EGI Role towards Europe 2020

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Policy Statement

This report provides an overview about the latest EU strategic developments relevant to the EGI community. Furthermore, the report initiates a discussion about how we could adapt our activities in order to improve our alignment with the new European strategic priorities, as well as a self-assessment as to the expected benefits. Thus, the report contains a list of general recommendations for the EGI.eu and the EGI community.



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IV. EXECUTIVE SUMMARY

The economic and social crisis has exposed structural weaknesses in the Europe leading to redefining of the European Commission's (EC) strategic priorities and vision. In addition, financial limitations on public spending in many European states have caused funding issues for the EGI community. In these turbulent times of global economic uncertainty, financial constraints and fragile social cohesion, the EGI community simply cannot allow itself the luxury of staying passive and conducting "business as usual".

The structural crises and this transformation effort has led the EC to put much more emphasis on smart, sustainable and inclusive growth and the focus on research and innovation field brings lot of attention and expectation and potential financial benefits to the digital world. The EC by establishing the Europe 2020 Strategy and through its flagship initiatives, especially "Digital Agenda for Europe", "Innovation Union" and "Recourse Efficient Europe", provides an opportunity for the EGI community to play an important role in achieving some of the key objectives defined in these strategies.

The EGI.eu Policy Development Team has prepared this report in order to inform the EGI community about the new European strategic approach. This will support the various EGI management bodies in making informed decisions as to how to align EGI.eu's policy, organisational and communication activities, and those in the NGIs and EIROs, within a broader European strategy across the EGI community. This report examines the significance of these policy priorities for the EGI and extends the analyses by considering also two important reports from high-level expert groups: "The Future of Cloud Computing" and "Riding the wave - How Europe can gain from the rising tide of scientific data" and the importance of the DCI Collaborative Roadmap in the context of these new European priorities.

Potentially, this strategic change and focus on research and innovation could driver the European economy with ICT at the forefront of the European "battle" for achieving the Europe 2020 vision.

- The EGI community can naturally contribute to the implementation of key actions of the "Digital Agenda" within e-infrastructures, such as improved interoperability and standardisation. In addition, the existence of the EGI is of crucial interest if Europe wants to help research and scientific communities bridge the fragmentation and improve cooperation and efficiency.
- "Green IT" supported in the "Resource Efficient Europe" sends a clear message to the e-Infrastructure world about the need to increasingly adopt Green IT principles.
- The report on Scientific Data, observes that the EGI community will be one of the major stakeholders in establishing the Collaborative Data Infrastructure.
- The report on future cloud computing shows how EGI could cooperate more closely with cloud providers in order to integrate cloud technology within e-Infrastructures.
- For the DCI community, to act as one through stronger internal coordination, to influence EC policy decisions.

The EGI community must raise their level of awareness in regard to the importance of these initiatives for its own funding and be proactive and decisive in fully exploiting these emerging opportunities for e-science and research. Policy and strategic responses are needed at the highest level, by the EGI Council to support EGI.eu's efforts to provide a coordinated response across the community to the EC and other relevant stakeholders, and to ensure that the EGI not only retains but improves its position as the key stakeholder within Europe and globally.

Thus, based on the general strategic and policy developments within Europe, recommendations to the EGI.eu and its participants are listed in the report. Some of the key recommendations for the EGI.eu are to:

- provide a quarterly report that comprises the latest strategic, policy and legislative activities within the EC (e.g. European Interoperability Strategy and European Interoperability Framework, Data Protection regulation, EU strategy for cloud computing, etc.)
- develop a Communication and Lobbying Strategy within Europe
- investigate how to further strengthen the role of the EGI community in international digital fora through a greater coordination between DCI projects.
- join the stakeholder debate on the progress at the annual Digital Assembly in the first half of 2011
- investigate the adoption of Green-IT initiatives within the EGI community.

Some of the key recommendations for the NGIs are to:

- improve communication with their national authorities and check the latest development and measures taken by their states related to promotion and implementation of the goals of the Europe 2020 Strategy
- clearly communicate to their Member States the ability to use structural funds (now and post 2013) for research & innovation projects.

Starting with the "Digital Agenda for Europe" and "Innovation Union", followed by the "Resource Efficient Europe" and closing with two reports on scientific data and cloud computing, a final conclusion can be only one. In the following years Europe needs the EGI community more than ever as a valuable and reliable partner in a challenge to achieve the vision of Europe 2020.

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1 INTRODUCTION

The crisis is a wake-up call, the moment where we recognise that "business as usual" would consign us to a gradual decline, to the second rank of the new global order. This is Europe's moment of truth. It is the time to be bold and ambitious. Jose Manuel Barroso, President of the European Commission [R1]

In the time of global challenges, the current economic crisis and evident European Union structural weaknesses, the European Union is redefining its strategic priorities. The direction in which the new strategic priorities are being defined puts more emphasis on so called 'smart growth' and focuses on research and development in order to transform the EU into a smart, sustainable and inclusive economy. The Europe 2020 Strategy sets out a vision of Europe's developed social market economy which has high levels of employment, productivity and social cohesion. Three priority areas that are at the heart of Europe 2020 is smart growth – a concept to develop an economy based on knowledge and innovation, sustainable growth – a concept to develop a resource efficient, greener and more competitive economy and inclusive growth – and a concept to develop a high-employment economy that will improve economic and social cohesion. In order to catalyse progress under these priority areas seven flagship initiatives have been identified.[1]

This new strategic approach from the European Union supports the concept of "Fifth Freedom"[2] [R11] that becomes more important than ever to deliver not only the free movement of researchers but also the free movement of innovative ideas. Thus, Europe is creating a new vision of Europe 2020 in order to ensure that the "Fifth Freedom" is pursued with vigour for the common good of all European societies.

The European Union has a central, managing role in accomplishing the vision of smart and sustainable growth within Europe – through its Europe 2020 strategy, the Framework Programme and the policies embodied in the European Research Area initiatives.

In the Europe 2020 Strategy and through its flagship initiatives, Distributed Computing Infrastructures have an opportunity to play an important role in achieving some of the key objectives defined in the strategy. Therefore, the EGI.eu Policy Development Team has prepared this report in order to inform the EGI community about the new European strategic approach and provide a strong foundation for the informed decisions through the EGI management bodies in order to align EGI.eu's policy, organisational and communication activities with the broader European strategy.[3] This report examines the significance of these policy priorities for the EGI and extends the analyses by considering also two important reports from high-level expert groups: "The Future of Cloud Computing" [R2] and "Riding the wave - How Europe can gain from the rising tide of scientific data" [R9].

A medium-term vision for the evolution of EGI has been already defined via the DCI Collaborative Roadmap [R3]. This sees a pan-European production infrastructure built from federated virtualised distributed resources that sees the continued support, maintenance and development of the middleware needed to federate these resources and integrate the needs of sites and user communities so that applications can be hosted sustainably in commercial, public, publicly procured and private "cloud computing" environments for the European research community.

This report informs the EGI community about the EU strategic policies which have an impact on EGI and explore and investigate potential connections and correlations between the seven flagship initiatives of the

1 Each of these flagship initiatives is explained in the next section.

2 The EU's Fifth Freedom is concept based on creating free movement of knowledge within European Union that will be added to the four original "freedoms" of free movement of persons, capital, services and goods in the European Union. Introduction of the "Fifth Freedom" should boost cross-border mobility of researchers, scientists, university teachers and students, as well as labor markets and work conditions for European researchers and further reforms in high education. The "Fifth Freedom " is closely related to one of the key actions of "Innovation Union" flagship initiative which is to complete the European Research Area.

3 This report is based on the latest policy and legislative initiatives within EU recorded in December 2010.

Europe 2020 strategy, the high-level expert groups reports and the DCI's vision. Overall, this report aims to answer three basic sets of questions:

- What does the new vision and new strategic priorities mean for the EGI community and EGI.eu? In other words, what message should it send to the EGI community?
- What does the EGI.eu and EGI community need to change in its activities to better align itself with these new European strategic priorities? How to position itself and benefit in the context of these changes and redefined European strategic targets?
- What is the significance of DCI collaboration and vision in the wake of redefined EU strategic priorities?

