end of 2012 is 1953TB. Furthermore, average size of tape storage (TB) installed in the considered sample at the end of 2012 is 2601.3. The total size of disk storage available via the NGIs infrastructure at the end of 2011 is 396 PB. The total size of tape storage available is 7193.8 TB per NGI. The utilisation for the computing infrastructure in the sample during 2012 (% of used logical CPU hour over the total available in the year) is 66.8% while the median is 80%.

Middleware components: EMI components from the gLite stack are the most popular category of middleware being deployed by all NGIs (thirty-one NGIs). The second most deployed middleware component is ARC with 19.3% (six NGIs), followed by Globus with 9.7% (three NGIs) and EMI components from UNICORE with 6.4% (two NGIs). None of the NGIs deployed dCache, StratusLab or EDGI while one NGI (Poland) deployed QosCosGrid.

1. INTRODUCTION

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.

The purposes of the EGI Compendium 2012 are to strengthen the community's knowledge base and contribute to an efficient interaction between EGI's stakeholders. This motivation can be expressed in three major goals:

1) To increase the transparency of EGI's activities;
2) To support the strategic planning and long-term development of EGI;
3) To provide an essential body of information for the various EGI stakeholders.

The EGI Compendium report is an authoritative reference source that can be used to chart the development of federated computing in Europe, covering areas such as General Information, Strategy, Governance, Funding and Staffing, Policy, Outreach, Services, Users, Infrastructure and Technology.

Tables with detailed information for each area are provided in the Appendix - Tables.

2. General Information

2.1 Respondents

Of a total of 38 NGIs[1], 17 responded to the EGI Compendium 2012 survey conducted in the first months of 2013 (Table 2.1.1).

Fig. 2.1.1 shows a breakdown of the answers completed by each responding NGI.

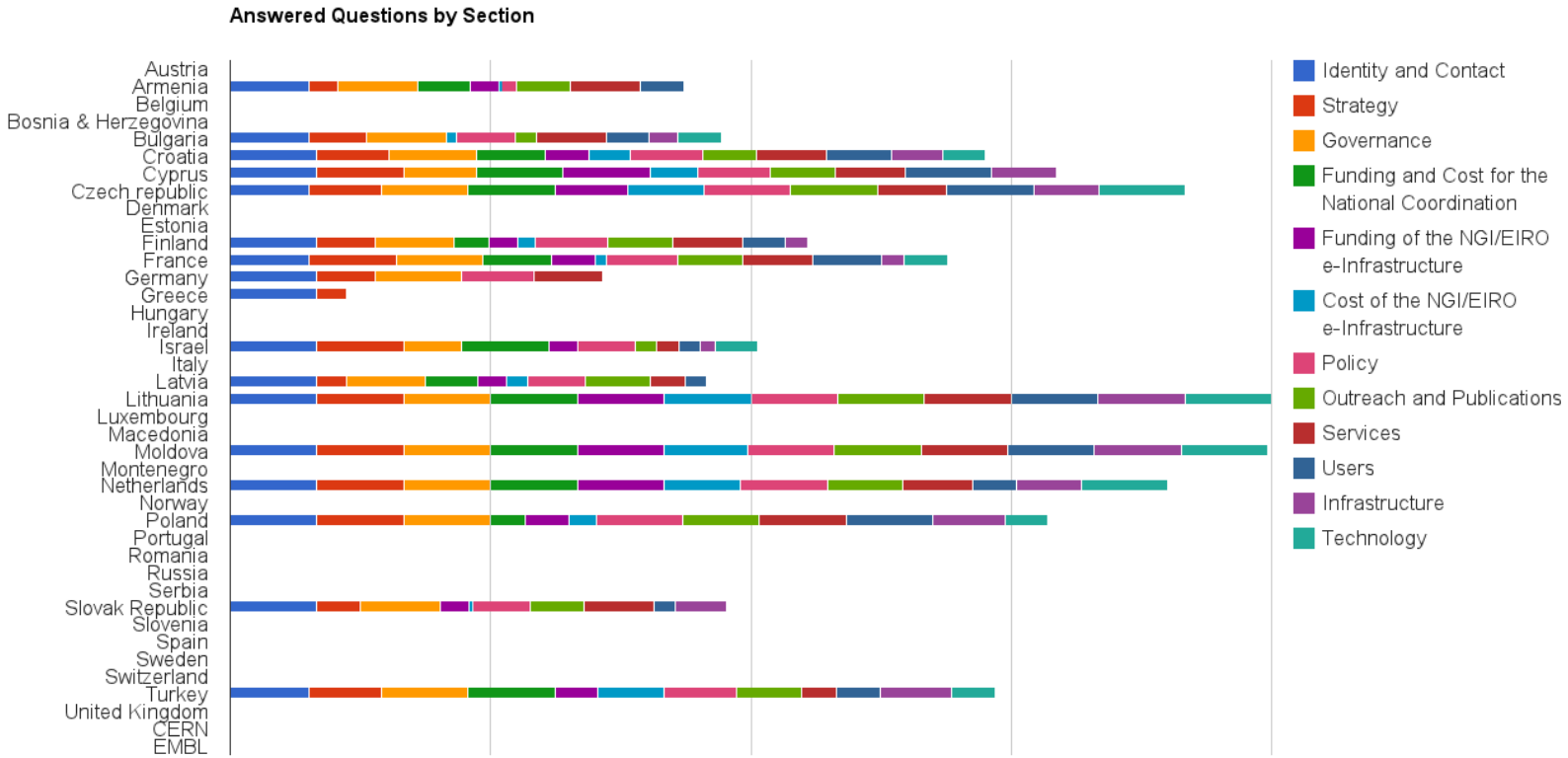


Fig. 2.1.1 – Percentage of completed answers per NGI

[1] For the purpose of this document and for the sake of simplicity, the meaning of the acronym 'NGIs' (plural) has been expanded to include EIROs as well (NGIs then means the group comprising NGIs plus CERN and EMBL).

EGI has collected, over the years, a variety of information, some of which explicitly covered by the compendium survey. This existing information was used to prefill survey questions where appropriate to reduce redundant requests for information and to minimise the time required for its completion. Some of this prefilled information regards NGIs that did not formally answer the survey. The data was taken into account where applicable.

Further information in the Appendix:

Table 2.1.1 - NGIs that did and did not respond to the EGI Compendium survey.

Table 2.1.2 - Snapshot of the general information about individual NGIs including full name and abbreviation both in English and national languages.

Table 2.1.3 - Website URLs of the NGIs.

Table 2.1.4 - NGIs member and deputy member of the EGI Council, as well as NGIs International Liaison contact and deputy contact.

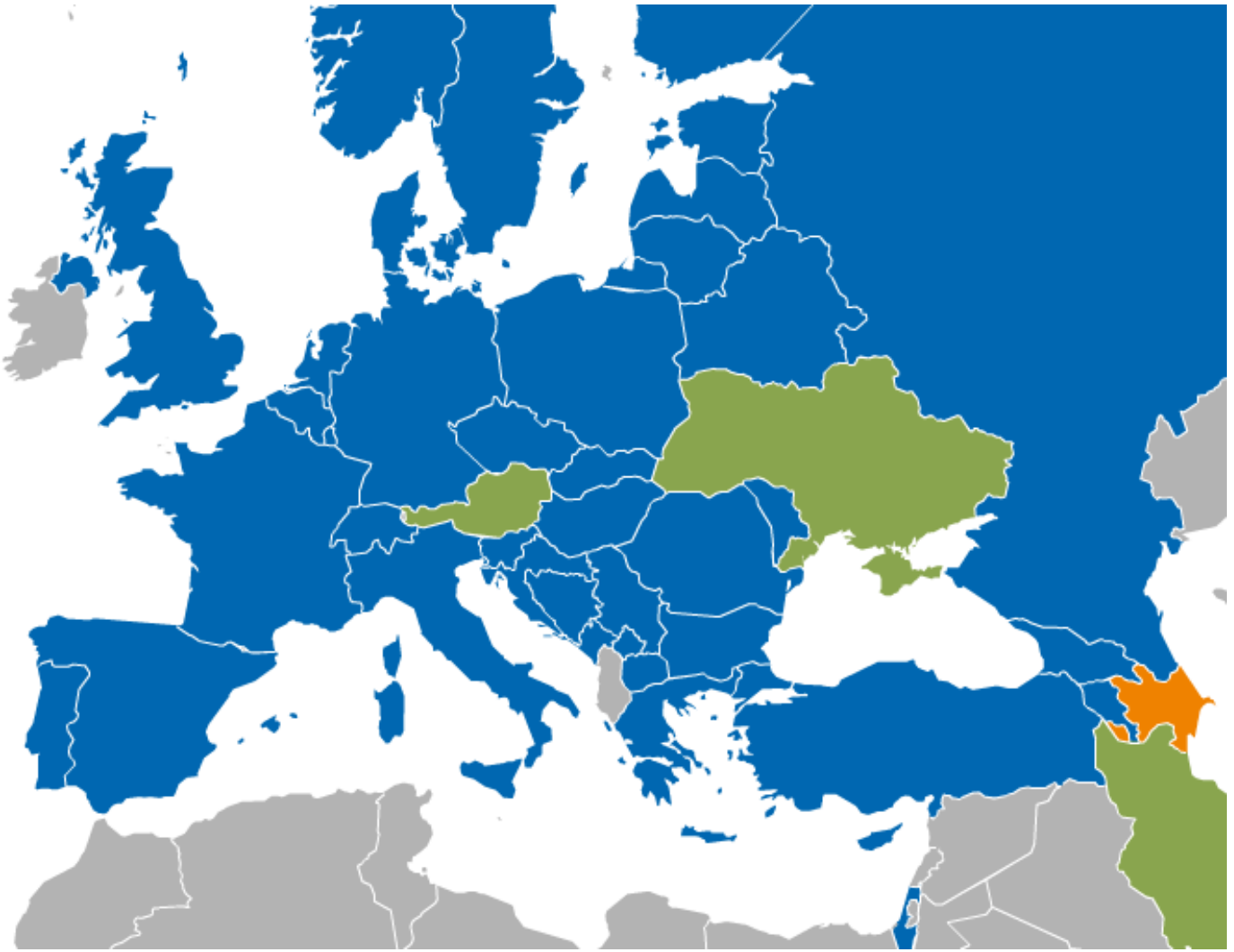
Table 2.1.5 - Operations manager and deputy of the NGIs.

Table 2.1.6 - Year of establishment of the NGIs and the year of start of grid operations started in the NGIs country.

Table 2.1.7 - History of the NGIs as related to the grid activities or URL to a webpage.

2.2 Geographical Breakdown

Map 2.2.1 is a highlight of Europe showing EGI.eu council members and EGI-InSPIRE participants (in blue), integrated resource infrastructure providers (in green) and resource providers under integration (orange).



3. STRATEGY

The following section offers a snapshot at where the NGIs are in terms of planning, vision, mission, core values, recognition in national e-Infrastructure strategies and plans and areas of opportunity moving into the future.

3.1 Planning and Recognition

Of the respondent NGIs, seven (41.2%) have defined a strategy document to steer the provision of grid and distributed computing services (Fig. 3.1.1). The majority of the strategies are written in their national languages and are not available as public documents. In some cases, the documents include sections on strategy not specifically focused on distributed computing (Table 3.1.1).

Seven NGIs (46.7%) out of 15 respondents have their NGI recognised in government national e-Infrastructure strategies or plans related to computational and data infrastructures for research and innovation (Fig. 3.1.1).

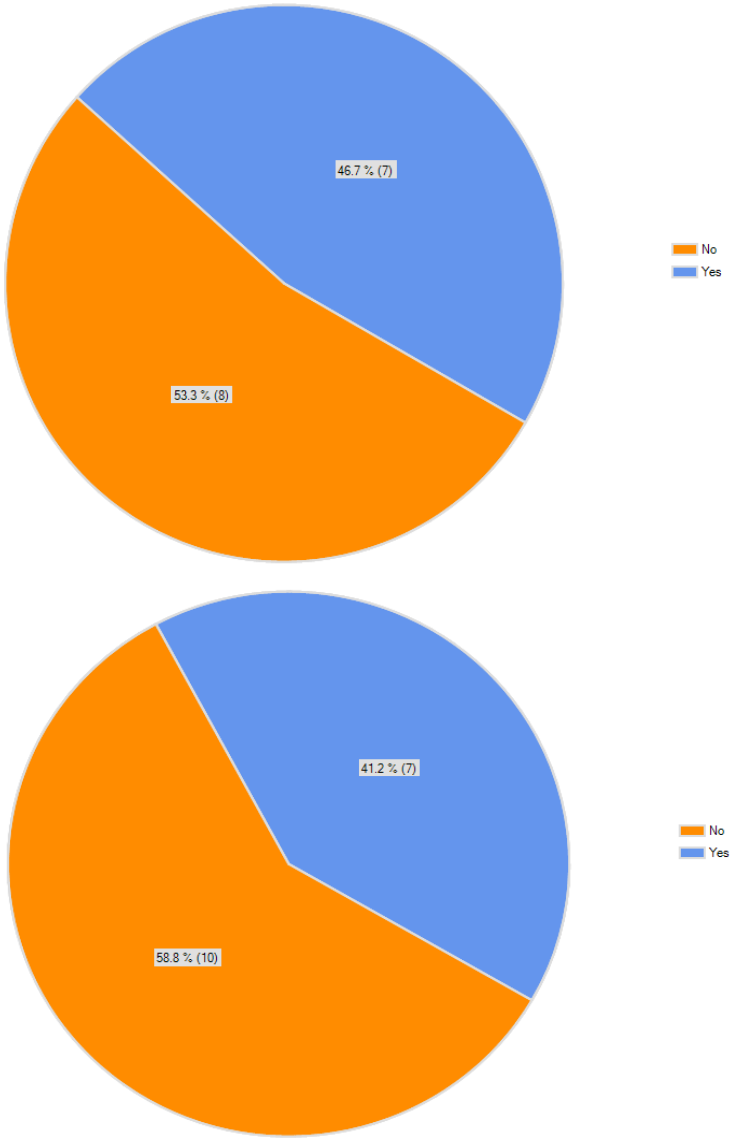
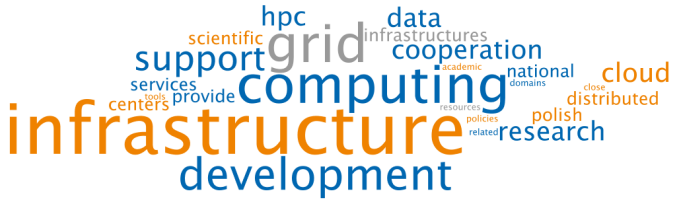


Fig. 3.1.1 – Percentage of NGIs with/without defined strategies (top); percentage of NGIs recognised in national e-Infrastructure strategies or plans (bottom).

3.2 Vision, Mission and Core Values

3.2.1 Vision

Nine NGIs have defined their vision for grid and distributed computing. The full list of vision statements is documented in Table 3.2.1. Some of the mentioned key terms are: Grid Infrastructure, Development, Computing and Data, Distributed Computing and Services.



3.2.2 Mission

Thirteen NGIs provided a mission statement. The full list of mission statements is documented in Table 3.2.2.

3.2.3 Core values

Ten NGIs have defined a list of their core values. The full list of core values is documented on Table 3.2.3. The most recurrent core values are Communities, Reliability and Openness.

3.3 Major changes

Major changes were reported by ten NGIs during 2012, including major technology upgrades, increased resources, new hardware, cloud and virtualisation services in production, adopted strategy document, increased number of users. Two NGIs reported no major changes in 2012. Concerning the foreseen changes for the coming year, one NGI is expecting that 2013 will be a very important year of transition in order to bringing all e-Infrastructure provisioning under one umbrella (see Table 3.3.1)

There are six roles within the EGI ecosystem, defined in the EGI-InSPIRE D2.14 Evolving the EGI Business Model report[2]: National Coordinating Body, Resource Infrastructure Provider, Resource Centre, Technology Provider, Platform Integrator and Platform Operator.

All responding NGIs (16) have roles as National Coordinating Body, which is logical since this is a core role for any NGI. Fourteen NGIs have a role of Resource infrastructure provider (87.5%), while nine NGIs perform the role of Resource Centre (56.3%), seven NGIs are Technology Providers (43.8%), six are Platform Integrators (37.5%) and seven perform also the role of Platform Operator (43.8%) (Fig. 4.2.1).

Table 4.2.1 presents the different roles of individual NGIs.

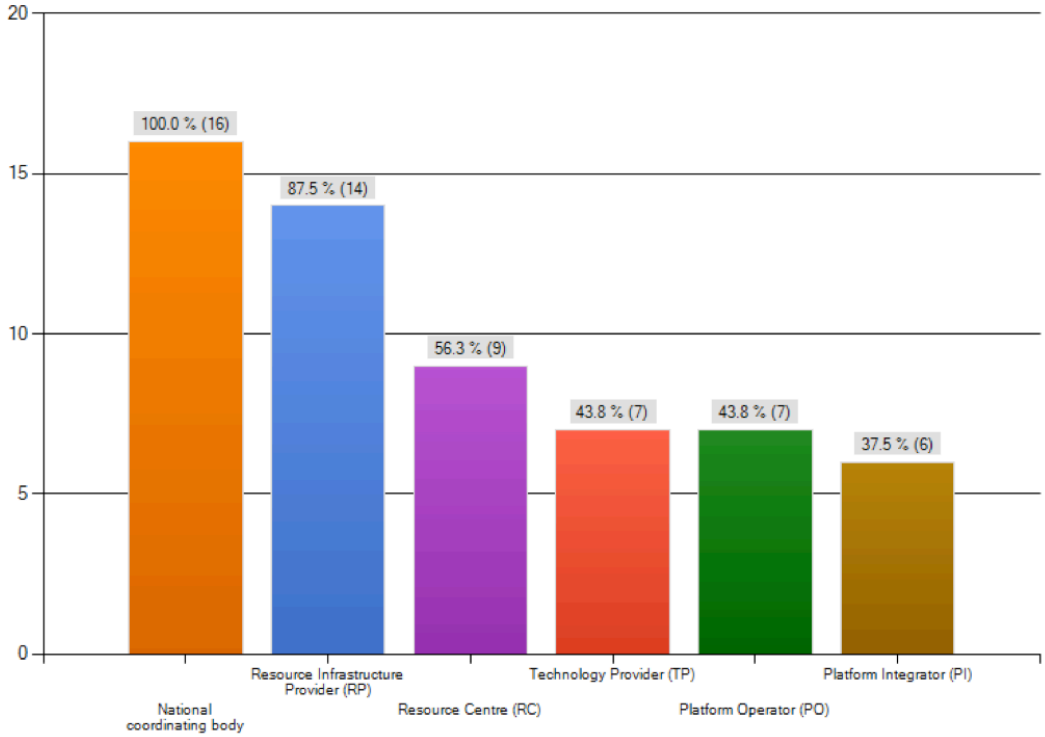


Fig. 4.2.1 – Roles covered by the NGI/EIRO

[2] https://documents.egi.eu/document/1040

4. GOVERNANCE

4.1 Legal Forms and Agreement Duration

Half of the NGIs (eight) are not legal entities and belong to the 'group of interest' type, seven NGIs (43.8%) are a non-profit legal entity, and one NGI is coordinated by a for-profit legal international entity.