2 EUROPE 2020

Smart growth means strengthening knowledge and innovation as drivers of our future growth. This requires improving the quality of our education, strengthening our research performance, promoting innovation and knowledge transfer throughout the Union, making full use of information and communication technologies and ensuring that innovative ideas can be turned into new products and services that create growth, quality jobs and help address European and global societal challenges [R1]

In the year of the EGI.eu launch, the European Commission started to redefine its strategic priorities in order to transform the EU into a smart, sustainable and inclusive economy that will deliver high levels of employment, productivity and social cohesion. To achieve these priorities by 2020, seven flagship initiatives have been identified that will commit both the EU and Member States (see Table 1)

Table 1 – The seven flagship initiatives of Europe 2020

Seven flagship initiatives of Europe 2020		
Smart growth	**Sustainable growth**	**Inclusive growth**
Digital agenda for Europe	Resource efficient Europe	An agenda for new skills and jobs
Innovation Union	An industrial policy for the globalisation era	European platform against poverty
Youth on the move		

The seven flagship initiatives, briefly described below, aim to catalyse progress under each priority theme:

- "Innovation Union" to improve framework conditions and access to finance for research and innovation so as to ensure that innovative ideas can be turned into products and services that create growth and jobs
- "Youth on the move" to enhance the performance of education systems and to facilitate the entry of young people to the labour market
- "A digital agenda for Europe" to speed up the roll-out of high-speed internet and reap the benefits of a digital single market for households and firms
- "Resource efficient Europe" to help decouple economic growth from the use of resources, support the shift towards a low carbon economy, increase the use of renewable energy sources, modernise our transport sector and promote energy efficiency
- "An industrial policy for the globalisation era" to improve the business environment, notably for SMEs, and to support the development of a strong and sustainable industrial base able to compete globally
- "An agenda for new skills and jobs" to modernise labour markets and empower people by developing their of skills throughout the lifecycle with a view to increase labour participation and better match labour supply and demand, including through labour mobility
- "European platform against poverty" to ensure social and territorial cohesion such that the benefits of growth and jobs are widely shared and people experiencing poverty and social exclusion are enabled to live in dignity and take an active part in society.[4]

Within each flagship initiative, there are listed recommendations and proposed actions that are listed in two parts. One part deals with the key additional actions at the EU level that are the EC's responsibility. Second, relates to the actions on national level, hence, specific to EU members states. Of course, national actions are related only to the EU member states and can potentially influence the activities of the NGIs that are in the EU member states; therefore, they are not related to the NGIs outside the EU.

[4] EU defined EU headline targets. Main targets are to: raise EU employment rate from 69% to 75%; 3% of the EU's GDP to be invested in R&D (in comparison with current level that is below 2%); reduce greenhouse gas emissions by 20%, 20% of total energy consumption to be from renewable energy and increasing energy efficiency by 20%; reduce school drop-out rates to less than 10%; reducing the number of Europeans living in poverty by 25% [R1].

The EGI.eu and EGI community have an opportunity to participate and contribute to the achievement of three out of seven flagship initiatives: the Digital Agenda for Europe, the "Innovation Union" and Resource efficient Europe. In the following chapters each of these initiatives are analysed along with the identification of how they specifically affect EGI, the major points they try to communicate and how EGI.eu can redefine strategic priorities in order to align itself with EU priorities ultimately benefiting both sides, the EGI community and the EU.

2.1 Digital Agenda for Europe

European researchers' access to greater computing power will help them to tackle major research challenges in areas such as climate change and healthcare. The European Grid Infrastructure will help strengthen Europe's hand in research and give our scientists the support they need, whilst saving energy and cutting costs. Neelie Kroes, Commission Vice-President for the Digital Agenda [R12]

One of the three major priorities promoted within the Europe 2020 Agenda is Smart growth a concept of having growth based on knowledge and innovation. The Digital Agenda for Europe deals with the ways to develop and gain the benefits from enhancing interoperability of IT solutions in Europe, promote a better use of standards and establish single digital market and high-speed broadband internet.

The Council of the European Union have endorsed the Digital Agenda since it will *"strengthen Europe's competitive position in this important sector through reinforcing efforts on ICT Research and Development and Innovation and boosting the knowledge triangle"* [R4].

The "Digital Agenda" for Europe report identifies seven problem areas that need to be tackled via appropriate actions: 1) fragmented digital markets, 2) lack on interoperability, 3) rising cybercrime and risk of low trust in networks, 4) lack of investment in networks, 5) insufficient research and innovation efforts, 6) lack of digital literacy and skills, 7) missed opportunities in addressing societal challenges (see Figure **1**). Key actions are then defined to systematically tackle these seven problem areas and funds should be directed in pursuing them. Europe must focus and increase its investments to keep its competitive edge in this field and continue to invest in high-value research, including multi-disciplinary fundamental research.

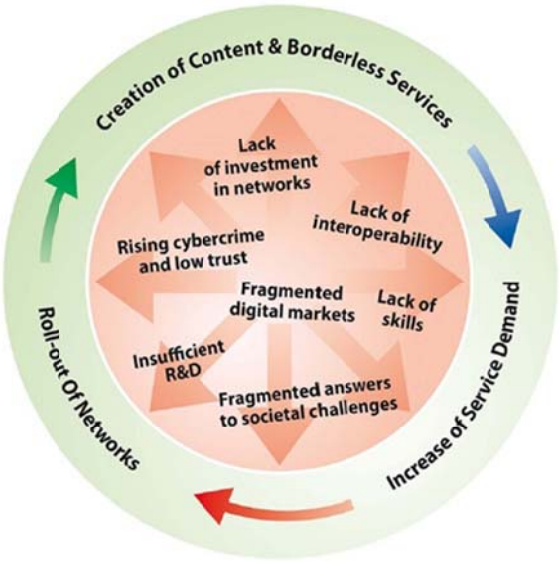

Figure 1: Virtuous cycle of the digital economy [R4]

In the "Digital Agenda" document it was explicitly mentioned *"Europe should also build its innovative advantage in key areas through reinforced e-Infrastructures"* (in the document's footnote for this sentence EGI

was explicitly mentioned) [R2]. Therefore, it is clear that EGI activities have full support of the Commission and strongly reaffirms that supporting EGI activities is beneficial for the effectiveness and efficiency in the European research and innovation field. Moreover, it is directly related to the collaboration between European DCI projects which is further elaborated in Section 4.

Key actions of the European Commission related to the EGI community are listed in Table 2.

Table 2

Key actions of the European Commission related to the EGI community	
Actions[5]	**Relevance for the EGI**
• Action 53: Ensure sufficient financial support to joint ICT research infrastructures and innovation clusters, develop further e-Infrastructures and establish an EU strategy for cloud computing notably for government and science.	With this key action the European Commission illustrates the importance of e-Infrastructures and the EGI community to its activities. It opens an opportunity for EC to continue contributing to EGI and related activities provided the community is aligned with their goals. Furthermore, EGI.eu should also ensure close monitoring of establishing the EU strategy for cloud computing especially any parts that is concern the integration of clouds technology into EGI.
• Action 51: Reform the research and innovation funds and increase support in the field of ICTs to reinforce Europe's technology strength in key strategic fields.	More funds for research and innovation mean potentially greater need through more requests and increased utilisation of production infrastructure from the research and scientific communities in Europe. This also importantly triggers the opportunity for researcher positions and further job opportunities filling the void of skilled workers and growing knowledge. EGI as a whole is focused on supporting VRCs and their use of the production infrastructure.
• Action 50: Leverage more private investment through the strategic use of pre-commercial procurement and public-private partnerships, by using structural funds for research and innovation and by maintaining a pace of 20% yearly increase of the ICT R&D budget at least for the duration of FP7.	The Commission is aware that industry is increasingly in need of open and interoperable solutions to exploit ICT across all sectors and avoid vendor lock-in. Therefore, the EC's plan is to support the activities that will bring together various stakeholders around common research agendas. EGI.eu should look for a way to facilitate and materialise EC support to improve the interaction EGI has with industry. Collaboration with industry will not only align EU and EGI goals and potentially bring additional financial benefits to EGI, but will also contribute to the development of the infrastructure and bringing interoperable solutions to EGI which will progressively adapt to industrial best practice. The Commission's decision to start using structural funds in supporting the "Digital Agenda", which could be very beneficial for the NGIs enabling them to diversify funding sources and ultimately leading to improved sustainability and financial stability of the European Grid Infrastructure.
• Action 21: Propose legislation on ICT interoperability • Action 22: Promote standard-setting	Interoperability is a key requirement for EGI since it is widely recognised that open standards have a key role in enabling interoperability of networks, services and equipment. There is

[5] Actions are referenced by using the action number from official web page of "Digital Agenda" : http://ec.europa.eu/information_society/digital-agenda/index_en.htm

rules • Action 23: Provide guidance on ICT standardisation and public procurement • Action 24: Adopt a European Interoperability Strategy and Framework	an obvious necessity to follow and be up to date with the last developments in the EU interoperability and standardisation field. EGI.eu should strongly communicate to the European Commission that it needs its support in order to expedite interoperability and standardisation efforts for Distributed Computing Infrastructures. The Commission can support technology providers, Grid operators and application integrators and other stakeholders by funding meetings and establishment of working groups that will result in better collaboration and proper identification of open standard priorities. It would be highly desirable to include into this collaborative framework other DCI projects and European and global Standards Developing Organisations (SDOs), especially the Open Grid Forum (OGF). It is important to highlight not only the participation but leadership roles that EGEE and EGI and other high-level people have played in various standards groups (especially OGF) and that EGI and EGI.eu will continue to push technical efforts in order to reach these goals
• Action 54: Work with stakeholders to develop a new generation of web-based applications and services, including for multilingual content and services, by supporting standards and open platforms through EU-funded programmes.	Depending on the definition of web-based applications and services, or if it is related to user-oriented portals that are used by some of EGI's users, then EGI could be a stakeholder of this action. If the EGI community can create a list of services, then an analysis of potential "products" could be identified as part of EGI.eu business model to help the organisation's potential economic growth and sustainability. It is essential that the money the EC invests results in tangible outcomes that can be exploited by EGI now and in the future
• Action 12: Review the EU data protection regulatory • Action 28: Reinforced Network and Information Security Policy • Action 29: Combat cyber-attacks against information systems • Action 30: Establish a European cybercrime platform • Action 32: Strengthen the fight against cybercrime at international level • Action 33: Support EU-wide cyber-security preparedness • Action 34: Explore the extension of security breach notification provisions	In 2010 The EC consulted the public and the stakeholders and adopted a Commission Communication on renewing the EU data protection rules. In 2011 and 2012, EC will work towards adopting the legislation. In addition, the Proposal for a Directive on attacks against information systems is already published. Initial assessment of the impact of new legislative initiatives is needed and the EGI.eu will take necessary steps to analyse key actions and legislative initiative proposed by the "Digital Agenda". Furthermore, improved communication with the European Network and Information Security Agency (ENISA) through an MoU or by other means is desirable. The key EU actions and any national laws which may follow will have an impact on EGI's sites and services. EGI.eu needs to ensure that any new EGI policy is consistent with the current EU security and trust policies.

Finally, the European Commission will organize in the first half of 2011 a wide stakeholder debate on the progress in the form of an annual Digital Assembly, bringing together Member States, EU institutions, citizen representatives and industry to assess progress and emerging challenges. EGI.eu should ensure its presence there, at least in the form of observer if not through active participation, to improve EGI's visibility and extend its networking efforts.

Key actions of the EU Member States related to the EGI community are listed in Table 4.

Table 3

EU Member States key actions	
Actions[6]	**Relevance for the EGI**
• Action 26: Member States to implement European Interoperability Framework by 2013. • Action 27: Member States to implement Malmö and Granada declarations by 2013.	As common practice, NGIs must closely monitor the latest national laws and policies related to their work in order to benefit from them. Moreover, in the times of severe financial constraints of public funding from the national administration there is an urgent need to not only passively observe the latest developments, but to intensify talks with their national authorities in order to fully utilise both Structural and Rural Development Funds or their planned increased national public spending on ICT R&D. The role of the EGI in supporting e-government role is still being explored. For example, for providing storage and web sites commercial cloud platforms might be more suitable, but if e-government covers public policy services that are compute or data oriented (e.g. predicting flooding areas, meteorology, etc.) the EGI could have a potentially significant role. Some of the security actions are still under development; however it is clear that the latest EU Member States actions should be taken into account by the NGIs.
• Action 38: Member States to establish pan-European Computer Emergency Response Teams • Action 39: Member States to carry out cyber-attack simulations • Action 40: Member States to implement harmful content alert hotlines • Action 41: Member States to set up national alert platforms	
• Action 55: Member States to double annual public spending on ICT research and development[7]	
• Action 56: Member States to engage in large scale pilots to test and develop innovative and interoperable solutions in areas of public interest that are financed by the Competitiveness and Innovation Framework Programme.	
• Action 89: Promote deployment and usage of modern accessible online services (e.g. e-government, online health, smart home, digital skills and security).	

Thus, based on the key actions from European Commission and EU Member States, recommendations to the EGI.eu and EGI community are listed in Table 4.

Table 4

	Recommendations to the EGI.eu and EGI community
1) Digital Agenda for Europe	*The EGI.eu should:* 1) attend a wide stakeholder debate on the progress at the annual Digital Assembly in the first half of 2011 2) as a part of the quarterly report, highlight information and keep up to date with the latest developments in the interoperability review of EU standardization policy, rules on implementation of ICT standards in Europe

[6] Actions are referenced by using the action number from official web page of "Digital Agenda" : http://ec.europa.eu/information_society/digital-agenda/index_en.htm

[7] By 2020 and double annual total public spending on ICT research and development spending from €5.5bn to €11bn (which includes EU programmes) [R4].

	and adoption of a European Interoperability Strategy and European Interoperability Framework 3) as a part of the quarterly report closely follow the review of the EU data protection regulatory framework 4) as a part of the quarterly report present efforts and related information regarding the establishment of the EU strategy for cloud computing especially part that is concerned with the integration of clouds technology into Grid production 5) continue participation in the EC organised gatherings between e-Infrastructure related projects and organisations and industry in order to actively promote their grid computing services and understand available commercial products and techniques. 6) ensure the relevant EGI.eu policy groups closely follow the newest security policy developments and their impact on EGI security policies *The NGIs should:* 7) closely monitor the latest national laws and policies related to their work, especially the adoption of the European Interoperability Framework at national level by 2013 and implement commitments on interoperability and standards in the Malmö and Granada Declarations by 2013 8) intensify communication with public authorities in order to fully utilize both Structural and Rural Development Funds or planned increased national public spending on ICT R&D.

2.2 The Innovation Union

In a rapidly changing global economy, Europe must build on its strengths and tackle the following weakness: under-investment in knowledge foundation, unsatisfactory framework conditions to attract investments and too much fragmentation and costly duplication. The "Innovation Union" aims to set out a bold, integrated and strategic approach to address such weakness by improving conditions and access to finance for research and innovation, to ensure that innovative ideas can be turned into products and services that create growth and jobs [R8].

This flagship initiative is of crucial importance since innovation represents the core of the Europe 2020 Strategy. By adopting bold, integrated and strategic approaches the "Innovation Union" will improve framework conditions and access to funds for research and innovation. Furthermore, in order to achieve the defined goals of the "Innovation Union" it is necessary to *"get more value for money and tackle fragmentation. EU and national research & innovation systems need to be better linked up with each other and their performance improved", "researchers and innovators must be able to work and cooperate across the EU as easily as within national borders", "faster setting of interoperable standards"* [R8].

Hence, it is apparent that the EGI community is and should be part of the effort to establish the "Innovation Union" since it can significantly contribute to overcoming all mentioned bottlenecks. Moreover, work on implementation of the DCI Collaborative Roadmap deals with exactly the same issues that the EC has identified. The EC should be aware of the importance of such an endeavour and vision of a production infrastructure based on federated virtualised resources. This is EGI's key advantage in communication with the EC and emphasises EGI's significance in the overall European effort to achieve true "Innovation Union". Ground-breaking research and innovation increasingly require world-class e-Infrastructures and EGI is the one, so EGI importance for achieving the full potential of "Innovation Union" cannot be overlooked.

Key actions of the European Commission related to the EGI community are listed in Table 5.