Some NGIs are planning to establish a dedicated legal entity, however, the majority do not plan to set up a dedicated organisation if there is no direct support from government. Table 4.1.1 provides a list of NGIs with specific information regarding their legal arrangement and agreement duration.

Most NGIs (62.5%) have unlimited agreement duration (Fig. 4.1.2). Five NGIs (31.3%) have limited duration while only one NGI has duration until 2012 (Table 4.1.1).

4.2 Roles and Functions

Over the last decade, the EGI community has been evolving towards an open, sustainable ecosystem that meets the needs of research communities. This is achieved through a combination of a variety of different roles, services, capabilities, and values that are independently delivered across the EGI ecosystem.

There are six roles within the EGI ecosystem, defined in the EGI-InSPIRE Evolving the EGI Business Model report: National Coordinating Body, Resource Infrastructure Provider, Resource Centre, Technology Provider, Platform Integrator and Platform Operator.

All responding NGIs (16) have roles as National Coordinating Body, which is logical since this is a core role for any NGI. Fourteen NGIs have a role of Resource infrastructure provider (87.5%), while nine NGIs perform the role of Resource Centre (56.3%), seven NGIs are Technology Providers (43.8%), six are Platform Integrators (37.5%) and seven perform also the role of Platform Operator (43.8%). Table 4.2.1 presents the different roles of individual NGIs.

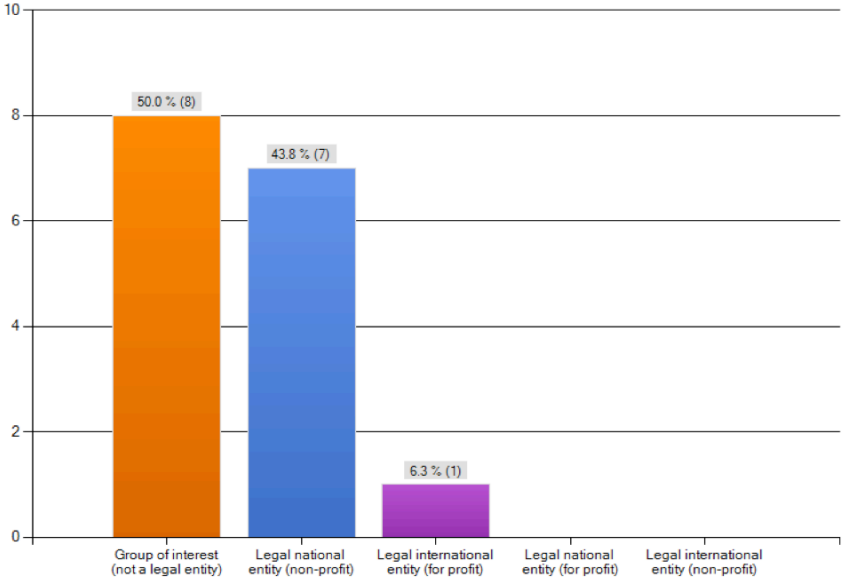


Fig. 4.1.1 – Legal form adopted by the NGIs

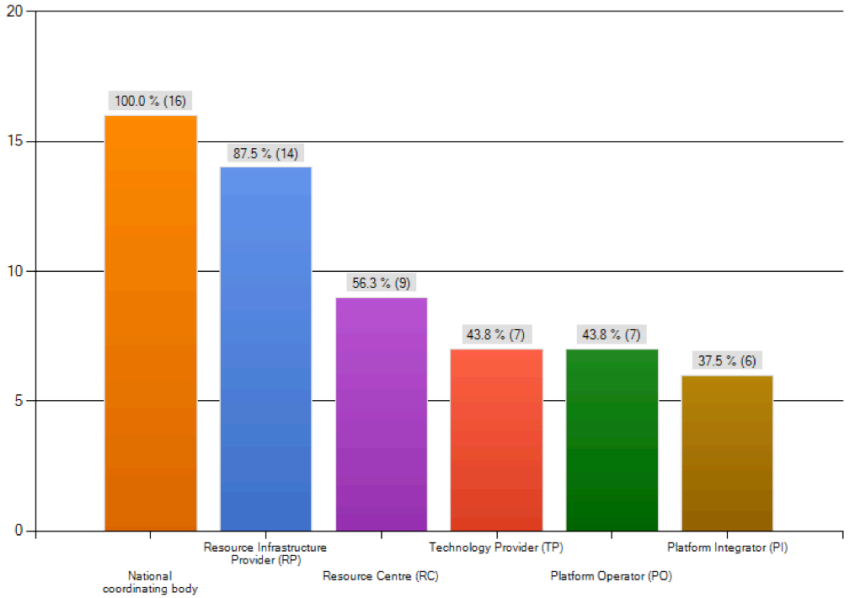


Fig. 4.1.2 – Timespan of the legal agreement that established the NGI/EIRO

4.3 Membership

On average, NGI partnerships are composed of nine members (e.g. universities, research institutions). In most cases, the same organisation is representing the NGI in the EGI Council and is the lead organisation as well.

Table 4.3.1 presents data concerning participant/associate participant status, the organisations representing the NGI in the EGI Council, lead organisation of the NGI, number of member institutions as part of the NGI and the name of the NGIs governing body is shown in.

4.4 Stakeholders

a) Governing body

Fifteen NGIs have academic institutions (93.8%) as a stakeholder in its governing body, while twelve (75.0%) have research institutes as well. Five NGIs (31.6%) have the national government as a stakeholder, while three NGIs (18.8%) have resource centres. Three NGIs (18.8%) have representatives from Industry and two NGIs (12.5%) have user communities as a stakeholder. None of NGIs have VOs or intergovernmental organisations as stakeholders (Fig. 4.4.1).

b) Advisory board

Of the respondent NGIs, nine (40.0%) have an advisory board, while sixteen (60.0%) do not. User communities are stakeholders in 50.0% of the cases, followed by 40.0% with academic institutions and others like university representatives, EGI.eu and members of other NGIs, 30.0% are research institutes and resource centres and 20.0% with national governments and industry (Fig. 4.4.2).

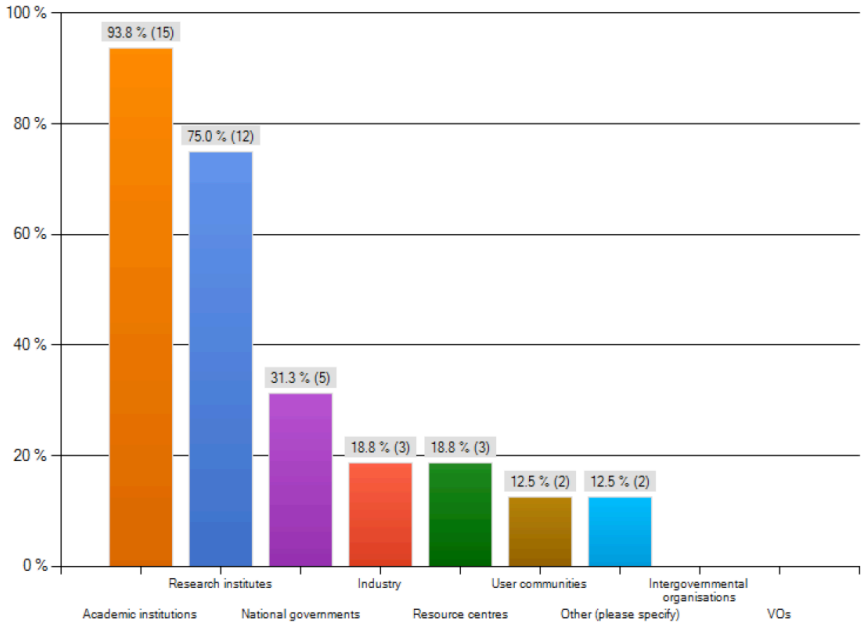


Fig. 4.4.1 – Stakeholders represented in governing body

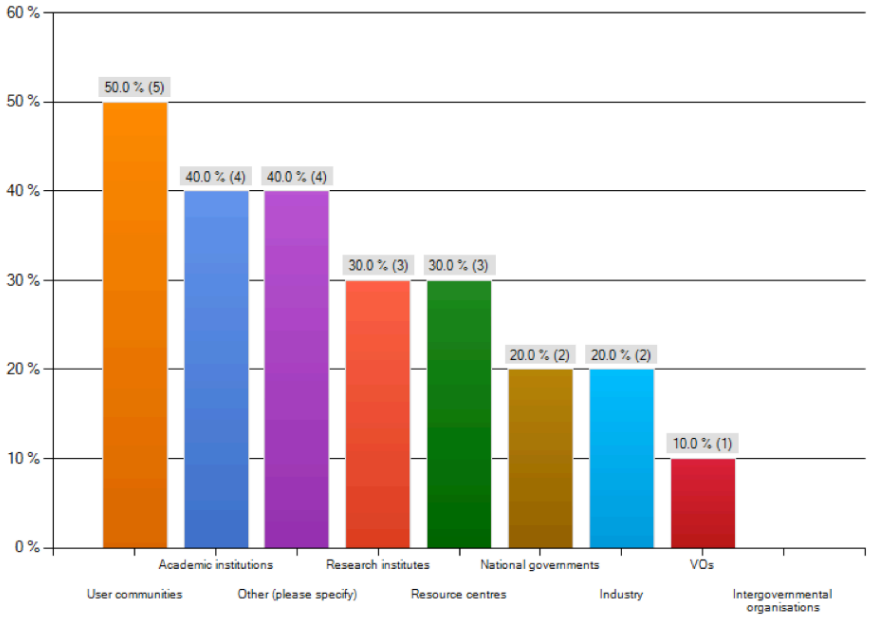


Fig. 4.4.2 – Stakeholders represented in advisory boards

4.5 Government Relations

This section distinguishes five types of relationship with a government:

a) Hierarchical (e.g. subordinate to a responsible government body)

b) Direct/Formal (e.g. board member; contact with Ministry)

c) Informal/Indirect (e.g. government liaison; proposals; tenders)

d) Non-existent

e) Other

One NGI (6.3%) has a direct hierarchical subordination to governmental Ministry, while six NGIs (37.5%) have a direct/formal relationship with their government, either through delegated responsibility from a Ministry or having a Ministry representative as a board member. On the other hand, five NGIs (31.5%) have an informal/indirect relationship with their government and two NGIs (12.5%) do not have any kind of relationship with their national governments (Fig. 4.5.1). One NGI (Netherlands) has a relationship with government through other organisations (in this case, SURF and NWO).

Table 4.5.1. lists the webpages describing the governance model of 37.5% of the NGIs. The remainder do not have a public webpage with this information.

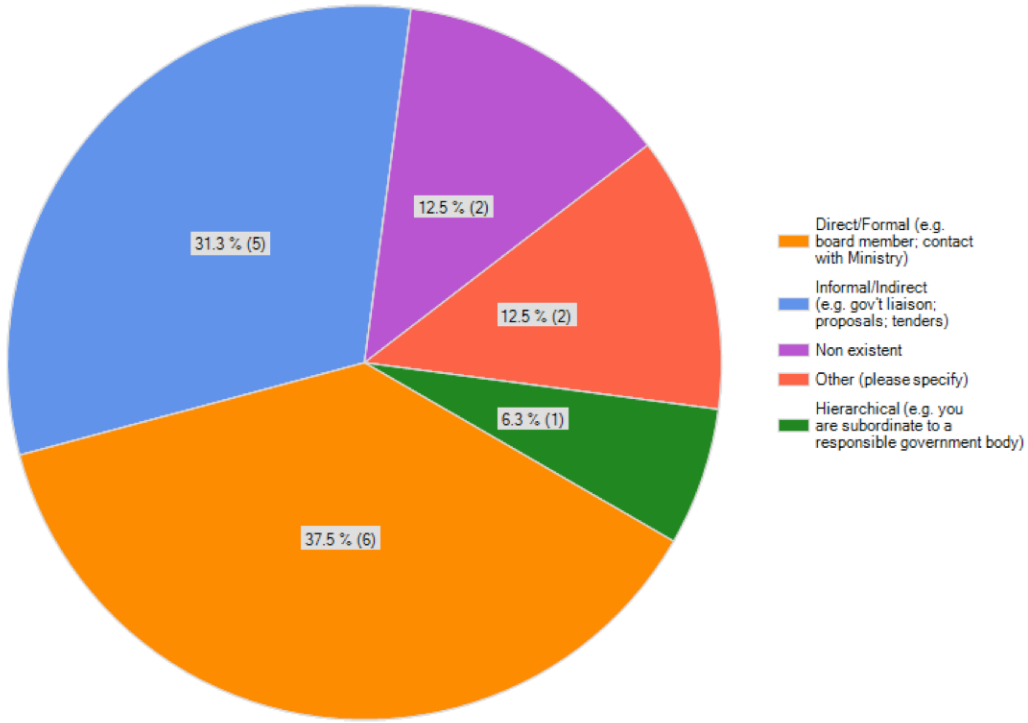


Fig. 4.5.1 – Type of NGI relation with the national government

5. Funding, Staffing and Cost

For analysis purposes, a distinction is made between an NGI as a legal organisation and an NGI as an infrastructure. If an NGI is established as a legal organisation, it will include all coordination activities done by the coordinating body, while an NGI as infrastructure includes operations and upgrade activities, thus, activities of all national resource centres.

5.1 NGIs as Legal Organisations

The biggest funding source for ten NGIs (76.9%) comes from national public funding (e.g. state, universities). Nine NGIs (69.2%) are funded, at least partially, by the European Commission, through the EGI-InSPIRE project and in some cases by Structural Funds. Five NGIs (38.5%) are funded by institutes, while two NGIs (15.4%) are funded by users (Finland and Turkey). One NGI (Czech Republic) also receives funding from membership fees and one NGI (The Netherlands) from private investments. None of the NGIs is funded through donations and royalties (Fig. 5.1.1). Table 5.1.1. shows the funding sources for individual NGIs.

Funding as a recurrent line item is received by 54.5% of NGIs, while 81.8% of NGIs receive funding on a project basis meaning many are supplementing and/or enhancing their organisational resources for specific objectives. One NGI (Turkey) directly charges services to users. None of the NGIs has a subscription fee funding scheme, either from user communities or from resource centres. Table 5.1.2 shows funding types for individual NGIs.

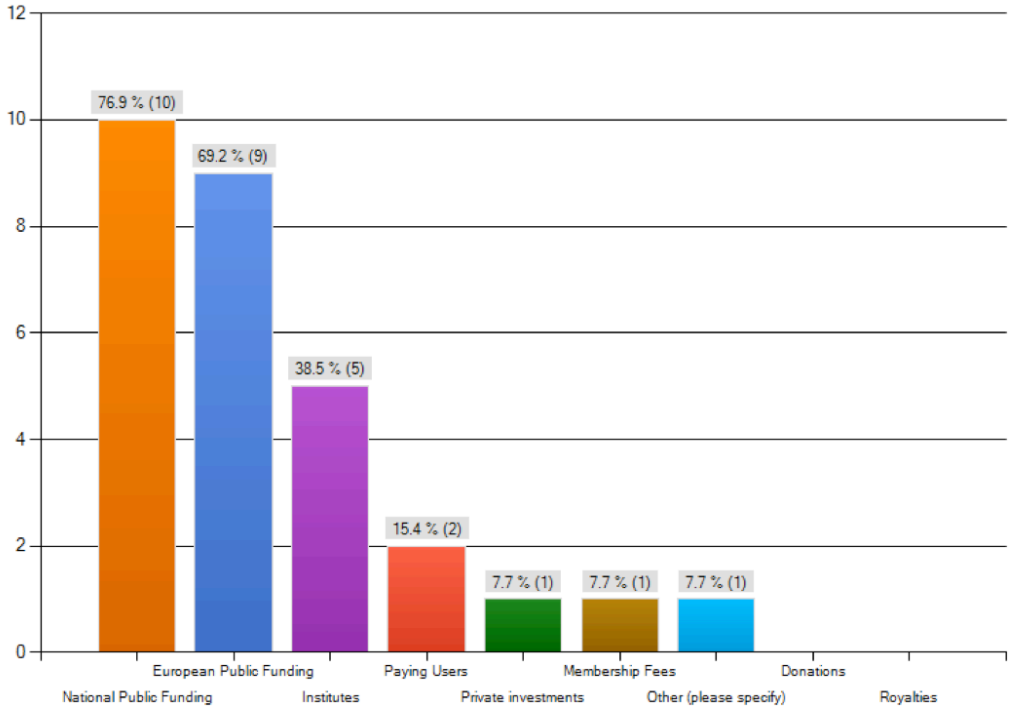


Fig. 5.1.1 – The funding sources to support the national coordination

Concerning FTEs dedicated to the national coordination of the NGI in 2012, the average number in 2012 is 2.2 FTEs with median number being 1.8 FTEs.

For three NGIs, guaranteed funding period is indefinite. Two NGIs have funding guaranteed for four years, while one NGI reported guaranteed funding for three years, one for two years and one for a year. For two NGIs there is no guarantee to be funded at all beyond 2012.