Table 5

Key actions of the European Commission related to EGI	
Actions[8]	**Relevance for the EGI**
• Action 4: Complete the European Research Area.[9]	EGI can contribute to the fulfilment of this action since the consolidation and unification of the European Research Area can be achieved through utilisation of the EGI, especially in regard to efforts in avoiding costly overlaps and unnecessary duplication in national research.
• Action 16: Improve framework conditions for business to innovate. In early 2011, as a first step, the Commission will present a Communication accompanied by a legislative proposal on standardisation, which will inter alia cover the ICT sector, in order to speed up and modernise standard-setting to enable interoperability and foster innovation in fast-moving global markets.	This action is related to the action in the "Digital Agenda" that deals with improving interoperability and standardisation, therefore making this legislative proposal linked with EGI efforts already explained under the "Digital Agenda" initiative. However, it emphasises one more time the importance of establishing better collaboration with industry and the business community. It is important to notice that in this document, in the several places, it is strongly suggesting that the cooperation between the world of science and the world of business must be enhanced and that the Commission will facilitate debate and exchanges of ideas and best practices through online exchanges and social networking. This opportunity should be used to revive EGI's efforts in establishing stronger involvement with industry partners by improving EGI dissemination and outreach to the business community.
• Action 32: The European Union should step up its cooperation on the roll-out of the global research infrastructures.[10]	This is an excellent opportunity for EGI to collaborate with European Research Infrastructures and with international partners to play a more relevant role on the global e-Infrastructure stage.
• Action 9: Promoting the European Institute of Innovation and Technology (EIT) as a model of innovation governance in Europe.	By mid-2011, the European Institute of Innovation and Technology (EIT) should set out a Strategic Innovation Agenda to expand its activities as a showcase for Innovation in Europe. This should map out its long term development within the "Innovation Union". It should also build on the EIT Foundation being set up in 2010 and on the introduction in 2011 of the "EIT degree" as an internationally recognised label of excellence. EGI should explore the opportunity of establishing the cooperation with the EIT, if possible through MoU. Furthermore, EGI should obtain "EIT degree".

[8] Actions are referenced by using the action number from official web page of "Innovation Union" : http://ec.europa.eu/research/innovation-union/index_en.cfm?pg=action-points&view=all

[9] Since it is of crucial importance to avoid costly overlaps and unnecessary duplication in national research a genuinely unified European Research Area should be created, hence, the Union set a deadline of end 2014 for achieving a well-functioning European Research Area [R8].

[10] By 2012, agreement should be reached with international partners on the development of research infrastructures, including ICT infrastructures, which owing to cost, complexity and/or interoperability requirements can only be developed on a global scale [R8].

Key actions of the EU Member States related to the EGI community are listed in Table 6.

Table 6

EU Member States key actions	
Action[11]	**Relevance for EGI.eu and EGI community**
Action 5: By 2015, Member States together with the Commission should have completed or launched the construction of 60% of the priority European research infrastructures currently identified by the European Strategy Forum for Research Infrastructures (ESFRI). The potential for innovation of these (and ICT and other) infrastructures should be increased. The Member States are invited to review their Operational Programmes to facilitate the use of cohesion policy money for this purpose.	Stronger focus on research and innovation and increased financial support to the national R&D projects can only intensify NGIs collaboration with various national and regional projects, therefore leading to higher utilisation of the grid infrastructure. Furthermore, national initiatives should achieve higher visibility and increased NGI importance, so their national states will realise the significance of the production infrastructure for implementation of "Innovation Union" actions. In addition, NGIs from the EU candidate countries (e.g. Turkey, Croatia, Macedonia etc.) can also explore opportunities for the financing through pre-accession funding.
Action 25: Member States should initiate the preparation of post 2013 Structural Fund programmes with an increased focus on innovation and smart specialisation. Future regulations governing the operation of the European Regional Development Fund should further commit substantial financial resources to support innovation initiatives within the regions of the European Union.	
Action 24: Starting in 2010 Member States should considerably improve their use of existing Structural Funds for research & innovation projects, helping people to acquire the necessary skills, improving the performance of national systems and implementing smart specialisation strategies and trans-national projects. This should also apply to the pre-accession funding for EU candidate countries. The Commission stands ready to assist and will use its regional research and cluster initiatives to support this change and establish a "smart specialisation platform" by 2012, including further support for the emergence of world class clusters.	

[11] Actions are referenced by using the action number from official web page of "Innovation Union" : http://ec.europa.eu/research/innovation-union/index_en.cfm?pg=action-points&view=all

Thus, based on the key actions from European Commission and EU Member States, recommendations to the EGI.eu and EGI community are listed in Table 7.

Table 7

	Recommendations to the EGI.eu and EGI community
2) Innovation Union	*The EGI.eu should:* 1) as a part of the quarterly report inform and monitor the adoption EC legislative proposal on standardisation that will happen in early 2011 2) participate in developing agreements with International partners on the development of research infrastructures by 2012, including ICT infrastructures, which owing to cost, complexity and/or interoperability requirements can only be developed on a global scale. *The NGIs should:* 1) clearly communicate to their Member States that from 2010 existing Structural Funds can be used for research and innovation projects, that the post 2013 Structural Fund programmes will have an increased emphasis on innovation and smart growth specialisation. Also funding opportunities for the Cohesion Fund and European Regional Development Fund can be explored. 2) create an NGI/SME group that should be composed of a number of local and national small and medium sized enterprises who are given early access to EGI to help these companies think about how they can better utilise grid technologies in their business.[12]

2.3 Resource Efficient Europe

The Resource Efficient Europe initiative has been established to help the shift towards a resource efficient and low carbon economy, increase the use of renewable energy sources, hence, reduce CO2 emissions, modernise its transport sector and promote energy security and efficiency.[13]

In order to achieve sustainable growth means *"building a resource efficient, sustainable and competitive economy, exploiting Europe's leadership in the race to develop new processes and technologies, including green technologies, accelerating the roll out of smart grids using ICTs, exploiting EU-scale networks, and reinforcing the competitive advantages of our businesses, particularly in manufacturing and within our SMEs, as well through assisting consumers to value resource efficiency. Such an approach will help the EU to prosper in a low-carbon, resource constrained world while preventing environmental degradation, biodiversity loss and unsustainable use of resources. The aim is to support the shift towards a resource efficient and low-carbon economy that is efficient in the way it uses all resources"* [R11].

To date, the EC has yet to produce a separate document describing in details of the "Resource efficient Europe" initiative, as with the "Digital Agenda" and the "Innovation Union". However, the "Digital Agenda" 2020 document describes some of the general measures that will be taken.

[12] In exchange, the SMEs provide their insights on how EGI.eu could be better adapted to meet their requirements.

[13] Europe should stick to its 2020 targets in terms of energy production, efficiency and consumption. This would result in €60 billion less in oil and gas imports by 2020 [R11].

Key actions of the European Commission related to the EGI are listed in Table 8.

Table 8

Key actions of the European Commission related to EGI
• Mobilise EU financial instruments (e.g. rural development, structural funds, R&D framework programme, TENs, EIB) as part of a consistent funding strategy.
• Adopt and implement a revised Energy Efficiency Action Plan.
• Incentivise energy saving instruments that could raise efficiency in energy-intensive sectors, such as based on the use of ICTs.

"Resource efficient Europe" will also deal with the concept of Green IT. IT-related CO2e emissions alone have been estimated at two per cent of the world's total. In order to reduce this figure; EGI can support the greening of grid computing processes along with EU2020. Pressure continues to grow on various organisations including e-infrastructures to act more responsibly with regard to the environment and resource efficiency and reduce their environmental impact and improve resource efficiency, especially as EU regulation will continue to tighten. The EGI community should have this in mind and improve efforts, since ICTs should become a leader in showing how the EU can benefit from a low carbon economy and maximise energy efficiency. In communication with the EU, the EC together with green grid representatives should facilitate a meeting in order for key players to gather and discuss how these challenges can be met and realise the concept of Green IT. One of the concrete ways to adopt a resource efficient approach and improve energy efficiency is by collaboration with other DCI projects and achieving a vision of a production infrastructure based on federated virtualised resources.[14] In addition, by supporting scientific and research communities in their innovation effort, EGI indirectly supports more resource efficient and greener economy and, thus, makes its own contribution to achieving the objectives of Resource Efficient Europe initiative.

There is a role for ICT, and the potential for a significant impact in Energy demand /energy end-use management through Smart-metering, buildings & construction (40% of EU energy end-use) and transports & logistics (26% of EU energy end-use). Today, there is not a common understanding of how to quantify energy efficiency gains/ energy performance – in particular at the level of whole systems. In the ICT sector today, carbon and energy accounting are based on different measurement methodologies, estimates and assumptions. The consequences are due to a lack of reliable data, targets set by individual organisations by cannot be compared, best practices are not transferrable across the industry and 'green' claims by industry are spurious. There is therefore a need for a common framework to measure (like accounting standards) and evaluate gains (energy cost-benefit analysis).[15]

In Table 9, you can see general recommendation to the EGI.eu.