5.2 NGIs as e-Infrastructures

For the creation and operation of NGIs infrastructure, twelve (85.7%) NGIs receive funding from national public funding (e.g. state, universities). The second biggest funding source for ten NGIs (71.4%) is the European Commission, principally through the EGI-InSPIRE project and, in some cases, projects funded by Structural Funds. Seven NGIs or 50.0% of NGIs are funded by institutes, while 7.1% of funding coming from membership fees. One NGI (Netherlands) is partly funded through private investments, and one NGI (Turkey) is funded through user payments. None of the NGIs infrastructure is funded through donations and royalties (Fig. 5.2.1).

Table 5.2.1 shows funding sources for individual NGIs as e-Infrastructures.

Eight NGIs (57.1%%) receive funding as a recurrent line item while eleven NGIs (78.6%) also receive funding on a project basis. One NGI (Turkey) is funded on usage-based type. No NGI has a subscription fee funding type from either user communities or resource centres (Fig. 5.2.2).

Table 5.2.2 shows funding types for individual NGIs as e-Infrastructures.

Concerning funding sources for 2012 budget, the biggest average funding source (60.9%) comes from national public funding (e.g. state, universities). The second biggest funding source for most of the NGIs are funds from Institutes with 21.2%, while the third is the European public funding with 16.0%. Membership fees contribute only 1.9%. None of the NGIs is funded through users, donations, private investments and royalties (Fig. 5.2.3).

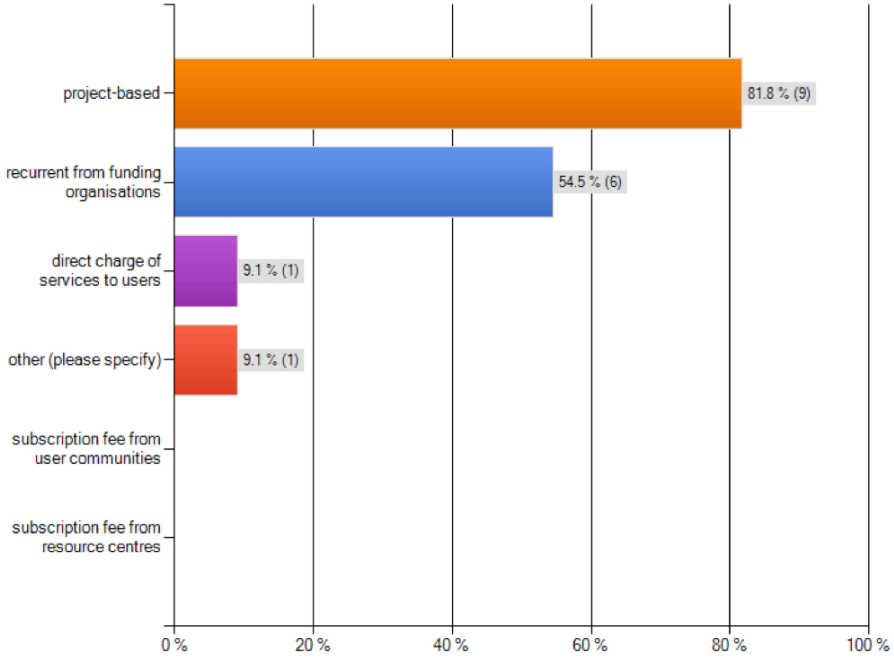


Fig. 5.2.1 – Funding sources for the NGI/EIRO e-Infrastructure

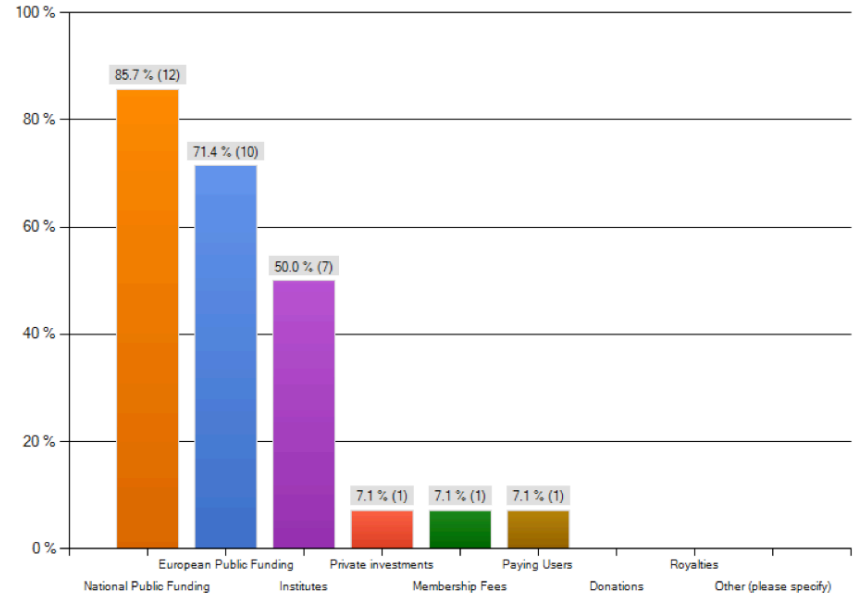


Fig. 5.2.2 – Funding types for NGIs as e-Infrastructures

The average national funding received for the operation and replacement of the physical resource infrastructure is 1.2 million euros. The average national funding for the technical outreach staff is 0.5 million euros. The average national and European funding to support technology innovation projects in which the NGIs are involved in is 0.2 million euros.

5.3 Cost of the NGI e-Infrastructure

Understanding the overall costs of European research services is a prerequisite to plan for their long-term sustainability, for example by developing new business models for service provision. A quantitative analysis of the factors involved helps service providers and user communities to identify areas where the overall cost efficiency can be optimised.

The e-FISCAL project[3] analysed the costs and cost structures of national research infrastructures involved in High-Throughput Computing (HTC) through EGI and High-Performance Computing (HPC) through PRACE, and compared them with similar commercially leased or on-demand offerings. The study also analysed the qualitative differences in the service provided by HTC and HPC e-Infrastructures and their closest commercial counterparts.

The future cost assessments of HTC infrastructure will be done annually in the EGI Compendium using the e-FISCAL methodology.

Six NGIs (46.2%) provided information for one resource centre, one NGI provided answer for multiple resource centres, one NGI for all resource centres they manage and five NGIs for none. The average number of logical CPUs installed at the end of 2012 is 7,426 cores. The average size of disk storage installed at the end of 2012 is 1,953 TB, with a median of 600 TB. For tape storage, the average was 2601.3 TB.

On average users consumed 66.8% of the logical CPU hours available during 2012.

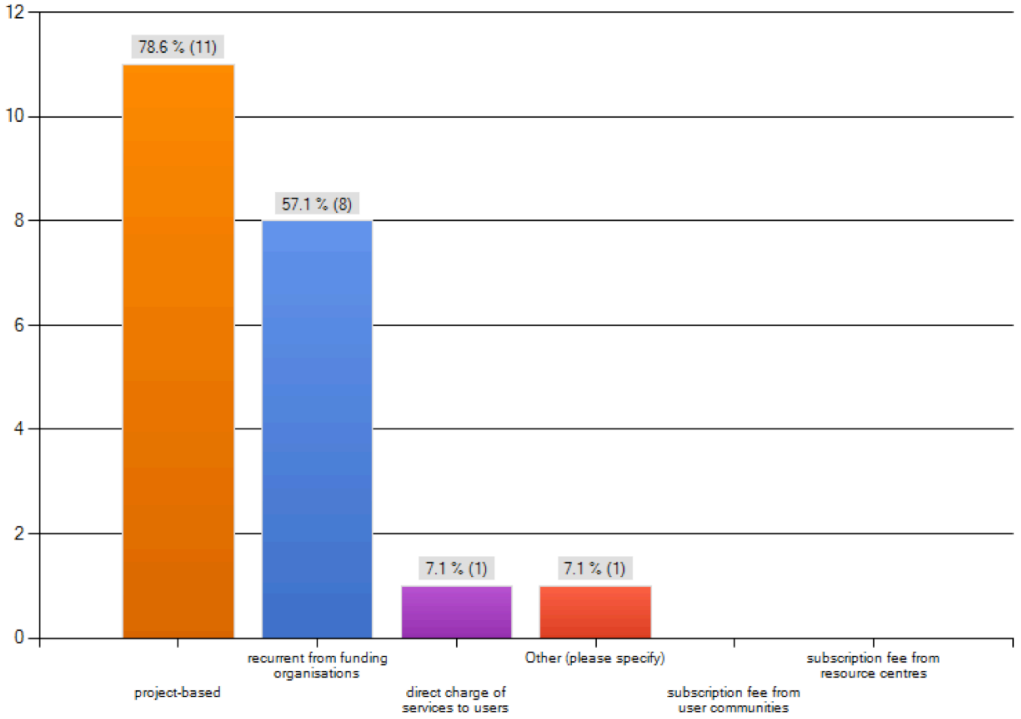


Fig. 5.2.3 – Funding sources for the 2012 budget

[3] e-FISCAL Final Report: http://goo.gl/lDCmxf

The average acquisition cost per logical CPU, based on information provided by four NGIs, was €370, with a €337.5 median. Concerning the cost of disk storage, the average spent on 2012 by five NGIs was 272€ per TB, with a €200 median. None of the three responding NGIs reported acquisition expenses for tape storage.

The average useful life of CPUs is 5.3 years while the median is 5.0. The average useful life of disk storage in years is 5.0 years and the median is also 5.0. Finally, the average useful life of tape storage in years is 6.8 while the median is 7.0.

Interconnect equipment costs as percentage of hardware acquisition costs is in average 11.7% while the median is 15%. The estimated support contract cost as percentage of hardware acquisition cost is in average 17.3% while the median is 10. Concerning auxiliary equipment such as UPS, air-cooling, liquid cooling, power generators, power transformers, fire detection, estimated cost of these equipment, as percentage of the cost of computing and storage infrastructure is on average 14.3%, while the median is 20%.

The NGI infrastructures were run on average by 10.1 dedicated Full Time Equivalents (FTEs). The absolute values reported by the NGIs vary from 1 to 34 FTEs, which is explained by size differences between NGIs. The estimated percentage of the FTEs that would need to be retained if the NGI/EIRO would use commercial cloud providers (IaaS) for all computing and storage services is in average 29.2% and median is 7.0%. Female workers represent on average 12.7% of the FTEs reported by eight answering NGIs; replies range from none (in case of three NGIs) to 40.0% (in case of one NGI).

If the NGI infrastructure would double the size measured in number of logical CPUs (cores), the estimated percentage increase of FTEs would be 16.1% on average, while 17.5% as median. The average total cost per FTE in 2012 (e.g. gross salary, fringe benefits) is €30,606.7.

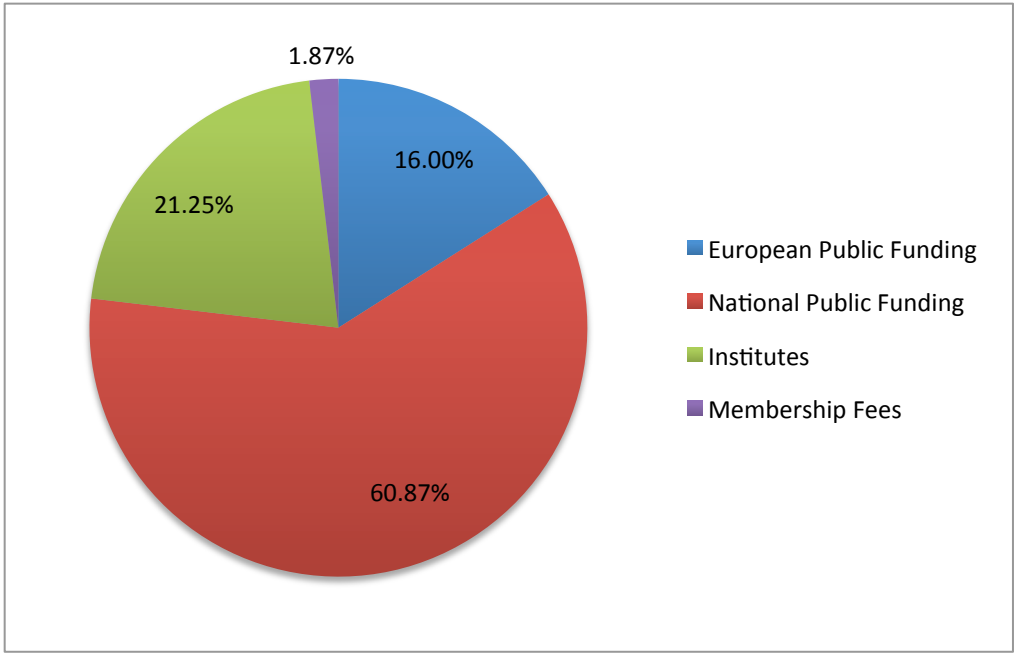


Fig. 5.2.3 – Funding sources for the 2012 budget

The average area dedicated to host computing resources was 149.7m^2 in 2012, with a median of 125.0m^2. The total yearly electricity consumption for hosting in 2012 in MWh (hosting includes servers, storage, networking, cooling, lighting, UPS systems, etc.) is 1359.2 MWh on average while is 680 MWh as median. The total yearly electricity consumption for IT in 2012 in MWh (IT includes only servers, storage and networking) is 1466.8 MWh while the median is 450 MWh. Therefore, the average Power Usage Effectiveness (PUE)[4], a measure of how efficiently a computer data centre uses its power, in 2012 is 1.3 while the median is 1.5.

On average, NGIs expect an increase of the FTEs dedicated to e-Infrastructure activities of 4.6% in 2013, 10.0% in 2014, and 12.2% in 2015. None of the NGIs expects a decrease in staff, a trend that suggests NGI plans for further expansion of activities (Fig. 5.3.1).

Average costs of responding NGIs:

CAPEX (Capital Expenditure)	€ 795,194.00
OPEX (Operational expenditure)	€ 2,408,872.62
CAPEX + OPEX	€ 3,204,066.62
Utilisation rate	% 68.00
Cost per Core/Hour	€ 0.0724
Cost per Core/Year	€ 431.47

Ratios:

FTEs/1000s cores	1.36
m^2/1000s cores	20.16
Kwh/core per year	183.03
Power Usage Effectiveness	0.93
OPEX/Total	75.18%
CAPEX/Total	24.82%

Cost breakdown are shown in Fig. 5.3.2

[4] http://en.wikipedia.org/wiki/Power_usage_effectiveness

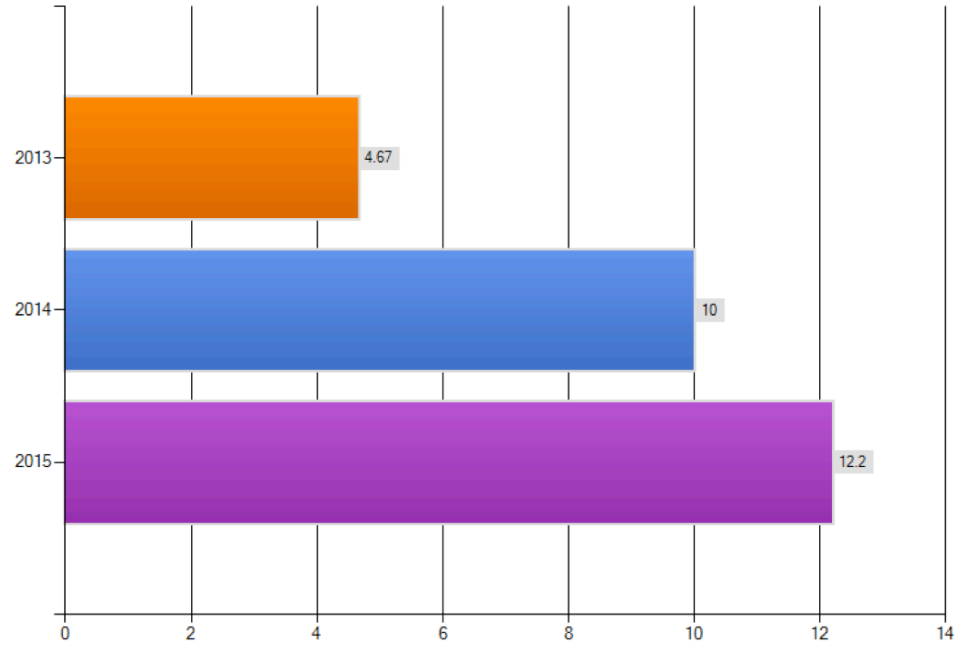


Fig. 5.3.1 – Expected increase/decrease of FTEs dedicated to e-Infrastructure activities

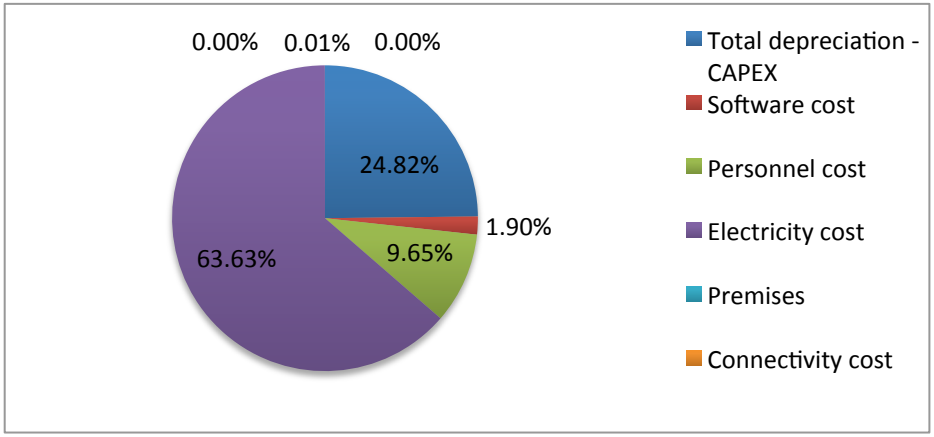


Fig. 5.3.2 – Cost breakdown

6. POLICY

6.1 Resource Allocation

Nine NGIs (56.3%) have central resource allocation processes, while seven (43.8%) have users negotiating directly with individual resource centres (Fig. 6.1.1).