Table 9

	Recommendations to the EGI.eu
3) Resource Efficient Europe	*The EGI.eu should:* 1) facilitate with a financial and organisational support from the EC a meeting together with green grids providers and stakeholders in order to see how EGI can meet these challenges and realise the concept of Green IT for the grid computing.

[14] This DCI collaboration connection is explained in detail in section related to the DCI collaboration.

[15] http://ec.europa.eu/information_society/activities/sustainable_growth/docs/events/past_events/cebit.pdf

3 THE HIGH-LEVEL EXPERT GROUPS AND THEIR RECCOMENDATIONS

In addition to the flagship initiatives, the European Commission also took into consideration the recommendations that have been received by high-level expert groups on the topic of scientific data and cloud computing. However, this advice is from experts external to the EC and therefore is informative in nature and has not binding.

The EU Competitiveness Council in 2009 called on the European Commission to address the issue of e-infrastructure for science, and the High Level Group for Scientific Data was created as part of that effort. In particular, the High Level Expert Group on Scientific Data analysed potential benefits of a collaborative data infrastructure and define recommendations to enable it.

The Cloud computing high-level expert group was created as a part of the effort to analyse the opportunities for the development of cloud computing technology in Europe beyond 2010. The Group investigated the current impact and open research issues of virtualisation technologies and the derived business models on provisioning ICT services.

3.1 The High-Level Expert Group on Scientific Data

The High-Level Group on Scientific Data produced the report "Riding the Wave: How Europe can gain from the rising tide of scientific data" that describes long term scenarios and associated challenges regarding scientific data access, curation and preservation as well as the strategy and actions necessary to realise the vision. The main point of the report is the introduction of the novel concept of data as an infrastructure and identifies the *"benefits and costs of accelerating the development of a fully functional e-infrastructure for scientific data – a system already emerging piecemeal and spontaneously across the globe, but now in need of a far-seeing, global framework. The outcome will be a vital scientific asset: flexible, reliable, efficient, cross-disciplinary and cross-border. Our vision is a scientific e-infrastructure that supports seamless access, use, re-use, and trust of data. In a sense, the physical and technical infrastructure becomes invisible and the data themselves become the infrastructure"* [R9]. Thus, an integrated scientific data e-Infrastructure is essential if we are to achieve vision of Europe 2020.

Neelie Kroes, Vice-President of the European Commission responsible for the "Digital Agenda", pointed out that there should be evident progress towards open access to the scientific data until the Framework Programme 8 (FP8) and *"we need to ensure that every future project funded by the EU has a clear plan on how to manage the data it generates. Such plans should foster openness and economies of scale, so that data can be re-used many times rather than duplicated"* [R10]. This will have an impact on EGI operations and relevant significance if there are plans to apply for the next FP8.

The list of the recommendations presented in the report is recorded in Table 10.

Table 10

The list of the recommendations presented in the report	
Key actions	**Relevance for the EGI**
• Develop a framework for a Collaborative Data Infrastructure.	The first recommendation is the most important one as it focuses on a vision of creating the Collaborative Data Infrastructure. Since there is no one technology that can achieve an integral scientific e-Infrastructure it is essential to

	develop a broad, conceptual framework for the different stakeholders including companies, institutes, universities, governments and individuals to interact with the system. This framework is called a Collaborative Data Infrastructure, and the European Commission should take a leading role in accelerating efforts to make it a reality. In addition, all relevant EU research project, such as GRDI2020[16], should, in regard to their data management fit into such a framework. Therefore, there is an urgent need for EGI.eu to become part of these collaboration efforts and to position itself as an integral and central part of Collaborative Data Infrastructure.
• Earmark additional funds for scientific e-infrastructure.	Additional funds should be found to develop the infrastructure, which will most likely come from the EU's Structural Funds since a portion of this budget is already dedicated to digital infrastructures. Authors of the Scientific data report urge the EC to increase the amount spent specifically on e-Infrastructures for scientific data: *"Development of e-infrastructures for scientific data will cost money, obviously – and as there is a significant element of public good in this, so there must be a significant degree of public support. One obvious source is found in the EU's Structural Funds – a portion of the budget mostly used to build roads, industrial parks and other key infrastructures, targeted at those regions of Europe most in need. Already, a portion of this budget is earmarked for research and innovation, including digital infrastructure. We call upon the European Council to expand the funding possibilities"* [R9]. This is a big opportunity for the EGI community to diversify funding sources and represent novel ways of upgrading their business and financial models, thus, contributing to the long-term sustainability of the EGI.
• Develop and use new ways to measure data value, and reward those who contribute it.	In order to develop and use new ways to measure data value, the EC is recommended to lead a study on how to create more universal and meaningful metrics in collaboration with other stakeholders. EGI.eu should ensure that the EGI community is a part of this study in order to provide EGI experiences and expertise in order to obtain better insight into the latest developments in the field of data metrics.
• Create incentives for green technologies in the data infrastructure.	Concerning the creation of incentives for green technologies, these recommendations correlate with the Resource Efficient Europe initiative and strongly promote it. The ICT industry must be incentivised to change its production, distribution and methods in order to go greener and the EC should consider the environmental impact of e-Infrastructures and prepare appropriate policies, as with the Code of Conduct on Data Centres Energy Efficiency. These incentives will help EGI's improve its energy efficiency, save its resources and costs and find the most efficient and effective ways to re-use instead of duplicate data.
• Establish a high-level, inter- ministerial group on a global level to plan for data	EGI.eu should have a defined communication and lobby strategy for Brussels in order to clearly express the intention

[16] www.grdi2020.eu

infrastructure.	to become a part of a high–level global forum that will regularly discuss the global governance of scientific e-Infrastructures. Being an integral part of the Collaborative Data Infrastructure is essential to have a strong voice in this global framework.

To conclude, the EGI community has the capacity, knowledge and expertise to be one of the major players on a European and global scene when it comes to developing the Collaborative Data Infrastructure. Moreover, we are already a multi-institutional organisation and we know how to deal with federate resources, operate them in a coordinated manner, manage policies/procedures process through consensus that span organizations. EGI experiences in dealing with large quantity of data through supporting current heavy users of the infrastructure, such as high energy physics, computational chemistry and life sciences is of crucial importance in the collaboration needed for building up the scientific data e-Infrastructure. It is also of great importance to adopt proactive approaches in communication and collaboration with the stakeholders involved, especially the European Commission in order to show the advantages and benefits of EGI in establishing the framework. Alongside the high–level global forum, EGI should urge the Commission to establish an expert working group composed of different projects and stakeholders on a global or European level. Stakeholders should meet on a regular basis to discuss challenges and impediments and tackle bottlenecks that occur on the way to establishing a scientific data e-Infrastructure. The focus of the group should be on technical issues, discussing principles of interoperability, verification and reliability since accomplishing an interoperable data infrastructure in the midst of heterogenic environment is a major challenge.

Thus, based on the recommendations from the expert group, recommendations to the EGI.eu and EGI community are listed in Table 11.

Table 11

	Recommendations to the EGI.eu and EGI community
4) Report on scientific data	*The EGI.eu should:* 1) become part of collaboration efforts and position itself as an integral and central part of Collaborative Data Infrastructure 2) investigate the possibility of earmarking additional funds to the EGI community development of a Collaborative Data Infrastructure 3) be part of a study on how to create more universal and meaningful metrics 4) investing in providing additional incentives for using green technologies in the data infrastructure 5) urge the Commission to establish an expert working group composed of different projects and stakeholders in order to discuss technical challenges and impediments and tackle bottlenecks that occur on the way to establish scientific data e-infrastructure.

3.2 The High-Level Expert Group on Clouds

Authors of the report "The Future of Cloud Computing" indicated that Europe is in a strong position to address both technological and non-technological areas of cloud provisioning: *"technologically due to its excellent background in many of the key research and development aspects related to cloud systems, such as GRIDs and Service Oriented Architectures, and non-technologically due to Europe's position as a united body"* [R2].

The list of the recommendations presented in the report is recorded in Table 12.