The process by which new or existing user community can apply for computational resources is very diverse across the NGIs. For example, some NGIs have developed a system of grants with guarantees, some have certain percentages of the resources reserved to new user communities, in others resources may be allocated on the base of an application proposal, or according to a fair share or best effort model (Table 6.1.1).

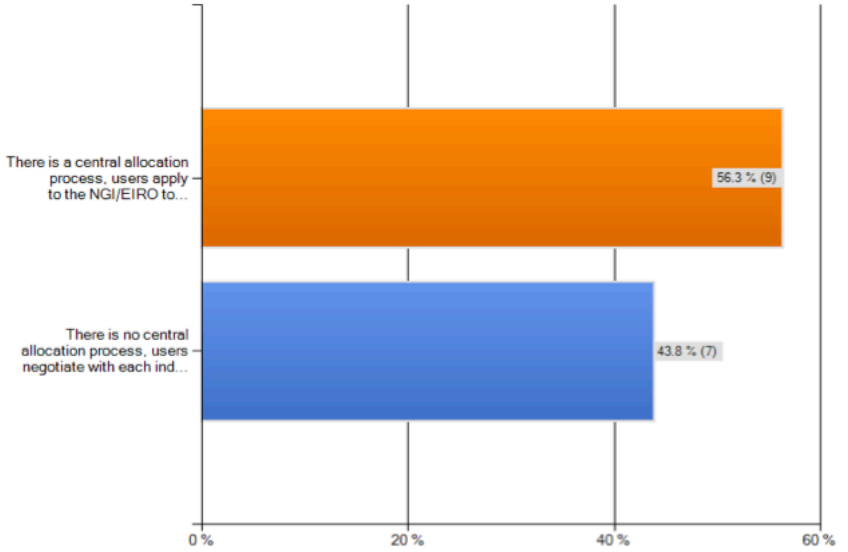


Fig. 6.1.1 – Resource allocation model

6.2 EGI and National Policies

The majority of NGIs (ten) do not enforce additional restrictions on the infrastructure in addition to EGI policies. Five NGIs (33.3%) have additional policies in place to support specific areas. These national policies are related to technology, user communities (e.g. Acceptable Usage Policy), security, and different policies required by law of a country of origin (Table 6.2.1).

The areas affected by national policies are shown in Fig. 6.2.1. Most policies are related to the users and their specific needs (77.8%) and security (77.8%), followed by operations (55.6%), technology (44.4%). Green IT as a policy area is addressed by one NGI (Poland).

Six NGIs (40.0%) have a webpage with the list of policies/procedures that apply to the coordinated e-Infrastructure (Table 6.2.2).

Only one NGI (Bulgaria) out of thirteen NGI respondents has a defined Gender Action Plan. However, some NGIs that are inherited by the 'mother' organisation or as a Scientific Interest Group, each partner may have its own Gender Action Plan, such as with the French NGI.

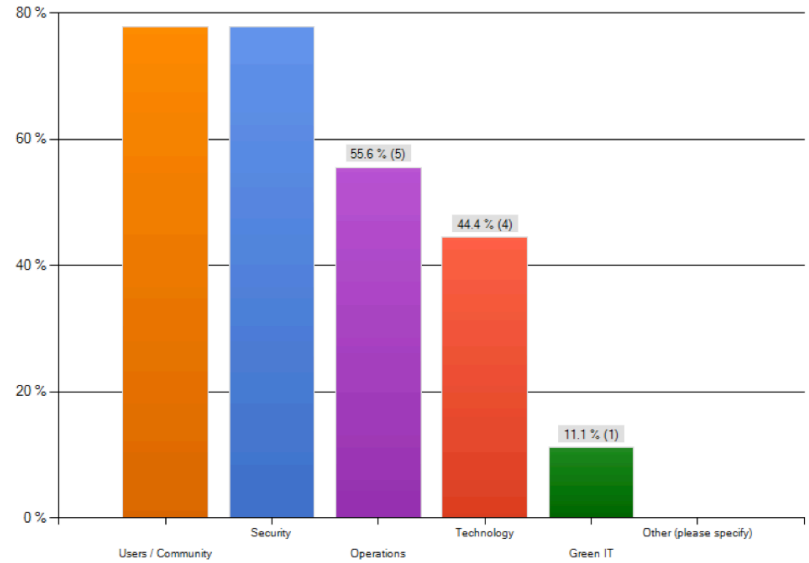


Fig. 6.2.1 – NGIs policy affected areas

7. Outreach and Publications

Eight NGIs provided information about the number of peer-reviewed publications published thanks to work based on work done with the NGI infrastructure. The average number of the publications per NGI is 161, while the median is 67 (Table 7.1.1).

7.1 Publications

Of the respondent NGIs, thirteen publish a regular newsletter, annual report, case studies or booklet (Table 7.2.1).

7.2 Events

Eight NGIs (61.5%) run at least one regular event. The majority organise events in the form of annual scientific events, annual conferences together with training days, summer schools or users conferences (Table 7.3.1).

7.3 Online News Feed, Outreach Materials, Websites and Social Media

Six NGIs (42.9%) publish online news feed (Table 7.4.1) while 69.2% of NGIs (nine) published outreach materials in 2012 (Table 7.4.2). Nine NGIs (64.3%) run their project websites (Table 7.4.3) and seven (28.6%) are active in social media.

8. SERVICES

8.1 Certification Authorities

Fourteen NGIs (100% of respondents) have an internal Certification Authority to issue certificates for users. Twelve NGIs (85.7%) also issue certificates for servers. One NGI (7.1%) issue certificates for code signing, while two NGIs rely on other organisations (e.g. TERENA) for certificate services to users and servers (Fig. 8.1.1 and Table 8.1.1).

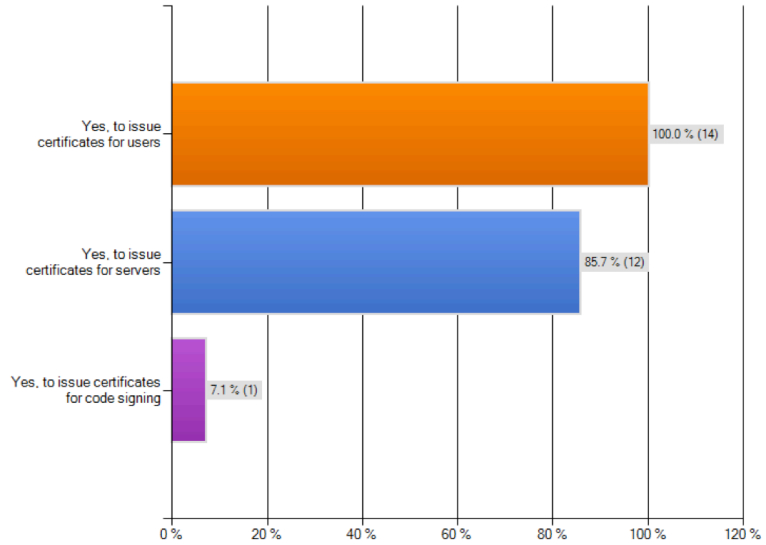


Fig. 8.1.1 – NGI/EIRO internal Certification Authority

8.2 Services for Users

Fourteen NGIs (87.5%) provide data management and job management services to the users. NGIs also provide users with a VO membership service (81.3%), digital certificates services (68.8%) and VO monitoring tools (62.5%). Six of the responding NGIs (37.5%) provide science gateways to the users (Armenia, Finland, Germany, Ireland, Israel, and Netherlands) (Fig. 8.2.1). Other services provided by NGIs include community-tailored services and tools, cloud interfaces and virtual environments, client support on request, helpdesk, BDII, MyProxy, CVMFS and technical coordination between these services and networking activities (user support, training, dissemination) (Table 8.2.1).

8.3 Training

In 2012, the average number of training days for grid end-users or grid operators was 8.8 days. On average, 67.7 grid end-users or operators attended training events during 2012. The biggest number of training days was delivered by Poland (30), who also reported the largest number of trained grid end-users or grid operators – 300 (Table 8.3.1).

8.4 NGI researcher support for commercial cloud services

Only three NGIs (Lithuania, Moldova and Poland) have supported researchers to use commercial cloud services in 2012 including Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS). Poland is supporting researchers free of charge for IaaS and SaaS. Lithuania listed the Open Nebula project as an example (Table 8.4.1).

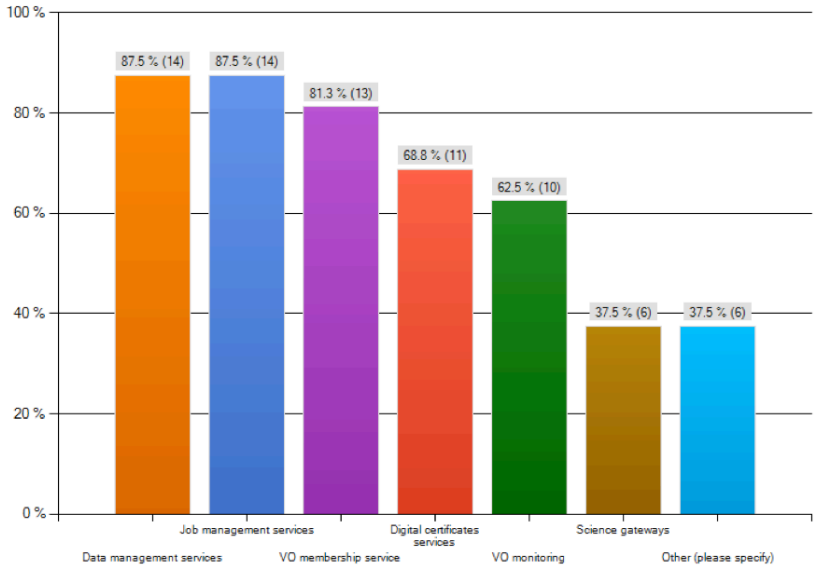


Fig. 8.2.1 – Services provided by the NGI/EIRO to users

9. USERS

9.1 End-users and Virtual Organisations

On average, each NGI has 316.5 grid end-users with valid credentials released by the NGIs at the end of 2012

The average number of VOs supported by NGIs is 34.1 (Fig. 9.1.1).

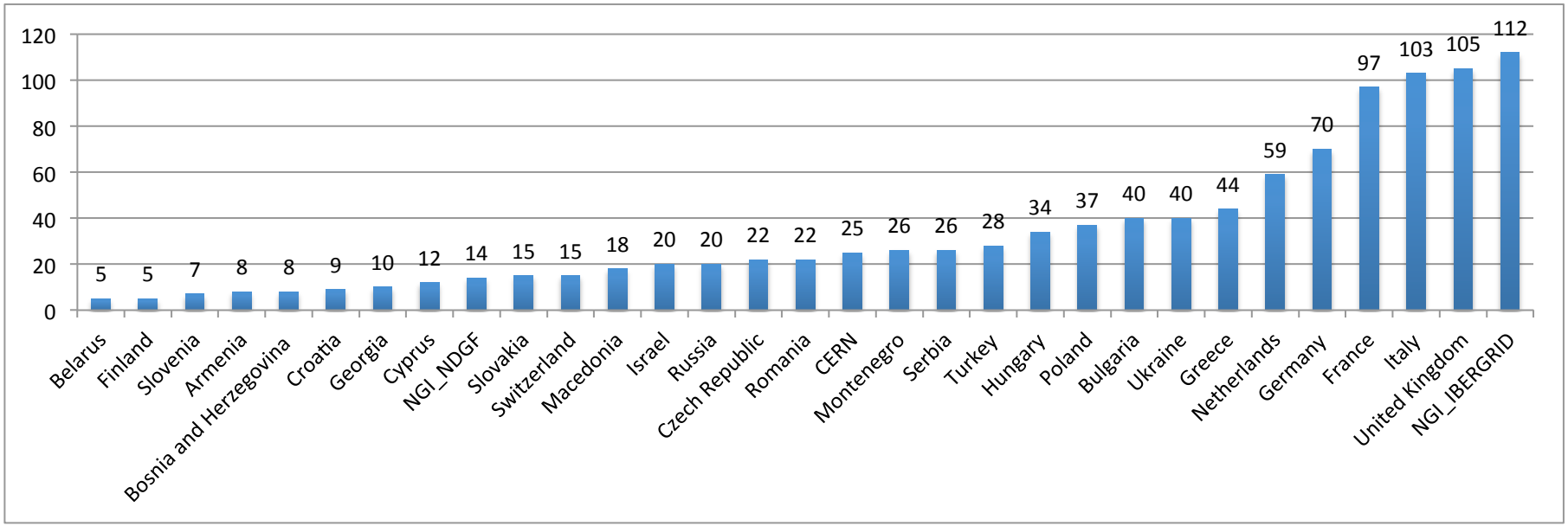


Fig. 9.1.1 – Number of supported VOs per NGI

The top VO by usage (logical CPU wall time) is ATLAS, followed by Alice and CMS (Table 9.1.1)

The usage of the NGI/EIRO infrastructure by non-LHC VOs (percentage on total logical CPU wall time) is on average 11.0%.

9.2 Research Areas

The research areas in which the NGIs are mostly involved are: Computer Science & Mathematics and Life Sciences with 85.7% (twelve NGIs), Multidisciplinary with 78.6% or eleven NGIs, Computational Chemistry and High-Energy Physics both with 71.4% or ten NGIs, Earth Sciences with 57.1% or eight NGIs, Astronomy, Astrophysics and Astro-Particle Physics with 50% (seven NGIs). Finally, other research areas, such as Complex systems, Engineering, Computational Fluid-Solid State Dynamics, Climate/Weather Modelling, Materials, Medical Sciences, Metallurgy, Acoustics, Nanoscience, Material science, Energetics, etc. are supported by 42.9% of NGIs (six NGIs) and Fusion with 14.3% or two NGIs (Fig. 9.2.1, Table 9.2.1)[5].

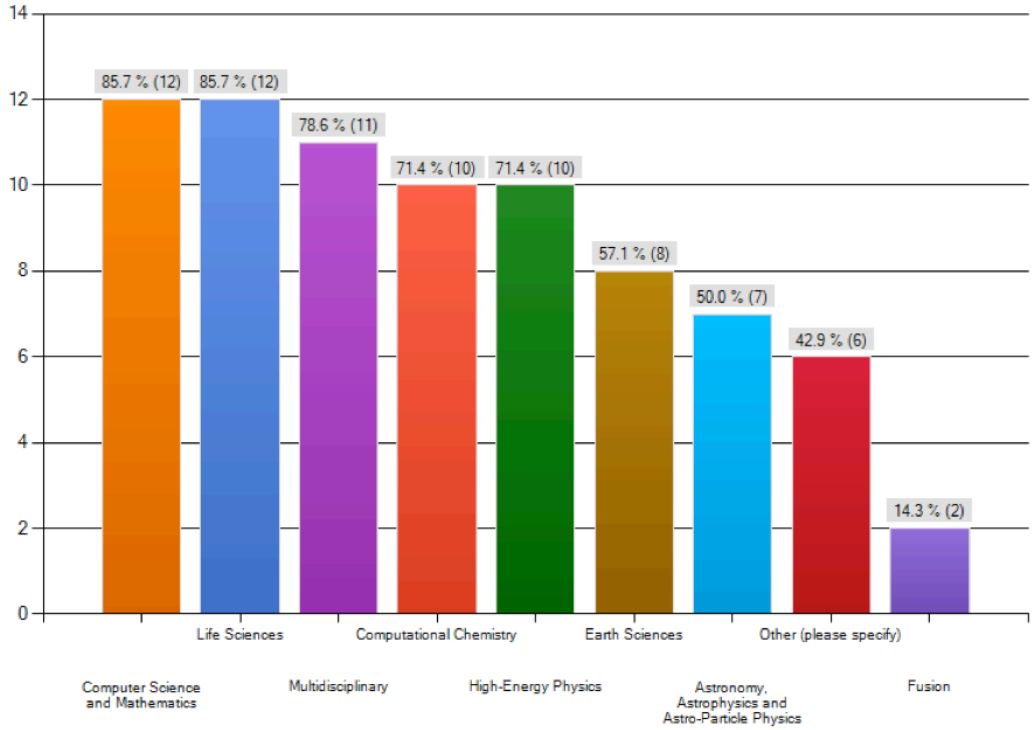


Fig. 9.2.1 – Research areas supported by the NGI/EIRO infrastructure

9.3 Projects

Of the responding NGIs, seven were involved in other projects either directly or indirectly. Five NGIs (Czech Republic, Finland, France, Netherlands and Poland) were involved in ESFRI projects during 2012 (Table 9.3.1).

[5] New scientific discipline classification currently being implemented: http://go.egi.eu/sdc

10. INFRASTRUCTURE

10.1 Resource Centres

According to the data collected for this compendium, the total number of Resource Centres integrated in the EGI infrastructure is 287. Italy is the country with the most Resource Centres (54), followed by IBERGRID (27), the United Kingdom (24) and Germany (19). The average number of Resource Centres per NGI is 8.96 (Fig. 10.1.1, Table 10.1.1).