Table 12

Two main recommendations from the report	
Key actions	**Relevance for the EGI**
• The EC should stimulate research and technological development of Cloud Computing. In order to address research issues and variety of challenges within Cloud computing development, there is a need to exploit the available expertise and results from areas such as Grid, Service Oriented Architectures and other e-infrastructures. Specific research topics to be addressed in collaboration between cloud providers are elastic scalability, cloud development and management, data management, programming models and resource control and trust, security and privacy.	This would be good opportunity for EGI.eu, with the help and active support from the EC, to establish formal cooperation with other cloud technology providers. It is important to notice that EGI already plans to establish cooperation with StratusLab, which is developing and deploying cloud technologies with the aim of simplifying and optimising the use and operation of distributed computing infrastructures such as the EGI. Future plans also comprise collaboration with VENUS-C that will provide best practices, challenges and potential success stories to the EGI community on the applicability of "cloud computing" for scientific computing as well as the EDGI project, which will provide desktop and cloud resources to various European research communities. One of the effective ways to further enhance and broaden the EGI collaboration with various public and private cloud computing providers is to establish an expert working group that will gather regularly in order to identify specific research and technical bottlenecks. This collaboration will be of the great importance for EGI.eu since it will ease the integration of cloud technologies to the EGI production infrastructure.
• The EC and Member States should set up the proper regulatory framework to enable the uptake of Cloud computing in order exploit fully its capability. Subsequently, not only technological challenges need research efforts, also the specific issues that arise are of non-technological nature including: economical or commercial and business aspects, legalistic issues and Green IT.	Since Grid production still suffers from the similar non-technological "symptoms", exchange of the opinions on these non-technological issues will be quite useful for both sides.
Four additional recommendations from the report	
• The EU needs large scale research and experimentation test beds.	All of these recommendations are again confirming the similar nature of the issues that are present in Grid and Clouds and are a strong incentive to start working more closely on dealing with technological and non-technological bottlenecks. In addition, EGI-InSPIRE deliverable (D2.6) is dealing with the provision of a roadmap as to how clouds and virtualisation technology could be integrated into the EGI exploring not only the technology issues but also the total costs of ownership of delivering such resources. Thus, EGI.eu should closely cooperate with cloud computing providers in order to achieve this, especially with StratusLab and EDGI.
• The EC together with industrial and public stakeholders should develop joint programmes encourage expert collaboration groups.	
• The EC should encourage the development and production of Cloud interoperation standards an open source reference implementation.	
• The EC should promote the European leadership position in software through	

commercially relevant open source approaches.	

One of the questions EGI.eu should seriously take into consideration is posed by the authors of the report: *"European market players, particularly from the Grid domain, can hence generally be considered "ready" for a movement towards cloud service offering. In order to execute that step, it must become visible to them how a) this can improve their business, b) why any customers would follow this movement and finally c) how this can be implemented and how potential obstacles can be overcome?"* [R2]. Furthermore, we should have a more detailed look into some of the private grid companies that managed to successfully integrate cloud technology into their grid infrastructure which should motivate EGI.eu to consider intensifying the possibility of closer cooperation with private grid infrastructures, including the prospect of even building public-private partnership or signing an MoU with one of them. Therefore, the challenge of cloud integration into EGI is also the challenge of getting the business side of its activities developed in cooperation with the private organisations. That way a qualitative step forward could be made in the direction of fully utilising EGI's production infrastructure and services.

Thus, based on the recommendations from the expert group, recommendations to the EGI.eu and EGI community are listed in Table 13.

Table 13

	Recommendations to the EGI.eu and EGI community
5) Report on cloud computing	*The EGI.eu should:* *1)* initiate the establishment of an expert working group (with the EC support) in order to discuss specific research and technical bottlenecks (interoperability, verification and reliability) with various public and private cloud computing providers, and among other things to simplify the integration of cloud technologies to the EGI production infrastructure 2) investigate the possibility of establishing cooperation with private grid providers that already integrate cloud technology to their grid infrastructure 3) investigate business models used by private grid providers

4 THE DCI COLABORATIVE ROADMAP

The EGI-InSPIRE project's main focus is to deliver an integrated production infrastructure for the European Research Area. In order to deliver this, it needs to deploy a software environment that brings together software components provided from both within and from outside the DCI community. The DCI Collaborative Roadmap describes the individual interactions between the six European DCI projects and shows how the provision of e-Infrastructures in Europe could evolve over the next 3 years and the contributions that each project may make towards this future by working with each other. The plan is to provide a pan-European production infrastructure built from federated distributed resources, ensure the continued support, maintenance and development of the middlewares (gLite, ARC, UNICORE and Globus) that are in common use in Europe, explore how grid sites and different applications can be hosted sustainably in commercial, public, publicly procured and private 'cloud computing' environments, and provide desktop resources to the European research community.

Together, these infrastructures face the challenge of evolving their services to the changing needs of their data-intensive user communities, and providing a sustainable service that will support their users today, tomorrow and the years to come. A vision is to move from the current production infrastructure in Europe to one based upon federated virtualised resources. It is expected that this change will increase the flexibility of resource providers to meet the changing needs of the user communities they serve by adopting best practices from other sectors. Federated grids of virtualised resources are in many ways similar in architecture to today's federated grids of computing resources, but providing truly generic infrastructure that can be accessed by any authorised research collaboration, as an alternative or alongside commercially provided resources.

A Memorandum of Understanding (MoU) is being established with each project to describe common plans around dissemination, representation to ensure the exchange of requirements and the development roadmaps. Specific Service Level Agreements (SLAs) will be defined to govern the expected operational interactions on the provision of third line support and security incident handling. Two projects that provide software components for the EGI community are European Middleware Initiative (EMI) and Initiative for Globus in Europe (IGE). It is envisaged that future DCIs will make extensive use of virtualisation technology. An MoU will be established with StratusLab to ensure effective joint dissemination and events, where applicable, and for the operational staff within EGI to ensure that the software environment being released from StratusLab will be the needs of the production infrastructure. This may include requirements on reliability, scalability, monitoring and accounting. The main output from VENUS-C will be a series of user scenarios showing how the cloud computing model can benefit different scientific communities. VENUS-C will expand the supported communities by mean of an open call for up to twenty short experiments to exploit the VENUS-C Cloud Platform through the cloud resources provided within the project. EGI-InSPIRE would like to provide input to VENUS-C on the criteria for the experiments that are selected from the open call, to ensure they are of relevance to the EGI user community. It is expected that the EDGI project will build a desktop resource across Europe. EGI-InSPIRE would like to ensure that this computing resource can be integrated alongside the resource types offered within the production infrastructure. To this end, EGI.eu will collaborate with EDGI through an MoU that will establish the monitoring, accounting and functional integration of desktop resources into EGI. As a result of this, the reliability and use of this resource can be established alongside the other provided resource types and these desktop resources can then be offered up to the EGI user community [R3].

Together, the DCI projects are able to address some of these issues and move the community towards the presented vision of an integrated virtualised infrastructure for the Europe Research Area. Overall, EGI-InSPIRE will provide a route for the deployment across Europe of new technological innovations into production once they have shown sufficient robustness and value to the EGI community. EMI and IGE provide a source of innovation in the short-term, and it is expected this will be expanded over time to include the technology and procedures developed within the StratusLab project. VENUS-C will provide best practices and potential success stories to the EGI community on the applicability of cloud computing for scientific computing, while EDGI will provide desktop and cloud resources to various European research communities. However, EGI community should keep a close eye and understand what doesn't work and not so successful stories for cloud computing.

In relation with the Europe 2020 strategy and relevant flagship initiatives it is clear that collaboration between the six European DCI projects strongly supports and promotes actions and goals prescribed in the strategy.

One of the key actions from the Digital Agenda for Europe Initiative is to improve interoperability and standardization. Interoperability and integration between different e-Infrastructures and technologies is fundamental to the DCI projects and the work that will be undertaken between them. This activity will also help contribute to the broader vision described in the Digital Agenda for Europe communication that *"Europe should also build its innovative advantage in key areas through reinforced e-Infrastructures"* [R4].

The "Resource Efficient Europe" initiative plans changes in EU regulation on various ICT organisations including e-Infrastructures to act more responsibly with regard to the environment and resource efficiency and in order reduce their environmental impact. The Green IT approach is needed to be more vigorously adopted in order to reach the defined goals of the Europe 2020. The DCI report explicitly describes the tendency which will help in achieving resource efficient e-Infrastructure: *"The pressures (staffing costs, green energy, economies of scale etc.) that produced the consolidation of data centres and wide-scale adoption of virtualisation in the commercial sector are beginning to be felt in the academic and research space. Many campuses are encouraging the move of departmental or group level computing resources into central locations where they can be managed and supported by dedicated staff. This trend will inevitably continue over the next decade, forcing a greater integration between the client environment available at the researchers fingertips and the remote resources that they have access to 'somewhere' over the Internet"* [R3]. Moreover, the alignment of infrastructure provision in the research e-Infrastructure community with models used in the commercial world - provision of end-user environments through virtualisation - allows tools and techniques used in industry to be adopted in academia. This approach has already demonstrated increased server utilisation, better energy utilisation and greater flexibility in the commercial world. Not only does it have relevance for the Efficient Resource initiative it also shows the necessity to facilitate stronger cooperation with the business world, not only for the benefit of Green IT but also for the sake of improving interoperability and standardisation of the European grid landscape.

Getting more value for money and tackling fragmentation, can be dealt with through linking up EU funded projects with each other and improving their performance, easing the cooperation between researchers and innovators across the EU and faster creation and implementation of interoperable standards requires exactly the effort DCI projects are taking together. Thus, one can easily see that one of the major drivers in achieving the Innovation Union goals is the DCI projects collaboration efforts and implementation of a common DCI vision.

In order to develop a fully functional e-Infrastructure for scientific data DCI projects should be included in the international framework that will be working on this challenging task. DCI projects already envisioned that their integrated virtualised infrastructure should have an integrated data infrastructure embodied. Concerning the cloud computing report, the DCI community consists of two cloud computing related projects VENUS-C and StratusLab. Thus, DCI collaboration is aligned with recommendations of the projects by maximizing synergies between grid and cloud computing projects.

DCI collaboration and its vision play a significant role within the new strategic concept. It is obvious that the DCI's pan-European production infrastructure built from federated distributed resources is directly supporting the realisation of the goals and is in alignment with the actions and recommendations stated in Digital Agenda for Europe, Innovation Union, Resource Efficient Europe and the reports on scientific data and clouds.

5 THE BEST WAY FORWARD

The economic and social crisis have exposed structural weaknesses in the EU economy and have been a wakeup call for the EU to redefine its strategic priorities and vision to efficiently tackle long-term challenges. Furthermore, financial constraints on public spending in many European states have caused funding issues for the EGI community. Many NGIs already feel the economic crises in form of funding cuts from their states. These financial restrictions can endanger their own sustainability, but can also have a potential domino effect on the whole EGI community and put in question the stability and sustainability of the EGI. However, the structural crises and this transformation effort has led the EU to put much more emphasis on smart, sustainable and inclusive growth. The focus on research and innovation field brings lot of attention and expectation and potential financial benefits to the digital world. Furthermore, the EC has positioned ICT at the forefront of the European "battle" for achieving the Europe 2020 vision. The basic message is to rely on the digital world more than ever, hence, on DCIs, since they are the ones who need to break the vicious circle of mutually supported structural weaknesses and make the great leap forward towards the smart, sustainable and inclusive Europe.

Potentially this strategic shift and focus on research and innovation as great drivers of the European economy and can be of great benefit for the EGI community if it can seize this opportunity. The "Digital Agenda" provides strong confirmation of the EC support to the EGI community and its activities. The EGI community can contribute to the implementation of key actions of the "Digital Agenda" and in return EC financial support will be beneficial ultimately leading to more financial stability and sustainability of European Grid Infrastructure. Interoperability and standardisation is again confirmed as a key action within the "Digital Agenda" plan while at the same time it remains to stay a key requirement for the EGI community together with other stakeholders in the interoperability field that would like to create collaborative framework. Furthermore, fragmentation will be overcome through enhanced cooperation and improved performance by working together in synergy. The existence of the EGI is of crucial interest if Europe wants to help research and scientific communities bridge the gap. Green IT promoted in the Resource Efficient Europe initiative sends a clear message to the e-Infrastructure world about the need to increasingly adopt Green IT principles. Concerning the Report on Scientific Data, it is observable that the EGI community will be one of the major stakeholders in the process of establishing the Collaborative Data Infrastructure while the Report on future cloud computing is obliging EGI to cooperate more closely with cloud providers in order to integrate cloud technology in grid infrastructure.

Only after understanding the redefined context and the full significance of Europe 2020 and its flagship initiatives, one can answer a second set of questions. This set of questions concerns the way to align EGI activities and the strategic and policy positions with the new European strategic priorities in order to benefit and enhance the sustainability of European Grid Infrastructure. Thus, the main question that arises is what is the best way forward for the EGI community in the time of Europe's strategic, economic and social transformation?

In these turbulent times of global economic uncertainty, financial constraints and fragile social cohesion, the EGI community simply cannot allow itself the luxury of staying passive and conducting "business as usual". The EGI community must raise their level of awareness in regard to the importance of this specific moment and react in proactive and decisive way in order to fully exploit emerging opportunities for e-science and research. The toughest challenges ahead are to ensure that the objectives and list of actions and measures are defined in an appropriate manner and to ensure the adoption and implementation of these measures necessary to meet them. Thus, EGI.eu should create a list of action with defined deadlines and responsibilities in order to implement recommendations from the report. A shared determination and a common vision are needed to achieve this step that can qualitatively change the European scientific and research landscape.

EGI.eu should closely monitor the latest strategies and policy development activities in the EU in order to timely prepare appropriate responses, track EU policy implementations and achievements of key targets through regular reporting of progress to EGI.eu management bodies. EGI.eu should also look for ways to strengthen the role of the EGI community internationally by effectively promoting EGI's policy approaches and objectives on the

global stage. As part of this initiative, NGIs should improve the communication with their national authorities and check the latest developments and measures taken by their state in order to promote and implement goals of Europe 2020 Strategy.

The role of the EGI in supporting e-government role is still being explored and should be carefully considered by the major stakeholders. E-government covers public policy services that are compute or data oriented (e.g. predicting flooding areas, meteorology, etc.), hence, EGI could have a relevant role in these public sector areas.

It is clear that the Structural Funds will play a critical role in the provision of significant investments in research and innovation fields and will be restructured in order to reflect the redefined long-term strategic priorities. Much of the funds programmed for the 2007-2013 period have still not been spent and should be used more effectively for innovation and achieving the Europe 2020 objective. Furthermore, post 2013 Structural Fund programmes will be prepared with an increased focus on innovation and smart specialisation. Therefore, the EGI community should look for novel ways to use these funds either through facilitating formal collaboration with various public authorities, and/or by enhancing cooperation with private providers and potential industry partners. Improved financial stability can be achieved by pursuing new avenues though using a combination of private and public finance, and in creating innovative instruments to finance the needed investments, including public-private partnerships (PPPs) and potential contribution from the European Investment Bank and the European Investment Fund.

Learning some of the lessons from private grid companies could result in new approaches when it comes to dealing with the private partners. EGI.eu needs to investigate business models currently applied by private grid providers. Thus, by implementing some of the practices used by private Grid providers, the EGI community can improve collaboration with industry, in order to revive and accelerate the successful uptake of Grid technology by European industry.

Finally, answering the question regarding the significance of DCI collaboration and a common vision in the changed European strategic landscape, it is clear that the DCI collaboration adds significant value on the global DCI scene. The DCI community can influence EU policy decisions only if it acts jointly. Stronger external representation will need to go hand in hand with strong internal coordination.

Having in mind all the previous findings, policy and strategic responses are needed at the highest level, by the EGI Council and EGI.eu Executive Board to support EGI.eu attempts to improve the collaboration with the EU and other relevant stakeholders, to ensure that the EGI.eu not only remains and improves its position as the key stakeholder on the European and global scene which will lead to improved performance, full utilisation and solidified sustainability of EGI.

In order to be considered for the FP8 we need to show to the EC that our activities support implementation of the key actions from the related flagship initiatives and the experts' reports. Starting with the "Digital Agenda for Europe" and "Innovation Union", followed by the "Resource Efficient Europe" and closing with two reports on scientific data and cloud computing, a final conclusion can be only one. In the following years Europe needs the EGI community more than ever as a valuable and reliable partner in a challenge to achieve the vision of Europe 2020.

Thus, based on the general strategic and policy developments within EU, recommendations to the EGI.eu and EGI community are listed in Table 14.