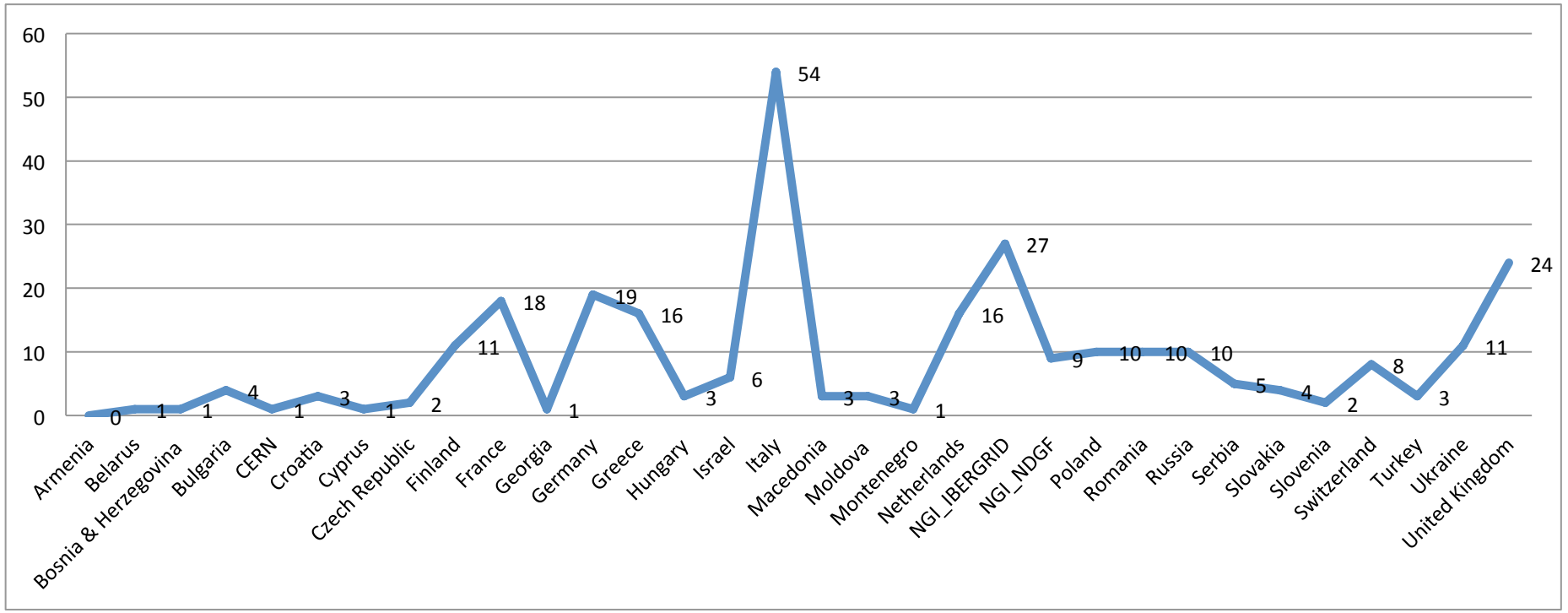


Fig. 10.1.1 – Number of RCs per NGI

10.2 Capacity

EGI's total logical CPU capacity at the end of 2012 was 349,720 cores. This represents an increase of 71,216 cores compared with 2011. 9 NGIs reported an average number of 156.5 cores being used to run virtual machines. The average percentage of usage the logical CPU (core) capacity in 2012 is 63.8%, which is a decrease of 2.8% compared with 2011. Average useful life of a CPU per NGI is 5.4 years.

During 2012, the infrastructure provided an average of 50,256,332 logical CPU hours (wall clock time) (Table 10.2.1)

The total GPUs available via the NGIs infrastructure at the end of 2011 is 410, distributed by ten respondent NGIs. Most of the NGIs do not collect GPU-related statistics.

Three NGIs of affiliated resource centres recycled CPUs or storage devices during 2012.

Four NGIs made acquisition of new hardware in 2012 based on energy efficiency considerations and included solutions based on GPUs & FPGA (Poland), scoring on power consumption in tender process (Netherlands) and E-series Intel CPUs were preferred (Slovakia).

10.3 Storage

The total size of disk storage available via the NGIs infrastructure at the end of 2012 is 396 TB. The median number is 0.4 TB per NGI. The total size of tape storage available via the NGIs at the end of 2012 is 7,193.8 TB per NGI (see Table 10.3.1). The average useful life of tape storage (in years) provided per NGIs is 4.2.

10.4 Resources for EGI Try-Out

For a try-out of the infrastructure, prospective EGI end-users can access logical CPUs and Disk Storage resources, but no Tape Storage (Table 10.4.1). The total CPUs available to new users are 2,566 from eight responding NGIs and 66 TB of Disk Storage provided by five NGIs. Four NGIs stated that they do not have available Tape Storage resources available for prospective users.

The average NGI pool of resources for new users is 320.7 CPUs and 13.20 TB of Disk Storage, compared with 362 CPUs and 23,9 TB of Disk Storage in 2011.

Concerning the amount of resources, the NGI/EIRO is willing to allocate to new users through the EGI federated resource allocation process in 2013, a total of logical CPUs (cores) was 274 from four NGIs, 64 TBs from four NGIs and 0TB of tape storage from three NGIs. The biggest contributor would be Czech Republic with 200 cores and 50TB.

Given the resources available to new users, 50% are owned by affiliated resource centres/institutions (five NGIs), 60% are owned by NGIs (six NGIs) and none of resources are of mixed ownership (see Table 10.4.2).

11. TECHNOLOGY

11.1 Middleware

The most popular category of middleware is the components from the gLite stack, provided by the European Middleware Initiative (EMI) and being deployed by all NGIs (thirty-one NGIs). The second most deployed middleware component is ARC with 19.3% (six NGIs), followed by Globus with 9.7% (three NGIs) and UNICORE with 6.4% (two NGIs). None of the NGIs deployed dCache, StratusLab or EDGI while one NGI (Poland) deployed QosCosGrid (Fig. 11.1.1 and Table 11.1.1).

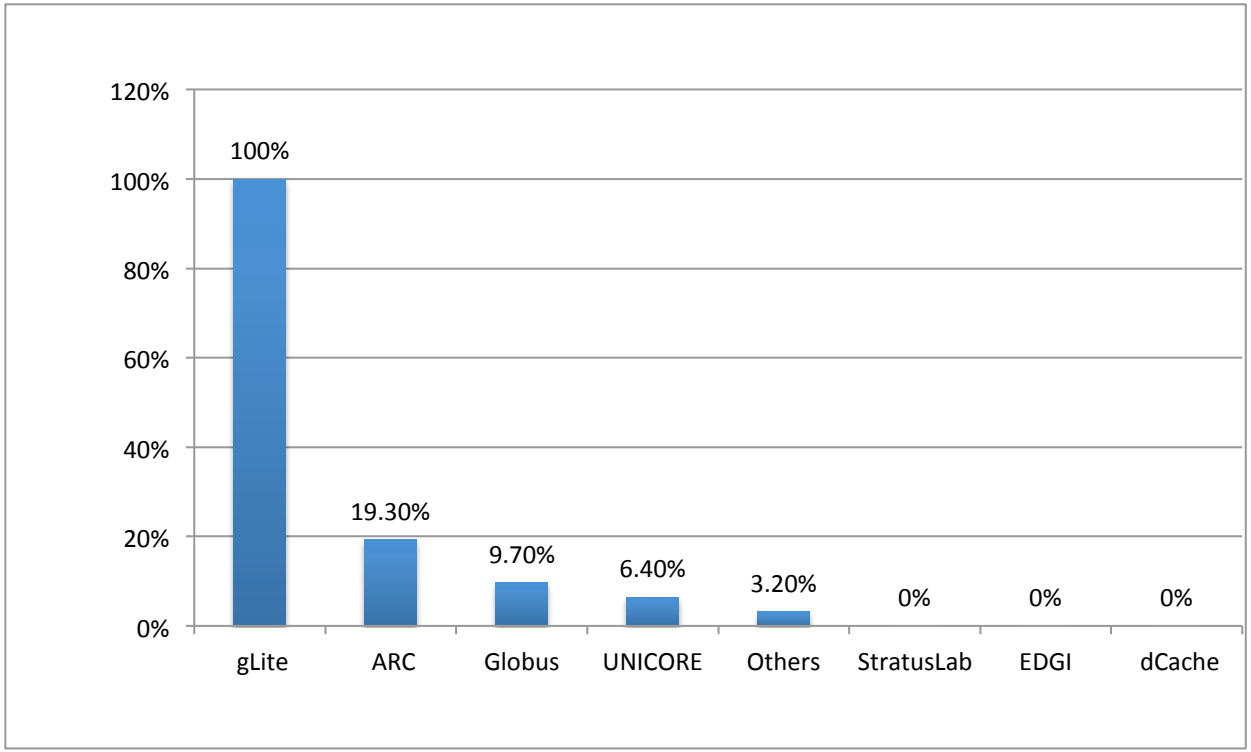


Fig. 11.1.1 – Type of middleware being deployed by NGIs

APPENDIX - TABLES

This section includes the full responses provided by the NGIs. The answers listed below were not edited nor modified during the preparation of the EGI Compendium 2012. The Tables are organised and numbered according to their compendium section.

Chapter 2 - General Information

Table 2.1.1 NGIs that did and did not respond to the EGI Compendium survey

Country	Completed 2012	Completed 2011	Country	Completed 2012	Completed 2011	Country	Completed 2012	Completed 2011
Armenia	✓	✓	Ireland	✗	✓	Serbia	✗	✓
Belgium	✗	✗	Israel	✓	✓	Slovakia	✗	✓
Bosnia & Herz.	✗	✗	Italy	✗	✓	Slovenia	✗	✗
Bulgaria	✓	✗	Latvia	✓	✓	Spain	✗	✓
CERN	✗	✗	Lithuania	✓	✓	Sweden	✗	✗
Croatia	✓	✓	Luxembourg	✗	✓	Switzerland	✗	✓
Cyprus	✓	✓	Macedonia	✗	✓	Turkey	✗	✓
Czech	✓	✓	Moldova	✓	✓	UK	✗	✓
Denmark	✗	✗	Montenegro	✗	✓			
Estonia	✗	✓	Netherlands	✓	✓			
Finland	✓	✓	Norway	✗	✗			
France	✓	✓	Poland	✓	✗			
Germany	✓	✓	Portugal	✗	✓			
Greece	✓	✓	Romania	✗	✓			
Hungary	✗	✓	Russia	✗	✗			

Table 2.1.2 General information about individual NGI including full name and abbreviation both in English and national languages

NGI	Full name of the NGI	The abbreviation of the full name in English of the NGI	Full name and abbreviation of the NGIs in the national language(s)
Armenia	Armenian National Grid Initiative	ArmNGI	«ՀԱՅԿԱԿԱՆ ԱԶԳԱՅԻՆ ԳՐԻԴ ՆԱԽԱՁԵՌՆՈՒԹՅՈՒՆ» ՀԻՄՆԱԴՐԱՄ , ՀԱԳՆ
Bulgaria	Bulgarian Grid Consortium	BGGC	Български Грид Консорциум (БГК)
Croatia	Croatian National Grid Infrastructure	CRO NGI	Hrvatska nacionalna grid infrastruktura, CRO NGI
Cyprus	CyGRID_NGI	CyGrid	CyGRID_NGI
Czech Republic	MetaCentrum	NGI_CZ	-
Estonia	Estonian NGI		Eesti Grid
Finland	Finnish National Grid Initiative	FGI	-
France	France Grilles	FG	France Grilles, FG
Germany	National Grid Initiative for Germany	NGI-DE	Nationale Grid Initiative für Deutschland (NGI-DE)
Greece	Greek Research and Technology Network (HellasGRID)	NGI_GRNET	Εθνικό Δίκτυο Έρευνας και Τεχνολογίας, ΕΔΕΤ
Hungary	Hungarian National Grid Initiative	NGI-HU	Hungarian Magyar (Nemzeti) Grid Iniciativa NGI-HU
Ireland	Grid-Ireland (Grid Ireland National Grid Initiative Ltd.)	G-I (the limited company is GINGI Ltd.; NGI_IE is often used in the EGI context)	English is used nationally. Greille-Éireann G-É
Israel	The Israel National Infrastructure for Grid and Cloud Computing	Isragrid	ישראגריד
Italy	Italian Grid Infrastructure	IGI	Italian Grid Infrastructure (IGI)
Latvia	Grid computing environment: theory, methods, applications	LatGrid	"Grid aprēķinu vide: teorija, metodes, pielietojumi" (Latvijas Grid)
Lithuania	Parallel and distributed computing network of Lithuanian academic institutions	NGI-LT	Lietuvos akademinių institucijų lygiagrečių ir paskirstytų skaičiavimų tinklas
Luxembourg	LUgrid	LUgrid	LUgrid
Macedonia	Macedonian Academic and Research Grid Initiative	MARGI	Македонска академска и истражувачка грид иницијатива
Moldova, Republic of	MD-GRID National Grid Initiative	MD-GRID NGI	MD-GRID Iniţiativă Naţională Grid

NGI	Full name of the NGI	The abbreviation of the full name in English of the NGI	Full name and abbreviation of the NGIs in the national language(s)
Montenegro	NGI Montenegro	NGI_ME	Crnogorska grid inicijativa
Netherlands	BiG Grid – The Dutch e-science grid	BiG Grid	BiG Grid
Poland	PL-Grid Consortium	PL-Grid	Konsorcjum PL-Grid, PL-Grid
Portugal	Portuguese National Grid Initiative	INGRID	-
Romania	National Grid Initiative RoGrid	RoGrid-NGI	Initiativa Nationala Grid RoGrid / RoGrid-NGI
Serbia	Academic and Educational Grid Initiative of Serbia	AEGIS	Akademska i obrazovna Grid inicijativa Srbije, AEGIS
Slovakia	Slovak National Grid Infrastructure SlovakGrid	SlovakGrid	Slovenská gridová iniciatíva SlovakGrid (SlovakGrid)
Spain	ES-NGI Spanish National GRID Initiative	CSIC	Iniciativa Grid Nacional Española
Sweden	Swedish National Infrastructure for Computing	SNIC	-
Switzerland	Swiss National Grid Association	SwiNG	-
Turkey	Turkish Science e-Infrastructure	TRUBA	Türk Ulusal e-Bilim e-Altyapısı, TRUBA
United Kingdom	UK NGI	NGI_UK	-

Table 2.1.3 Website URL of the NGIs

NGI	NGI url	NGI	NGI url
Armenia	www.grid.am	**Lithuania**	www.litgrid.lt
Bulgaria	www.grid.bas.bg/gate/	**Macedonia**	www.margi.ukim.mk
CERN	public.web.cern.ch/public/	**Moldova**	www.grid.md
Croatia	www.cro-ngi.hr	**Montenegro**	www.mren.ac.me (NGI_ME is working under MREN)
Cyprus	http://cygrid.org.cy	**Netherlands**	www.biggrid.nl
Czech Republic	http://metacentrum.cz	**Poland**	http://www.plgrid.pl
Estonia	http://grid.eenet.ee	**Portugal**	www.gridcomputing.pt/

NGI	NGI url	NGI	NGI url
Finland	www.csc.fi/english/collaboration/projects/fgi	**Romania**	www.ici.ro/
France	www.france-grilles.fr/	**Serbia**	www.aegis.rs/
Germany	www.ngi-de.eu/	**Slovakia**	www.slovakgrid.sk
Greece	www.hellasgrid.gr	**Spain**	www.es-ngi.es
Hungary	www.mgkk.hu/ngi_hu	**Sweden**	www.snic.vr.se/
Latvia	http://grid.lumii.lv	**Switzerland**	www.swing-grid.ch/
Lithuania	www.litgrid.lt	**Turkey**	www.truba.gov.tr
Ireland	http://grid.ie/	**United Kingdom**	www.ukngi.ac.uk/
Israel	www.isragrid.org.il		
Italia	www.italiangrid.it		

Table 2.1.4 NGIs member and deputy member of the EGI Council, NGIs International Liaison and deputy

NGI	Member of the EGI Council	Deputy member of the EGI Council	NGI International Liaison	Deputy NGI International Liaison
Armenia	Hrachya Astsatryan	Samvel Haroutiunian	Hrachya Astsatryan	Wahi Narsisian
Bulgaria	Svetozar Margenov	Emanouil Atanassov	Aneta Karaivanova	Todor Gurov
CERN	Robert Jones	David Foster	-	-
Croatia	Ivan Marić	Dobriša Dobrenić	Emir Imamagic	Dobriša Dobrenić
Cyprus	Marios Dikaiakos	George Pallis	Maria Poveda	Marios Dikaiakos
Czech Republic	Jan Gruntorád	Luděk Matyska	Ivana Krenkova	Luděk Matyska
Estonia	Mihkel Kraav	Hardi Teder	Hardi Teder	-
Finland	Per Öster	Pekka Lehtovuori	Jura Tarus	Johanna Lätti
France	Vincent Breton	Laurent Crouzet	Genevieve Romier	
Germany	Dieter Kranzlmüller	Achim Streit	Wilhelm Buehler	Andreas Heiss
Greece	Panagiotis Louridas	Tryfon Chiotis	Kostas Koumantaros	-
Hungary	Tamás Máray	-	Agnes Szeberenyi	-

NGI	Member of the EGI Council	Deputy member of the EGI Council	NGI International Liaison	Deputy NGI International Liaison
Ireland	Brian Coghlan	John Walsh	David O'Callaghan	John Walsh
Israel	Zivan Yoash	Hank Nussbach	Zivan Yoash	Yossef Baruch
Italy	Mirco Mazzucato	-	Daniele Cesini	Alessandro Costantini
Latvia	Inara Opmane	Baiba Kaskina	Baiba Kaskina	Dana Ludviga
Lithuania	Algimantas Juozapavičius	Arunas Stasionis	Jelena Tamuliene	
Luxembourg	Antoine Barthel	Théo Duhautpas	Claude Tompers	-
Macedonia	Boro Jakimovski	Aneta Buckovska	Boro Jakimovski	Anastas Mishev
Moldova	Ion Tighineanu	Peter Bogatencov	Peter Bogatencov	Nicolai Iliuha
Montenegro	Božo Krstajić	Luka Filipović	Božo Krstajić	Luka Filipović
Netherlands	Arjen van Rijn	Patrick Aerts	Coen Schrijvers	
Poland	Michał Turała	Kazimierz Wiatr	Mariusz Sterzel	-
Portugal	Luís Magalhães	Jorge Gomes	Miguel Angel Nuñez-Vega	Gonçalo Borges
Romania	Doina Banciu	-	Monica Anghel	-
Serbia	Aleksandar Belic	Antun Balaz	Antun Balaz	Dusan Vudragovic
Slovakia	Ladislav Hluchý	Miroslav Dobrucký	Ladislav Hluchý	-
Spain	Isabel Campos Plasencia	Victor Castelo	Miguel Angel Nuñez Vega	Gonçalo Borges
Sweden	Sverker Holmgren	-	Mats Nylén	-
Switzerland	Sigve Haug	Christoph Grab	Sergio Maffioletti	Simon Leinen
Turkey	Serkan Orcan	Onur Temizsoylu	Burcu Ortakaya	Onur Temizsoylu
United Kingdom	Matthew Dovey	Neil Geddes	Claire Devereux	John Gordon

Table 2.1.5 NGIs Operations Manager and deputy

NGI	Operations Manager	Operations Manager deputy	NGI	Operations Manager	Operations Manager deputy
Armenia	Hrachya Astsatryan	Wahi Narsisyan	**Luxembourg**	Claude Tompers	-
Croatia	Dobriša Dobrenić	Emir Imamagic	**Macedonian**	Boro Jakimovski	Bozhidar Proevski

NGI	Operations Manager	Operations Manager deputy	NGI	Operations Manager	Operations Manager deputy
Cyprus	Marios Dikaiakos	Andoena Balla	**Moldova**	Pavel Vaseanovici	Peter Bogatencov
Czech Republic	Miroslav Ruda	Jiri Chudoba	**Montenegro**	Luka Filipović	Lidija Milosavljevic
Estonia	Hardi Teder	Tõnu Raitviir	**Netherlands**	Ron Trompert	Luuk Uljee
Finland	Ulf Tigerstedt	Luis Alves	**Poland**	Marcin Radecki	Tadeusz Szymocha
France	Gilles Mathieu	Benjamin Levy	**Romania**	Alexandru Stanciu	Gabriel Neagu
Germany	Dimitri Nilsen	Pavel Weber	**Serbia**	Antun Balaz	Dusan Vudragovic
Hungary	Szabolcs Hernath	Gabor Roczei	**Slovakia**	Ján Astaloš	Miroslav Dobrucký
Ireland	John Walsh	Eamonn Kenny	**Spain**	Carlos Fernandez	Gonçalo Borges, Esteban Freire Garcia
Israel	Zivan Yoash	Yossi Baruch, Arad Alper	**Turkey**	Feyza Eryol	Onur Temizsoylu
Italy	Paolo Veronesi	Alessandro Paolini	**United Kingdom**	Jeremy Coles	Claire Devereux
Lithuania	Rolandas Naujikas	Eduardas Kutka			

Table 2.1.6 Year of establishment of the NGIs and year of start of grid operations

NGI	Year of establishment of the NGI	Year of start of grid Operations started in the NGI country (or EIRO)	NGI	Year of establishment of the NGI	Year of start of grid Operations started in the NGI country (or EIRO)
Armenia	2011	2010	**Greece**	2002	2001
Bulgaria	2002	2004	**Israel**	2010	2004
Croatia	2007	2004	**Latvia**	2006	2006
Cyprus	2010	2002	**Lithuania**	2004	2005
Czech Republic	1996	1996	**Moldova**	2007	2008
Finland	2004	2004	**Netherlands**	2006	2004
France	2010	2004	**Poland**	2007	2001
Germany	2010	1997	**Slovakia**	2005	2002

Table 2.1.7 History of the NGIs as related to the Grid activities or URL to a webpage

NGI	History of the NGIs as related to the Grid activities or URL to a webpage
Armenia	The Armenian National Grid Initiative (ArmNGI) represents an effort to establish a sustainable grid infrastructure in Armenia. Main aims of the initiative are: create a national GRID development policy to build up the national grid infrastructure to expand the high performance computing resources with collaboration of academia and commercial participants to give the information to the national user community about high performance computing, grid infrastructure and international grid projects to improve national applications to participate in the international grid projects actively ArmNGI Partners State Scientific Committee of the Ministry of Education and Science of the Republic of Armenia National Academy of Sciences of the Republic of Armenia State Engineering University of Armenia Yerevan State University Yerevan Physics Institute after A. Alikhanian Institute for Informatics and Automation Problems of the National Academy of Sciences of the Republic of Armenia Armenian e-Science Foundation
Bulgaria	http://www.grid.bas.bg/gate/
Croatia	The poly-project CRO-GRID (composed of projects: Infrastructure, Middleware Systems, Applications) under the auspices and financed by the Ministry of Science, Education and Sports introduced the first grid technologies to Croatia in between 2004 and 2006. One of the results of the CRO-GRID Infrastructure Project led by Srce was the establishment of the first grid infrastructure in Croatia as well as the successful integration with the European grid project EGEE-II. The established grid infrastructure was the basis of CRO NGI. Further information can be found on the following link: http://www.cro-ngi.hr/index.php?id=1396&L=1
Cyprus	LINC took the responsibility to formalise a National body for Grid operations in Cyprus through the concept of a National Grid Initiative (NGI). LINC agreed to establish a framework for research cooperation with key-role partners within the region and Europe. This initiative was consolidated, a few years later, through the signature of a Memorandum of Understanding for collaborative research between the University of Cyprus and the following institutions: 1. Albert-Ludwigs-Universität Freiburg (Germany) 2. Ecole Nationale Supérieure des Mines de St-Etienne (France) 3. University of Nicosia (Cyprus) 4. Ministry of Health - Nicosia General Hospital (Cyprus) 5. CYNET (Cyprus) CyGrid, the Cyprus Grid Collaboration Initiative started activities in 2002, two years later the Cyprus Grid Certification Authority was established. CyGrid operates the Cypriot Grid infrastructure, which comprises clusters with over 140 CPUs and 5.5 TBs of storage.
Czech Republic	http://www.metacentrum.cz/en/about/meta/index.html
Finland	The FGI is the Finnish Grid Infrastructure, a national distributed computing environment and the NGI for Finland. The idea was to join a number of computing clusters at different places, which are logically combined into a grid. The total aggregated peak capacity of the infrastructure is 154 TFlop/s, or which 51 TFlop/s is CPU capacity and 103 TFlop/s is GPGPU capacity. The project originally started in the winter of 2004 resulting in the M-grid, which has been extended in 2011 to form the FGI. The Academy of Finland has participated in the funding through a grant in its FIRI 2010 Infrastructure call. The FGI consists of CSC and the following nine universities: Aalto University, University of Helsinki, Lappeenranta University of Technology, Tampere University of Technology, University of Eastern Finland, University of Jyväskylä, University of Oulu, University of Turku and Åbo Akademi University. The FGI hardware procurement was done in 2011 as a joint effort between the participating universities and CSC. System administration of the clusters/Grid is done in co-operation between CSC and the university partners. The FGI will be available for researchers in early 2012. More details: http://www.csc.fi/english/collaboration/projects/fgi http://www.csc.fi/english/csc/news/news/FGI_procurement

NGI	History of the NGIs as related to the Grid activities or URL to a webpage
Germany	http://www.ngi-de.eu/english/history.php
Israel	Isragrid is the Israeli National Infrastructure for Grid and Cloud Computing. A cooperation between the Ministry of Industry, Trade and Employment and the Israeli Science Academy led to the establishment of Isragrid, operating as a project of the National Infrastructures for R&D Forum (TELEM). The conclusion of establishing Isragrid was the result of a committee composed of subject matter experts from the academy and industry, headed by Mr. Yehuda Zisafel. The goal of the project is to enable an efficient e-Science research in various fields by providing production e-Infrastructure taking advantage of Grid and Cloud computing technologies. Isragrid services include: Grid production infrastructure: • Access to vast amount of Compute/Data resources via EGI (European Grid Infrastructure). • Help with establishing new VO's (Virtual Organisations). • Certificate Authority. User support: • Dedicated technical and information support for Grid users (Helpdesk). • Help with adapting user's applications and tools into the Grid. Training: • Consultation on establishing private Grid Computing environments. • Grid workshops.
Latvia	http://grid.lumii.lv/section/show/9
Lithuania	www.litgrid.lt
Moldova	http://grid.md/projects/ MD-Grid - National Grid Initiative of Moldova was officially inaugurated on the plenary session entitled “National Grid Initiative MD-Grid: presentation and inauguration” of RENAM Users Conference – 2007 on May, 14 2007 after receiving approval letters from Ministry of Information Development of Moldova (http://www.mtic.gov.md/) and the Academy of Sciences of Moldova (http://www.asm.md/). The MD-Grid NGI Consortium governed by RENAM as its Coordinating body and joins 7 partners: research, education and industry institutions that expressed their intent to participate in the processes of National Grid Infrastructure building and using.
Netherlands	2001-2003: Nikhef and SARA in EDG 2004-2010: Nikhef, SARA, RUG and NCF in EGEE-projects 2004-2009: Virtual Lab for e-Science (national project) created proof of concept infrastructure 2003-2006: NWO/NCF: first national grid infrastructure funding (3.3 M euro 2006: NWO/NCF: BiG Grid funded (29 M euro running from 2007 to 2012) >= 2012: SURF to incorporate e-Infrastructure including grid infrastructure; NCF dissolved
Poland	CrossGrid (2002-2005) Project coordinator EGEE Project (2004-2010) -- ROC CE EGI-DS Policy Board (2008-2010) EGI.eu Organisation (2010+) PL-Grid Project (2009-2012) EGI-InSPIRE Project (2010-2014) PLGrid Plus Project (2012-2014) KWF-Grid Project GSLM Project FedSM Project ViroLab Project VPH-Share Project
Turkey	Turkish NGI was established to consolidate and compose independent high performance and grid computing research communities of Turkey in 2003. Participation to the EC funded grid and HPC projects, setting up and operate the large scale grid and HPC sustainable infrastructure through the national budget and expansion of the user community are the main achievements of the NGI.

Chapter 3 - Strategy

Table 3.1.1 NGI Strategy

Country	URL
Czech Republic	It is part of Large Infrastructure project, not public, in Czech language only
Netherlands	BiG Grid proposal 2005 (see www.biggrid.nl)
Turkey	http://www.grid.org.tr/trgridolusumu/politika/TR-Grid_UGO_Strateji.pdf
France	The document is not online.
Bulgaria	It is written in national language

Table 3.2.1 NGI Vision

Country	Vision
Croatia	Those areas are covered in main document of CRO NGI (unfortunately only in Croatian): http://www.cro-ngi.hr/fileadmin/cro-ngi/dokumenti/CRO_NGI_Pravilnik_v1.pdf
Czech Republic	http://www.metacentrum.cz/
Cyprus	CyGRID_NGI carries out preeminent multidisciplinary research activities focusing on parallel and distributed computing, Cloud and Grid computing.
France	http://www.france-grilles.fr/-Presentation-
Israel	Isragrid vision is to interconnect Israeli academic resource centres and federate its Grid/Cloud/HPC services under one user portal.
Lithuania	Possible cooperation of Grid, Cloud and HPC infrastructures is described in a few proposals for example, inter-regional cooperation.
Moldova	To co-ordinate of the implementation of the National Grid Infrastructure and participate in the development of national policies related to data infrastructures for research and innovation (Grid, HPC, Clouds). To support the development and expansion of the existing MD-GRID infrastructure. To unite in Virtual Organisations research teams from various scientific fields having special needs for high performance computing resources and to provide their support and development
Netherlands	Build and operate an ICT infrastructure; Providing access to the infrastructure; Stimulate use of the infrastructure through: suitable hardware and middleware/software environment; support and development effort; dissemination, education and training;
Poland	1) Close cooperation of all five Polish computing Centres in building and development Polish Grid Infrastructure. 2) Support scientific domains by integrating domain specific services and tools within PL-Grid Infrastructure 3) Take part in ERIC on Distributed Computing and Data Infrastructure

Country	Vision
Turkey	To provide required technological, administrative and political frame that will allow the productive and cost efficient usage of computing and data centres by the researchers.

Table 3.2.2 NGI Mission

Country	Mission
Bulgaria	To facilitate the application of Grid technologies within research, educational and governmental institutions. To promote and support the development of the Bulgarian Grid infrastructure and the Bulgarian national research and education network as its solid base. To increase awareness of the scientific community, industry, government and the public about the potential uses and benefits of computational Grids and Clouds. To support development of Grid applications and stimulate collaboration between research communities.
Croatia	Those areas are covered in main document of CRO NGI (only in Croatian): http://www.cro-ngi.hr/fileadmin/cro-ngi/dokumenti/CRO_NGI_Pravilnik_v1.pdf
Czech Republic	http://www.metacentrum.cz/
Cyprus	One of the main objectives of CyGrid is to facilitate access to the massive Grid infrastructure of EGI (European Grid Infrastructure) deployed around the world. The Grid offers access to powerful processing facilities and large storage capabilities. Such facilities may be utilised by users by running their computationally intensive or large data processing applications. It is important to note that applications may originate from Scientific, Educational and even Industrial disciplines. The purpose of CyGrid is to provide the Cyprus scientific community a reliable Grid Infrastructure with access to powerful computing devices and storage facilities, where users can run successfully their application, store and analyse their data. In parallel to the user-centric efforts, CyGrid is also active in taking steps towards expanding the existing infrastructure with the addition of new resource centres Detailed information is made available to assist prospective users as well as resource centres in joining the largest production Grid worldwide. We welcome new applicants to join us our effort for further extending the Grid environment in Cyprus, either as resource centres that will build on the country's existing infrastructure, or as academic/industrial researchers who would like to experience the benefits from deploying their applications on the Grid.
Finland	CSC, as part of the Finnish national research structure, develops and offers high quality information technology services. CSC operational goals are to improve conditions for research and product development in universities, polytechnics, research institutions and commercial life to comply with the information strategy of the Ministry of Education, Science and Culture by providing national services that would be impracticable to establish at the university level to promote collaboration between universities and polytechnics, research institutions and companies that utilise information technology for science to provide internationally competitive supercomputing and data communication services to serve as a pioneer and information provider in the latest information technologies for science.
France	In France, the National Grid Initiative takes the shape of a Scientific Interest Group gathering 8 major research organisations. Operated by CNRS Grid and Cloud Institute, France Grilles oversees the deployment of production grids integrating at a national level distributed computing and storage resources for high throughput data analysis in multiple scientific fields. Identified among the Very Large Research Infrastructures by the French Ministry of Higher Education and Research, France Grilles focuses on responding to the exponentially growing needs of many scientific disciplines for IT resources. France Grilles builds on regional grids for supporting its users and reaching out to all

Country	Mission
	scientific communities. It also coordinates French contribution to the European Grid Initiative.
Germany	The mission of NGI-DE is to provide the reliable access to and the collaborative use of federated IT resources from science communities for science in Germany and worldwide.
Israel	Isragrid aims to facilitate Israel research by providing access to a production quality e-Infrastructure based on Grid/Cloud technologies. The service is provided both for Israeli academy and industry R&D
Lithuania	To serve for large scale computing for the academic institutions; To satisfy needs of researchers and R&D needs of business, via projects..
Moldova	To unite all existing in Moldova computing resources into a common distributed national infrastructures and to provide Moldavian scientists and their international partners with a sustainable, reliable access to e-Infrastructure that can support their needs in specific computational resources for large-scale data analysis.
Netherlands	To realise a national 'world class' ICT infrastructure for scientific research such as particle physics, life sciences and other sciences, including a variety of hardware facilities to enable e-Science.
Poland	Provision of computing and storage resources for scientific communities in Poland together with high quality services and ease their international cooperation. Support for domain specific tools and services tailored to the needs of scientific communities.
Slovakia	The Slovak national grid infrastructure SlovakGrid contributes to the progress of scientific research and development by performing activities to promote grid computation and enable access to enormous European computational and storage resources.
Turkey	To increase the national research capacity as well as collaboration between industry, public and research institutions.

Table 3.2.3 NGI Core Values

Country	Core Values
Bulgaria	1) Research; 2) Reliability; 3) Expertise; 4) Collaboration; 5) Large scale
Cyprus	1) Reliability; 2) Availability; 3) Leadership; 4) Transparency
France	1) Serving the communities; 2) Collaborating with the scientific communities; 3.) Building human networks
Germany	1) German Gründlichkeit (thoroughness); 2) Precision; 3) Openness; 4) Reliability; 5) Innovation
Israel	1) Dedicated service to our customers; 2) flawless execution; 3) honesty and maturity; 4) scale up the status quo; 5) Precision
Lithuania	1) Leadership in Lithuania; 2) Openness; 3) Reliability; 4) Innovation
Moldova	Reliability. To provide a reliable access to national and international e·Infrastructures. To collect user requirements and provide support for the current and potential new user communities. Promotion. To organise dissemination and training events, provides support for users' community in developing and deploying Grid and HPC applications. To monitor the implementation of the new culture in scientific cooperation at the national level, based on sharing both

Country	Core Values
	resources and benefits to achieve common objectives. Propagation. To increase awareness about MD-GRID activities and benefits among potential users. Dissemination of information received from European institutions, which is relevant for the development of the GRID domain. Evolution. To support the development of the MD-GRID integrated project as a consistent and coherent part of the European R&D activity in this field. To encourage and facilitate the involvement of other interested and competent institutions nation wide. To implement of the MD-GRID enlargement mechanism based on the capacity of candidate institutions to promote and fulfil NGI component projects. To represent of the MD-GRID integrated project in the international cooperation, including FP7 European projects.
Netherlands	1) Reliability; 2) Expertise; 3) collaboration and connection; 4) crossing boundaries; 5) large scale
Poland	Stable and reliable infrastructure & support Large set of domain tailored tools & services Diversified resources tailored to users' needs System of computational grants with guarantees Provision of large set of software packages
Turkey	1) Sustainability; 2) Reliability; 3) Integration; 4) Coordination; 5) Leadership

Table 3.3.1 Major changes in 2012 and foreseen changes for the coming year

Country	Major changes in 2012 and foreseen changes for the coming year
Bulgaria	No major changes.
Croatia	During 2012 CRO NGI infrastructure was upgraded with the following resources: - 736 CPU cores - 55 TB of disk space - 36 GPGPU processors.
Cyprus	During 2012 we bought new hardware in order to upgrade our infrastructure with computational power and storage servers. Also we moved all our services to the new middleware EMI, and retired all the services and site that could not run the new middleware.
Czech Republic	* New HW resources (8000 CPUs) * Cloud and virtualisation services in production * New SW available for local NGI users * We gained new resource centres.
Finland	The updated infrastructure was taken into grid use in 2012.
France	During 2012 a strategy document has been written and validated by the Scientific Interest Group partners. Foreseen organisation of a national cloud federation.
Israel	2011 was a critical year for our NGI as it was the year in which the NGI was re-organised and "rebuilt from scratch". New team members, new equipment and new technologies were introduced. More than 50 active R&D users were added during this period, some of the case studies can be found here: https://www.isragrid.org.il/case_studies. 2012 new team members, new Services and technologies were introduced. Isragrid supports more than 120 R&D users and still growing.