Table 14

	Recommendations to the EGI.eu and EGI community
1) General	*The EGI.eu should:* 1) publish a quarterly report that comprises the latest strategy and policy

	development activities within the EU and track EU policy implementation and achievements of key targets in order to timely prepare appropriate response 2) establish a Communication and Lobby Strategy for the EU 3) investigate the possibilities to strengthen the role of the EGI community in international digital fora through effective promoting of EGI positions - through a greater coordination between DCI projects in areas which are relevant for the EU and through improved communication of EGI policy approaches and objectives at the global stage. 4) strengthen the DCI collaboration in order to better influence EU policy decision making processes through stronger and integrated external representation of interest of the DCI collaborative framework 5) create an internal work plan with defined timelines and responsibility within EGI.eu in order to implement the recommendations from the report. *The NGIs should:* 1) improve communication with their national authorities and check the latest development and measures taken by their states related to promotion and implementation of the goals of the Europe 2020 Strategy (e.g. various funding opportunities) 2) look for novel ways to use Structural Funds, or through facilitating formal collaboration with various public authorities, either by enhancing cooperation with private providers and potential industry partners, using a combination of private and public finance, including public-private partnerships (PPPs) and potential contribution from the European Investment Bank and the European Investment Fund.

6 REFERENCES

R 1	Europe 2020 - European Strategy for smart, sustainable and inclusive growth http://ec.europa.eu/europe2020/index_en.htm
R 2	The Future of Cloud Computing – Opportunities for Cloud Computing Beyond 2010 cordis.europa.eu/fp7/ict/ssai/docs/cloud-report-final.pdf
R 3	Distributed Computing Infrastructure (DCI) Collaborative Roadmap https://documents.egi.eu/document/172
R 4	Communication from the Commission to the European Parliament, the Council, The European and Social Committee and The Committee of the Regions - A Digital Agenda for Europe http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:0245:FIN:EN:PDF
R 5	Granada Ministerial Declaration on the European Digital Agenda: Agreed on 19 April 2010 http://www.eu2010.es/export/sites/presidencia/comun/descargas/Ministerios/en_declaracion_granada.pdf
R 6	European Council 17 June 2010 Conclusions ec.europa.eu/eu2020/pdf/council_conclusion_17_june_en.pdf
R 7	European Digital Competitiveness Report 2010 ec.europa.eu/information_society/digital-agenda/documents/edcr.pdf
R 8	Communication from the Commission to the European Parliament, the Council, The European and Social Committee and The Committee of the Regions - Europe 2020 Flagship Initiative Innovation Union http://ec.europa.eu/research/innovation-union/pdf/innovation-union-communication_en.pdf#view=fit&pagemode=none
R 9	Riding the wave - How Europe can gain from the rising tide of scientific data - Final report of the High Level Expert Group on Scientific Data - A submission to the European Commission cordis.europa.eu/fp7/ict/e-infrastructure/docs/hlg-sdi-report.pdf
R 10	Neelie Kroes Vice-President of the European Commission responsible for the Digital Agenda Unlocking the full value of scientific data Formal presentation of the report "Riding the Wave: How Europe can gain from the raising tide of scientific data Brussels, 6th October 2010 http://europa.eu/rapid/pressReleasesAction.do?reference=SPEECH/10/518&format=HTML&aged=0&language=EN&guiLanguage=en
R 11	The EU's Fifth Freedom: creating free movement of knowledge http://europa.eu/rapid/pressReleasesAction.do?reference=SPEECH/07/257&format=PDF&aged=1&language=EN&guiLanguage=en
R 12	Digital Agenda: EU grid project unlocks processing power of 200,000 desktop computers for European researchers http://europa.eu/rapid/pressReleasesAction.do?reference=IP/10/1119&format=HTML&aged=0&language=EN&guiLanguage=en

ANNEX I List of all recommendations

	Recommendations to the EGI.eu and EGI community
1) General	*The EGI.eu should:* 1) publish a quarterly report that comprises the latest strategy and policy development activities within the EU and track EU policy implementation and achievements of key targets in order to timely prepare appropriate response 2) establish a Communication and Lobby Strategy for the EU 3) investigate the possibilities to strengthen the role of the EGI community in international digital fora through effective promoting of EGI positions - through a greater coordination between DCI projects in areas which are relevant for the EU and through improved communication of EGI policy approaches and objectives at the global stage. 4) strengthen the DCI collaboration in order to better influence EU policy decision making processes through stronger and integrated external representation of interest of the DCI collaborative framework 5) create an internal work plan with defined timelines and responsibility within EGI.eu in order to implement the recommendations from the report. *The NGIs should:* 6) improve communication with their national authorities and check the latest development and measures taken by their states related to promotion and implementation of the goals of the Europe 2020 Strategy (e.g. various funding opportunities) 7) look for novel ways to use Structural Funds, or through facilitating formal collaboration with various public authorities, either by enhancing cooperation with private providers and potential industry partners, using a combination of private and public finance, including public-private partnerships (PPPs) and potential contribution from the European Investment Bank and the European Investment Fund.
2) Digital Agenda for Europe	*The EGI.eu should:* 1) attend a wide stakeholder debate on the progress at the annual Digital Assembly in the first half of 2011 2) as a part of the quarterly report, highlight information and keep up to date with the latest developments in the interoperability review of EU standardization policy, rules on implementation of ICT standards in Europe and adoption of a European Interoperability Strategy and European Interoperability Framework 3) as a part of the quarterly report closely follow the review of the EU data protection regulatory framework 4) as a part of the quarterly report present efforts and related information regarding the establishment of the EU strategy for cloud computing especially part that is concerned with the integration of clouds technology into Grid production

	5) ensure participation the EC organised gatherings between e-Infrastructure related projects and organisations and industry in order to actively promote their grid computing services and understand available commercial products and techniques. 6) within responsible EGI.eu policy groups closely follow the newest security policy developments and their impact on EGI security policies *The NGIs should:* 7) closely monitor the latest national laws and policies related to their work, especially the adoption of the European Interoperability Framework at national level by 2013 and implement commitments on interoperability and standards in the Malmö and Granada Declarations by 2013 8) intensify communication with public authorities in order to fully utilize both Structural and Rural Development Funds or planned increased national public spending on ICT R&D.
3) Innovation Union	*The EGI.eu should:* 1) as a part of the quarterly report inform and monitor the adoption EC legislative proposal on standardisation that will happen in early 2011 2) participate in developing agreement that should be reached with International partners on the development of research infrastructures by 2012, including ICT infrastructures, which owing to cost, complexity and/or interoperability requirements can only be developed on a global scale. *The NGIs should:* 3) clearly communicate to their Member States their funding needs since from 2010 efforts have shifted to considerably improve their use of existing Structural Funds for research & innovation projects and initiate the preparation of post 2013 Structural Fund programmes with an increased emphasis on innovation and smart growth specialisation and explore funding opportunities for the Cohesion Fund and European Regional Development Fund. 4) create an NGI/SME group that should be composed of a number of local and national small and medium sized enterprises who are given early access to EGI to help these companies think about how they can better utilize grid technologies in their business.[17]
4) Resource Efficient Europe	*The EGI.eu should:* 1) facilitate with a financial and organisational support from the EC a meeting together with green grids providers and stakeholders in order to see how EGI can meet these challenges and realise the concept of Green IT for the grid computing.
5) Report on scientific data	*The EGI.eu should:* 1) become part of collaboration efforts and position itself as an integral and central part of Collaborative Data Infrastructure 2) investigate the possibility of earmarking additional funds to the EGI community development of a Collaborative Data Infrastructure 3) be part of a study on how to create more universal and meaningful metrics 4) investing in providing additional incentives for using green

[17] In exchange, the SMEs provide their insights on how EGI.eu could be better adapted to meet their requirements.

	technologies in the data infrastructure 6) urge the Commission to establish an expert working group composed of different projects and stakeholders in order to discuss technical challenges and impediments and tackle bottlenecks that occur on the way to establish scientific data e-infrastructure.
7) Report on cloud computing	*The EGI.eu should:* 1) initiate the establishment of an expert working group (with the EC support) in order to discuss specific research and technical bottlenecks (interoperability, verification and reliability) with various public and private cloud computing providers, and among other things to simplify the integration of cloud technologies to the EGI production infrastructure 2) investigate the possibility of establishing cooperation with private grid providers that already integrated cloud technology to their grid infrastructure 3) investigate business models used by private grid providers