Country	Major changes in 2012 and foreseen changes for the coming year
Lithuania	Major technology upgrades for Lithuanian infrastructure; Increasing number of users.
Moldova	Transferring of GRID-sites on the virtualisation platforms. Increase of stability. Improving monitoring - Nagios upgrades. Upgrade to EMI 2. Preparation of new two sites for introducing additional resources to NGI users.
Netherlands	Most important was the transition to bringing all e-Infrastructure provisioning, including all of BiG Grid under the SURF umbrella. The year 2012 concerned intensive preparations of this transition. In 2013 the transition will be completed.
Poland	System of computational grants has been deployed and is used on daily basis by users. The resources available for users have been enriched. We have started a pilot cloud infrastructure. Test versions of community tailored services have been implemented.
Slovakia	There were no major changes in 2012. In 2013 there will be major upgrade in computing and storage capacity of current sites and we expect that new sites will join the NGI infrastructure.

Chapter 4 - Governance

Table 4.1.1 Type of organisation and duration of legal agreement

Country	Legal national entity (for profit)/ Legal national entity (non-profit)/ Group of interest (not a legal entity)	Duration of legal agreement
Armenia	Legal national entity (non-profit)	unlimited
Bulgaria	Legal international entity (for profit) – BGGC is a consortium of legal entities (based on MoA for membership signed by all partners) and represented by IICT-BAS	unlimited
Croatia	Legal national entity (non-profit)	unlimited
Cyprus	Group of interest (not a legal entity)	unlimited
Czech Republic	Legal national entity (non-profit)	unlimited
Finland	Group of interest (not a legal entity)	unlimited
France	Group of interest (not a legal entity) – FG is a consortium of legal entities, operated by the IdGC (Grid and Cloud Institute), a service unit of the CNRS (French RPO)	not a legal organisation
Germany	Group of interest (not a legal entity) – NGI-DE works on behalf of the Gauß-Allianz e.V. (registered association)	unlimited
Israel	Legal national entity (non-profit)	not a legal organisation
Latvia	Group of interest (not a legal entity) – No plans, no support from government.	
Lithuania	Group of interest (not a legal entity) – In two years.	not a legal organisation
Moldova	Group of interest (not a legal entity. – Discussions on NGI transformation to new legal entity with main national authorities responsible on e-Infrastructure development have started in 2011. The status of the negotiation is that it's planned to establish new legal entity not earlier then in 2014 under umbrella of the Academy of Sciences of Moldova and coordination of the Ministry of Information Technologies and Communications.	unlimited
Netherlands	Legal national entity (non-profit) – BiG Grid runs officially until end 2012.	Limited; 2012
Poland	Legal national entity (non-profit)	unlimited
Slovakia	Group of interest (not a legal entity)	not a legal organisation
Turkey	Legal national entity (non- profit)	unlimited

Table 4.2.1 NGIs roles

Country	National coordinating body	Resource Infrastructure Provider	Resource Centre	Technology Provider	Platform Integrator	Platform Operator
Armenia	✓	✓	✓	✗	✗	✓
Bulgaria	✓	✓	✓	✗	✗	✗
Croatia	✓	✓	✗	✗	✗	✗
Cyprus	✓	✓	✓	✓	✓	✓
Czech Republic	✓	✗	✗	✓	✓	✓
Finland	✓	✓	✓	✓	✓	✓
France	✓	✗	✗	✗	✗	✗
Germany	✓	✓	✗	✗	✗	✗
Israel	✓	✓	✗	✗	✗	✗
Latvia	✓	✓	✓	✓	✓	✓
Lithuania	✓	✓	✗	✗	✗	✗
Moldova	✓	✓	✓	✓	✗	✗
Netherlands	✓	✓	✓	✓	✓	✓
Poland	✓	✓	✗	✓	✓	✓
Slovakia	✓	✓	✓	✗	✗	✗
Turkey	✓	✓	✓	✗	✗	✗

Table 4.3.1 Membership of the EGI Council

Country	Participant / Associate Participant	Organisation representing NGI in the EGI Council	Lead Organisation	Number of member institutions	Name of governing body
Armenia	Participant	-	Institute for Informatics and Automation Problems of the National Academy of Sciences of the Republic of Armenia	7	Council

Country	Participant / Associate Participant	Organisation representing NGI in the EGI Council	Lead Organisation	Number of member institutions	Name of governing body
Bulgaria	Participant	IICT-BAS	IICT-BAS	14	Council of representatives
Croatia	Participant	SRCE	SRCE	8	Council of Partners of CRO NG
Cyprus	Participant	University of Cyprus	University of Cyprus	1	-
Czech Republic	Participant	CESNET	CESNET	27	general assembly (general meeting of stakeholders)
Finland	Participant	CSC - IT Center for Science, Ltd.	CSC - IT Center for Science, Ltd.	10	FGI Board
France	Participant	CNRS	CNRS	8	Conseil de Groupement
Germany	Participant	Gauß-Allianz e.V.	Karlsruhe Institute for Technology (KIT)	9	JRU-Leitung
Israel	Participant		IUCC --	8	
Latvia	Participant	Institute of Mathematics and Computer Science, University of Latvia (IMCS UL)	Institute of Mathematics and Computer Science, University of Latvia (IMCS UL)	2	Institute of Mathematics and Computer Science, University of Latvia (IMCS UL)
Lithuania	Associate participant	Vilnius University	VU Faculty of Mathematics and Informatics	4	NGI.Lt
Moldova	Associate participant	RENAM (Research and Educational Networking Association of Moldova)	RENAM (Research and Educational Networking Association of Moldova)	7	MD-GRID NGI Executive Committee
Netherlands	Participant	NWO (formerly NCF)	NCF is the spokesperson for the organisation	6	BiG Grid directorate and Supervisory Council
Poland	Participant	ACC Cyfronet AGH	ACC Cyfronet AGH	5	PL-Grid Council
Slovakia	Participant	IISAS	IISAS	17	the coordinator

Country	Participant / Associate Participant	Organisation representing NGI in the EGI Council	Lead Organisation	Number of member institutions	Name of governing body
Turkey	Participant	TUBITAK ULAKBIM	TUBITAK ULAKBIM	12	TUBITAK ULAKBIM

Table 4.4.1 Types of stakeholders represented in NGI governing body

Country	Academic institutions	Research Institutes	National Government	Industry	Resource Centres	User Communities	VOs	Intergov'tal Organisations	Others
Armenia	✓	✓	✓	✗	✓	✗	✗	✗	✗
Bulgaria	✓	✓	✗	✗	✗	✗	✗	✗	✗
Croatia	✓	✓	✓	✗	✓	✓	✗	✗	✗
Cyprus	✓	✗	✗	✗	✗	✗	✗	✗	✗
Czech Republic	✓	✓	✗	✗	✗	✗	✗	✗	✗
Finland	✓	✓	✓	✓	✗	✗	✗	✗	✗
France	✓	✓	✓	✗	✗	✗	✗	✗	NREN (RENATER)
Germany	✓	✓	✗	✗	✗	✗	✗	✗	D-Grid GmbH, DFN e.V.
Israel	✓	✗	✗	✓	✗	✗	✗	✗	✗
Latvia	✓	✓	✗	✗	✗	✗	✗	✗	✗
Lithuania	✓	✓	✗	✗	✗	✗	✗	✗	✗
Moldova	✓	✓	✗	✓	✗	✓	✗	✗	✗
Netherlands	✓	✓	✗	✗	✗	✗	✗	✗	✗
Poland	✓	✓	✗	✗	✓	✗	✗	✗	✗
Slovakia	✓	✗	✗	✗	✗	✗	✗	✗	✗
Turkey	✗	✗	✓	✗	✗	✗	✗	✗	✗

Table 4.4.2 Types of stakeholders represented in NGI advisory body

Country	Academic institutions	Research Institutes	National Government	Industry	Resource Centres	User Communities	VOs	Intergov'tal Organisations	Others
Armenia	✓	✓	✓	✗	✓	✗	✗	✗	✗
Croatia	✗	✗	✗	✗	✗	✓	✗	✗	Government and universities representatives
Czech Republic	✗	✗	✗	✗	✗	✓	✗	✗	✗
France	✗	✗	✗	✗	✗	✓	✗	✗	EGI.eu, Members of other NGIs
Germany	✗	✗	✗	✗	✗	✓	✗	✗	✗
Moldova	✓	✓	✗	✓	✗	✗	✗	✗	✗
Poland	✓	✓	✗	✗	✓	✓	✓	✗	✗
Turkey	✓	✗	✓	✓	✓	✗	✗	✗	✗

Table 4.5.1 Relationship with Government and Governance Model

Country	Type of relation has the NGI with the national government	Web page describing the governance model
Armenia	Direct/Formal (e.g. board member; contact with Ministry)	-
Bulgaria	Informal/Indirect (e.g. gov't liaison; proposals; tenders)	-
Croatia	Direct/Formal (e.g. board member; contact with Ministry)	http://www.cro-ngi.hr/index.php?id=1580&L=1
Cyprus	Non existent	-
Czech Republic	Informal/Indirect (e.g. gov't liaison; proposals; tenders)	-
Finland	Direct/Formal (e.g. board member; contact with Ministry)	-
France	Direct/Formal (e.g. board member; contact with Ministry)	http://www.france-grilles.fr/Organigramme-France-Grilles
Germany	Informal/Indirect (e.g. gov't liaison; proposals; tenders)	-
Israel	Direct/Formal (e.g. board member; contact with Ministry)	www.isragrid.org.il
Latvia	Non existent	-
Lithuania	Informal/Indirect (e.g. gov't liaison; proposals; tenders)	-

Country	Type of relation has the NGI with the national government	Web page describing the governance model
Moldova	Other (please specify) - The Academy of Sciences and the Ministry of Information Technologies and Communications are represented in RENAM Coordinating Council and participating in NGI annual reports negotiation.	http://grid.md/contact-us/grid-management/
Netherlands	Other (please specify) - Via SURF and NWO	http://www.biggrid.nl/about-big-grid/organization/
Poland	Direct/Formal (e.g. board member; contact with Ministry)	http://projekt.plgrid.pl/en/project/partners
Slovakia	Informal/Indirect (e.g. gov't liaison; proposals; tenders)	-
Turkey	Hierarchical (e.g. you are subordinate to a responsible government body)	-

Chapter 5 - Funding and Staffing

Table 5.1.1. Funding sources for individual NGIs

Country	National Public Funding	European Public Funding	Institutes	Paying Users	Membership Fees	Private Investments	Donations	Royalties	Others
Armenia	✓	✓	✗	✗	✗	✗	✗	✗	✗
Croatia	✓	✗	✗	✗	✗	✗	✗	✗	✗
Cyprus	✓	✓	✗	✗	✗	✗	✗	✗	✗
Czech Republic	✓	✓	✗	✗	✓	✗	✗	✗	✗
Finland	✓	✓	✓	✓	✗	✗	✗	✗	✗
France	✓	✗	✗	✗	✗	✗	✗	✗	✗
Israel	✓	✓	✓	✗	✗	✗	✗	✗	✗
Latvia	✗	✓	✓	✗	✗	✗	✗	✗	✗
Lithuania	✗	✗	✗	✗	✗	✗	✗	✗	Support from projects
Moldova	✓	✗	✓	✗	✗	✗	✗	✗	✗
Netherlands	✓	✗	✓	✗	✗	✓	✗	✗	✗
Poland	✓	✓	✗	✗	✗	✗	✗	✗	✗
Turkey	✓	✓	✗	✓	✗	✗	✗	✗	✗

Table 5.1.2 Funding types for individual NGI

Country	Project based	Recurrent from funding organisations	Direct charge of services to users	Subscription fee from user communities	Subscription fee from resource centres	Others
Armenia	✓	✗	✗	✗	✗	✗
Croatia	✗	✓	✗	✗	✗	✗
Cyprus	✓	✗	✗	✗	✗	✗
Czech Republic	✓	✓	✗	✗	✗	✗

Country	Project based	Recurrent from funding organisations	Direct charge of services to users	Subscription fee from user communities	Subscription fee from resource centres	Others
Finland	✓	✓	✗	✗	✗	✗
Israel	✗	✓	✗	✗	✗	✗
Lithuania	✓	✗	✗	✗	✗	✗
Moldova	✓	✓	✗	✗	✗	✗
Netherlands	✓	✓	✗	✗	✗	Funding is in the process of becoming recurrent. Parts of the NGI's investments and running costs in 2012 have already been funded from recurrent funds from SARA.
Poland	✓	✗	✗	✗	✗	✗
Turkey	✓	✗	✓	✗	✗	✗

Table 5.2.1 Funding sources for NGIs as e-Infrastructures

Country	National Public Funding	European Public Funding	Institutes	Paying Users	Membership Fees	Private Investments	Donations	Royalties	Others
Armenia	✗	✓	✗	✗	✗	✗	✗	✗	✗
Croatia	✓	✗	✗	✗	✗	✗	✗	✗	✗
Cyprus	✓	✓	✗	✗	✗	✗	✗	✗	✗
Czech Republic	✓	✓	✗	✗	✓	✗	✗	✗	✗
Finland	✓	✓	✗	✗	✗	✗	✗	✗	✗
France	✓	✓	✓	✗	✗	✗	✗	✗	✗
Israel	✓	✓	✓	✗	✗	✗	✗	✗	✗
Latvia	✗	✓	✓	✗	✗	✗	✗	✗	✗
Lithuania	✗	✗	✓	✗	✗	✗	✗	✗	✗
Moldova	✓	✓	✓	✗	✗	✗	✗	✗	✗
Netherlands	✓	✓	✗	✗	✗	✓	✗	✗	✗

Country	National Public Funding	European Public Funding	Institutes	Paying Users	Membership Fees	Private Investments	Donations	Royalties	Others
Poland	✓	✓	✗	✗	✗	✗	✗	✗	✗
Slovakia	✓	✓	✓	✗	✗	✗	✗	✗	✗
Turkey	✓	✗	✗	✓	✗	✗	✗	✗	✗

Table 5.2.2 Funding types for NGIs as infrastructures

Country	Project based	Recurrent from funding organisations	Direct charge of services to users	Subscription fee from user communities	Subscription fee from resource centres	Others
Armenia	✓	✗	✗	✗	✗	✗
Croatia	✗	✓	✗	✗	✗	✗
Cyprus	✓	✗	✗	✗	✗	✗
Czech Republic	✓	✓	✗	✗	✗	✗
Finland	✓	✓	✗	✗	✗	✗
France	✓	✓	✗	✗	✗	✗
Israel	✗	✓	✗	✗	✗	✗
Latvia	✓	✗	✗	✗	✗	✗
Lithuania	✗	✓	✗	✗	✗	✗
Moldova	✓	✓	✗	✗	✗	✗
Netherlands	✓	✓	✗	✗	✗	Structural funding has been arranged from 2013 and onwards. Some recurrent funding has appeared already in 2012.
Poland	✓	✗	✗	✗	✗	✗
Slovakia	✓	✗	✗	✗	✗	✗
Turkey	✓	✗	✓	✗	✗	✗

Chapter 6 - Policy

Table 6.1.1 Resource Allocation model

Country	Resource Allocation model
Croatia	We use fair share model for allocating all resources.
Cyprus	For new user communities applying for resources in CyGRID, firstly, a certificate is created for the users and then, they are subscribed to the corresponding VO supporting their application. If the application is not supported in any VO, the user will join the SEE VO and the application will be installed in our clusters. No financials are involved.
Czech Republic	Best effort, priorities for ESFRI projects – prioritisation also related to the scientific outcome of individuals & research teams
France	Existing communities access resources on existing VOs. New communities access seed resources through regional grid initiatives and larger resources on the national France-Grilles VO
Germany	The resource owners decide about the usage of their resources. NGI-DE only moderates between owners and users.
Lithuania	User must register for resource allocation.
Moldova	New or existing users with new application apply for resources allocation through his institution manager. Application description must be prepared in accordance with recommended by MD-Grid NGI form. Filled form submitted to MD-Grid NGI Executive Board for acceptance.
Netherlands	Central application at BiG Grid NGI, no cost model for users.
Poland	We have designed, developed and deployed system of computational grants with guarantees.
Turkey	Dedicated resources for TUBITAK and national research projects. Shared queue of remaining resources, which is open to all individual national researchers.

Table 6.2.1 NGI National Policies

Country	National policies
Czech Republic	National users are required to acknowledge usage of the NGI infrastructure in their publications
Finland	At least 20% of the computing resources must be available to Grid Jobs. Resources are available to researchers affiliated to Finnish Universities or Research groups.
Germany	If German law requires different policies.
Poland	Users connected with Polish science can be members of PL-Grid Infrastructure and have full access to resources. International VOs can gain access to the resources via cooperation with Polish scientists
Netherlands	AUP and EULA (on user behaviour, responsibilities and disclaimers)

Table 6.2.2 NGI Webpages with the list of policies/procedures

Country	Webpage with the list of policies/procedures
Croatia	http://www.cro-ngi.hr/fileadmin/cro-ngi/dokumenti/CRO_NGI_Pravilnik_v1.pdf
Cyprus	http://www.cygrid.org.cy/certification.php
Czech Republic	https://meta.cesnet.cz/wiki/MetaVO_usage_rules plus policies of each VO
Germany	http://www.ngi-de.eu/english/policies.php
Lithuania	http://mif.vu.lt/cluster/
Poland	Internal pages, user's login required

Chapter 7 - Outreach and Publications

Table 7.1.1 Recorded Peer-reviewed scientific publications

Country	Recorded Peer-reviewed scientific publications
Czech Republic	80
Cyprus	2
France	532
Lithuania	10
Moldova	8
Netherlands	200
Poland	500
Turkey	54

Table 7.2.1 NGI regular newsletter/annual report/case study/book

Country	Regular newsletter/annual report/case study/book
Croatia	NGI publishes monthly reports to users: http://www.cro-ngi.hr/izvjestaji/
France	Regular newsletter in French (http://www.france-grilles.fr/-FG-Info-Express-?lang=en) articles/posters and slides of the annual scientific day (http://mesogrilles2012.sciencesconf.org/)
Latvia	liste@grid.latnet.lv (news are sent in Latvian)
Poland	http://www.plgrid.pl/projekty/plus/materialy_promocyjne/newsletter http://www.springer.com/computer/communication+networks/book/978-3-642-28266-9

Table 7.3.1 NGI Events

Country	Events
Croatia	NGI organises annual one day event "e-Infrastructure Day": http://www.cro-ngi.hr/dan/2012/
Cyprus	Training, Grid Day, Researchers Night, http://www.cygrid.org.cy/events.php
Czech Republic	http://metavo.metacentrum.cz/cs/seminars/index.html
France	Annual scientific day (http://mesogrilles2012.sciencesconf.org/) operations workshops and technical cloud days (twice a year)

Country	Events
Moldova	NGI is one of principal organisers (together with Institute of Mathematics and Computer Science, Institute of Informational Society Developments and eGovernment Center) of the circle of national level seminars dedicated to use modern computational infrastructures; http://www.grid.md/event
Netherlands	http://www.biggrid.nl/news-events/ http://sara.nl/news/ http://www.nikhef.nl/generalstorage/tt-news/evenementen/ http://www.esciencecenter.com/agenda/ http://www.nbic.nl/about-nbic/events/all-events/ http://www.ebiogrid.nl/
Poland	Workshop, two times a year. Internal www pages only. International conference "Cracow Grid Workshop"
Turkey	National High Performance Computing Conference http://www.basarim.org.tr

Table 7.4.1 Online news Feed

Country	Events
Cyprus	http://www.cygrid.org.cy/events.php
Czech Republic	metavo.metacentrum.cz
France	http://www.france-grilles.fr/spip.php?page=backend currently only in French
Latvia	grid.lumii.lv
Moldova	http://grid.md/events/
Poland	http://www.plgrid.pl/news http://www.plgrid.pl/en/news
Turkey	National High Performance Computing Conference http://www.basarim.org.tr

Table 7.4.2 Outreach Materials

Country	Events
Croatia	NGI publishes monthly reports to users: http://www.cro-ngi.hr/izvjestaji/
Cyprus	Poster, Brochure
Czech Republic	http://www.cesnet.cz/sdruzeni/dokumenty/zpravy-o-reseni-velkych-projektu/
Finland	Leaflets and brochures
France	Leaflets
Lithuania	Brochures and annual report.
Netherlands	annual report

Country	Events
Poland	http://www.plgrid.pl/en/projects/plus/promotional_materials http://www.youtube.com/watch?feature=player_embedded&v=DSEXnR2nj5w
Slovakia	Annual reports sent to the ministry to support the requests of yearly participation fees to EGI.eu.

Table 7.4.3 Project websites

Country	URL
Bulgaria	http://www.grid.bas.bg/gate/index.php?option=com_content&view=article&id=91&Itemid=69
Croatia	http://www.cro-ngi.hr/
Cyprus	http://www.cygrid.org.cy/index.php http://grid.ucy.ac.cy/index.php/projects
Czech Republic	http://www.metacentrum.cz/en/index.html
Finland	http://fgi.csc.fi
France	http://envri.eu/ http://creative-b.eu/ stratuslab.eu
Latvia	grid.lumii.lv
Netherlands	www.biggrid.nl www.ebiogrid.nl
Poland	http://www.plgrid.pl/en/projects

Chapter 8 - Services

Table 8.1.1 Certification Authorities

Country	Issuing certificates for users	Issuing certificates for code servers	Issuing certificates for code signing	Other
Armenia	✓	✓	✗	✗
Bulgaria	✓	✓	✗	✗
Croatia	✓	✓	✗	✗
Cyprus	✓	✗	✗	✗
Czech Republic	✓	✓	✗	we arrange TERENA TCS certificate for users and servers
Finland	✗	✗	✗	We use the TERENA model and also the NorduGrid CA
France	✓	✓	✗	The CA is provided by CNRS and RENATE
Germany	✗	✗	✗	CA are operated by KIT and DFN for users, servers and code signing
Israel	✓	✓	✗	✗
Latvia	✓	✓	✗	✗
Lithuania	✓	✗	✗	✗
Moldova	✓	✓	✗	✗
Netherlands	✓	✓	✓	✗
Poland	✓	✓	✗	✗
Slovakia	✓	✓	✗	✗
Turkey	✓	✓	✗	✗

Table 8.2.1 NGI Services

Country	Data management services	Job management services	VO membership service	Digital certificates services	VO monitoring	Science gateways	Others
Armenia	✓	✓	✓	✓	✗	✓	✗
Bulgaria	✓	✓	✓	✗	✓	✗	✗
Croatia	✓	✓	✗	✗	✗	✗	BDII, MyProxy
Cyprus	✓	✓	✓	✓	✗	✗	✗
Czech Republic	✓	✓	✓	✓	✓	✗	cloud interfaces and virtual environment
Finland	✓	✓	✓	✗	✓	✓	✗
France	✓	✓	✓	✓	✓	✗	The services are provided by the resource centres financed by the communities. France Grilles provides the technical coordination between these services and runs networking activities (user support, training, dissemination)
Germany	✓	✓	✓	✗	✓	✓	Helpdesk
Israel	✓	✗	✓	✓	✓	✓	✗
Latvia	✗	✗	✗	✓	✗	✗	Client support on request
Lithuania	✓	✓	✗	✗	✓	✗	✗
Moldova	✗	✓	✓	✓	✓	✗	✗
Netherlands	✓	✓	✓	✓	✗	✓	
Poland	✓	✓	✓	✓	✓	✓	Community tailored services and tools.
Slovakia	✓	✓	✓	✓	✗	✗	✗
Turkey	✓	✓	✓	✓	✓	✗	✗

Table 8.3.1 NGI Training Days and attendants (end-users and operators)

Country	Number of training days	Number of attendants
Armenia	4	20
Bulgaria	2	20

Country	Number of training days	Number of attendants
Croatia	0	0
Cyprus	8	23
Czech Republic	12	150
Finland	7	139
France	12	66
Germany	5	100
Israel	10	3
Lithuania	16	15
Moldova	8	62
Netherlands	10	50
Poland	30	300
Slovakia	0	0

Table 8.4.1 NGIs support researchers to use commercial cloud services

Country	IaaS	PaaS	SaaS	Other
Lithuania	✓	✓	✓	Open Nebula
Moldova	✓	✓	✓	✗
Poland	✓ Free of charge	✓	✓ Free of charge	✗

Chapter 9 - Users

Table 9.1.1 Users and VOs

Country / EIRO	Number of end-users with valid credentials	Number of VOs	Top three VOs by usage (logical CPU walltime)
Armenia	✗	8	alice, atlas, envirogrids.vo.eu-egee.org
Belarus		5	cms, belarus, balticgrid
Bosnia & Herzegovina	✗	8	seegrid
Bulgaria	60	40	biomed, lhcb, see
CERN	✗	25	alice, atlas, cms
Croatia	75	9	biomed, voce, lhcb
Cyprus	31	12	biomed, see, lhcb
Czech Republic	800	22	atlas, alice, auger
Finland	168	5	✗
France	989	97	atlas, cms, alice
Georgia	✗	10	seegrid
Germany	1500	70	atlas, cms, alice
Greece	✗	44	compchem, cms, biomed
Hungary	✗	34	cms, alice, vo.edges-grid.eu
Israel	82	20	atlas, lhcb, ilc
Italy	✗	103	cms, atlas, alice
Latvia	15	✗	balticgrid, ops
Lithuania	20	2	gamess, balticgrid
Macedonia	✗	18	biomed, see, seegrid
Moldova	12	7	biomed
Montenegro	✗	26	
Netherlands	✗	59	atlas, cms, lhcb
NGI_NDGF	✗	14	atlas, cms, alice

Country / EIRO	Number of end-users with valid credentials	Number of VOs	Top three VOs by usage (logical CPU walltime)
Poland	1000	37	alice, atlas, cms
NGI_IBERGRID	✗	112	atlas, cms, lhcb
Romania	✗	22	alice, atlas, lhcb
Russia	✗	20	atlas, alice, cms
Serbia	✗	26	see, vo.edges-grid.eu, aegis
Slovakia	42	15	alice, voce, esr
Slovenia	✗	7	atlas, C, gen.vo.sling.si
Switzerland	✗	15	atlas, cms, lhcb
Turkey	821	28	atlas, cms, biomed
Ukraine	✗	40	cms, alice, atlas
United Kingdom	✗	105	atlas, cms, lhcb

Table 9.2.1 Research Areas. AAA = Astronomy, Astrophysics and Astro-Particle Physics; CC = Computational Chemistry; CSM = Computer Science and Mathematics; ES = Earth Sciences; F = Fusion; HEP = High-Energy Physics; LS = Life Sciences; M = Multidisciplinary

Country	AAA	CC	CSM	ES	F	HEP	LS	M	Others
Armenia	✓	✓	✓	✓	✗	✓	✓	✓	✗
Croatia	✗	✓	✓	✗	✗	✓	✓	✓	✗
Cyprus	✗	✓	✓	✓	✓	✓	✓	✓	✗
Czech Republic	✓	✓	✓	✓	✗	✓	✓	✓	Only subset of VOs is visible in EGI, remaining are supported on national level
Finland	✗	✓	✓	✗	✗	✓	✓	✓	✗
France	✓	✓	✓	✓	✓	✓	✓	✓	Complex systems
Israel	✗	✗	✗	✗	✗	✗	✓	✓	✗
Latvia	✗	✓	✓	✗	✗	✗	✗	✗	Engineering
Lithuania	✓	✓	✓	✗	✗	✗	✓	✗	✗
Moldova	✗	✗	✓	✗	✗	✓	✓	✗	Physics, Computational Fluid-Solid State Dynamics, Climate/Weather Modelling, Materials, Medical

Country	AAA	CC	CSM	ES	F	HEP	LS	M	Others
									Sciences
Netherlands	✓	✗	✓	✓	✗	✓	✓	✓	Social sciences and Humanities
Poland	✓	✓	✗	✗	✗	✓	✓	✓	Metallurgy, Acoustics, Nanoscience, Material science, Energetics (GAS, energy consumption modelling)
Slovakia	✓	✗	✗	✓	✗	✓	✓	✓	✗
Turkey	✗	✓	✓	✓	✗	✗	✗	✓	✗

Table 9.3.1 Projects

Country	Direct involvement of the NGIs as a partner	Indirect involvement through an NGIs member	ESFRI projects the NGIs is directly involved
Armenia	✗	3	✗
Croatia	0	0	✗
Cyprus	1	✗	EGI-InSPIRE
Czech Republic	5	✗	Elixir
Finland	✗	✗	Elixir
France	0 - NGI is not a legal entity	10 European funded projects and many other projects	LHC experiments CTA, KM3NET ELIXIR, INSTRUCT ICOS, EPOS, LIFEWATCH MYRRHA
Lithuania	1	✗	no
Moldova	0	1	no
Netherlands	✗	✗	LHC, KM3NeT, CLARIN, DARIAH, LifeWatch, Elixir, WeNMR (INSTRUCT), EPI, SKA, BBMRI, ICOS.
Poland	2	✗	EPOS, CTA, WLCG

Chapter 10 - Infrastructure

Table 10.1.1 Resource Centres

Country	Resource Centres	Country	Resource Centres	Country	Resource Centres
Armenia	0	**Germany**	19	**Poland**	10
Belarus	1	**Greece**	16	**Romania**	10
Bosnia & Herzegovina	1	**Hungary**	3	**Russia**	10
Bulgaria	4	**Israel**	6	**Serbia**	5
CERN	1	**Italy**	54	**Slovakia**	4
Croatia	3	**Macedonia**	3	**Slovenia**	2
Cyprus	1	**Moldova**	3	**Switzerland**	8
Czech Republic	2	**Montenegro**	1	**Turkey**	3
Finland	11	**Netherlands**	16	**Ukraine**	11
France	18	**NGI_IBERGRID**	27	**United Kingdom**	24
Georgia	1	**NGI_NDGF**	9		

Table 10.2.1 CPUs (cores) and GPUs. VMs = virtual machines

Country	Logical CPUs	Logical CPUs dedicated to run VMs	Hours of logical CPU wall clock time	Utilisation of the logical CPU capacity	Total GPUs available	Hours of GPUs wall clock time	Utilisation of the GPU computing capacity
Armenia	93	✗	85503	✗	✗	✗	✗
Belarus	139	✗	67217	✗	✗	✗	✗
Bosnia & Herz.	16	✗	288	✗	✗	✗	✗
Bulgaria	983	✗	227407	✗	✗	✗	✗
CERN	28867	✗	154893422	✗	✗	✗	0%
Croatia	560	0	37965	✗	36	✗	0%
Cyprus	132	40	36952	70%	0	0	

Country	Logical CPUs	Logical CPUs dedicated to run VMs	Hours of logical CPU wall clock time	Utilisation of the logical CPU capacity	Total GPUs available	Hours of GPUs wall clock time	Utilisation of the GPU computing capacity
Czech Republic	4244	0	39754351	75%	0	✗	✗
Finland	1512	0		✗	✗		✗
France	30878	✗	192100498	✗	0	✗	✗
Georgia	12	✗	463	✗	✗	✗	✗
Germany	44380	✗	215483364	✗	✗	✗	✗
Greece	1749	✗	4084973	✗	✗	✗	✗
Hungary	1733	✗	3100179	✗	✗	✗	✗
Israel	1607	✗	4769552	✗	✗	✗	✗
Italy	43258	✗	194736036	✗	✗	✗	✗
Lithuania	✗	700		30%	0	0	0%
Macedonia	2056	✗	121850	✗	✗	✗	0%
Moldova	72	56		25%	2	0	0%
Montenegro	40	✗	1567	✗	✗	✗	
Netherlands	29627	608	64580945	85%%	0	0	0%
NGI_IBERGRID	19009	✗	132176653	✗	✗	✗	0%
NGI_NDGF	43503	✗	40178535	✗	✗	✗	0%
Poland	31840	5	23427709	98%	300	✗	90%
Romania	7086	✗	19280883	✗	✗	✗	✗
Russia	4721	✗	40025208	✗	✗	✗	✗
Serbia	1097	✗	266904	✗	✗	✗	✗
Slovakia	720	✗	3228669	✗	36	✗	✗
Slovenia	3844	✗	28685550	✗	✗	✗	✗
Switzerland	2753	✗	16151138	✗	✗	✗	✗
Turkey	6019	0	10885148	✗	36	✗	0%
Ukraine	794	✗	1629607	✗	✗	✗	✗

Country	Logical CPUs	Logical CPUs dedicated to run VMs	Hours of logical CPU wall clock time	Utilisation of the logical CPU capacity	Total GPUs available	Hours of GPUs wall clock time	Utilisation of the GPU computing capacity
United Kingdom	36448	✗	317671432	✗	✗	✗	✗

Table 10.3.1 Disk and Tape Storage

Country	Disk Storage (PB)	Tape Storage (PB)	Country	Disk Storage (PB)	Tape Storage (PB)
Armenia	0.01975	0	**Macedonia**	0.007488	0
Belarus	0.01364	0	**Montenegro**	0.001707	0
Bosnia & Herzegovina	0.01	0	**Netherlands**	10.861	7,027
Bulgaria	0.01262	0	**NGI_IBERGRID**	15.54	7.322
CERN	29.12	76.39	**NGI_NDGF**	8.7570615	0
Croatia	0.06	0	**Poland**	1.08	0
Cyprus	0.003432	0	**Romania**	1.45	0
Czech Republic	2.286	0.2	**Russia**	2.4	0
Finland	0.3562	0	**Serbia**	0.04408	0
France	17.37	22.53	**Slovakia**	0.16	0
Georgia	0.001032	0	**Slovenia**	0.04	0
Germany	25.53	40.38	**Switzerland**	1.74	0
Greece	0.2	0	**Turkey**	1.2	0
Hungary	0.05276	0	**Ukraine**	0.28	0
Israel	1.5414	0	**United Kingdom**	20.37	10.01
Italy	24.42	10			

Table 10.4.1 Availability and Ownership of NGI Resources for new users

NGI	Number of Logical CPUs	Disk Storage (TB)	Tape Storage (TB)
Cyprus	140	5	0
Czech Republic	300	50	

NGI	Number of Logical CPUs	Disk Storage (TB)	Tape Storage (TB)
Finland	0	0	0
Israel	60	✗	✗
Lithuania	50	10	0
Poland	2000	2	✗
Moldova	12	1	0
Slovakia	4	✗	0

Table 10.4.3 NGI Ownership of resources for new users try-out

NGI	Ownership of resources for new users try-out
Czech Republic	Owned by NGI/EIRO
Cyprus	Owned by affiliated resource centres/institutions
France	Owned by affiliated resource centres/institutions
Israel	Owned by NGI/EIRO
Lithuania	Owned by NGI/EIRO
Moldavia	Owned by NGI
Netherlands	Owned by affiliated resource centres/institutions
Poland	Owned by NGI/EIRO / Owned by affiliated resource centres/institutions
Slovakia	Owned by affiliated resource centres/institutions
Turkey	Owned by NGI/EIRO

Chapter 11 – Technology

Table 11.1.1 Middleware components.

NGI / EIRO	Deployed middleware	NGI / EIRO	Deployed middleware
Armenia	gLite	**Macedonia**	gLite
Belarus	gLite	**Montenegro**	gLite
Bosnia &Herzegovina	gLite	**Netherlands**	Globus, gLite
Bulgaria	gLite	**NGI_IBERGRID**	gLite
CERN	gLite	**NGI_NDGF**	ARC, gLite
Croatia	Globus, gLite	**Poland**	QCG, Unicore, gLite
Cyprus	gLite	**Romania**	gLite
Czech Republic	gLite	**Russia**	gLite
Finland	ARC	**Serbia**	gLite
France	gLite	**Slovakia**	gLite
Georgia	gLite	**Slovenia**	ARC, gLite
Germany	ARC, Globus, Unicore, gLite	**Switzerland**	ARC, gLite
Greece	gLite	**Turkey**	gLite
Hungary	gLite	**Ukraine**	ARC, gLite
Israel	gLite	**United Kingdom**	ARC, gLite
Italy	gLite		