ZERO-IN
BUILDING INSIGHTS, BREAKING BOUNDARIES
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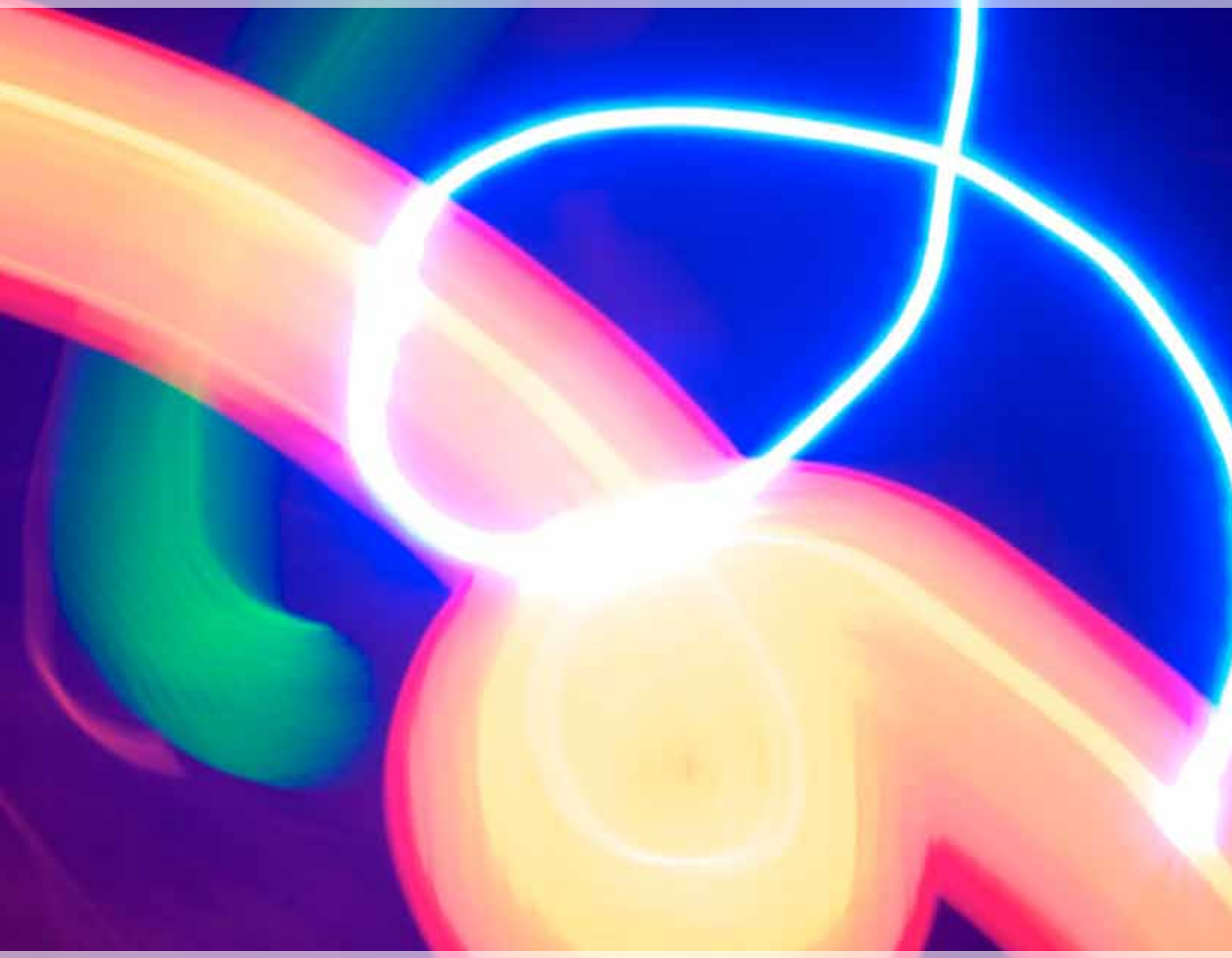

GOVERNANCE ISSUES FOR e-INFRASTRUCTURES

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ZERO-IN: BUILDING INSIGHTS, BREAKING BOUNDARIES

GOVERNANCE ISSUES FOR e-INFRASTRUCTURES

Dear Readers,

Welcome to this issue of Zero-In! We are glad to bring you insights from South Africa, Brazil and South-East Asia as well as debates on the cross cutting, special theme of this issue: governance.

Effective Governance gives research not only relevance but also long lasting benefits in society. The decisions on the structures and policies for sustainable operations and innovative development of e-Infrastructures go a long way to deciding whether there will be a social dividend from public support to this research paradigm. And as this 4th issue of Zero-In goes to press, there is everything to play for: decisions on governance are far from settled. This means that the next two years, starting from now, are going to be key in building tomorrow's e-Infrastructures. This issue brings you the latest thoughts on the issues at stake, and recommendations for future governance. The debate is also approached from the South African point of view: in global research communities, governance structures must adapt to those who must implement and use it, wherever they are. To bring this to life, we also have a fascinating interview on e-Infrastructures in Africa, with Prof. Samuel Elmaleh. He brings to life how e-Infrastructures are bought to users via different levels of government, discusses the different issues facing the regions in southern and Sub Saharan Africa, and looks at prospects for the future.

Alongside the governance theme, this issue also brings you a range of articles highlighting the cutting edge activities throughout the e-Infrastructures world, both in terms of research results and technology development. As you take these insights from the world of e-Infrastructures as inspiration, we wish you happy reading!

Stephen Benians
BELIEF-II Project Coordinator

HIGHLIGHTS ON THE COLLABORATION BETWEEN FRANCE/EU AND SOUTH AFRICA AND FUTURE CHALLENGES

An interview with Professor Samuel Elmaleh, Counsellor, Head of Cooperation at the Embassy of France in South Africa

In the occasion of the last international conference jointly organised by BELIEF and the CHPC in Johannesburg, South Africa, the BELIEF coordination team, with the support of Dr. Bruce Becker of the Meraka Institute (the interviewer), had the opportunity and pleasure to run an interview with Prof. Samuel Elmaleh. Several issues were addressed in order to have a deeper understanding of the actual collaborations between France/EU and South Africa, the challenges that South Africa is facing and the great collaboration opportunities that this amazing country offers to its European counterparts.
The interview was held in French and has been translated and reported in its entirety in English below.

Interviewer: Considering the success of Wisdom IST initiative in South Africa, why did you chose South Africa as partner for collaboration in this research area and which benefits brought this project?

Samuel Elmaleh: There are several reasons. The first one is that South Africa is a partner with scientific capacities similar to most northern countries: South Africa, at least for France, is not a developing country partner but a partner with similar scientific potentials as in Europe and/or in North America. It clearly appears that South Africa needs a cooperation based on excellence enabling South Africa to be a major player of the European Research Area. However, South Africa is challenged by a painful human resources scarcity. In order to alleviate the problem, all our programmes include a "capacity building" component (ie: strengthening of capacities, human resources training). You mentioned earlier the projects in the framework of SAFeTI (South African French Programme for Information and Communications Science & Technology). Most of the funded projects significantly contribute to capacity building. We are therefore involved in a double entry cooperation simultaneously focused on excellence and capacity building which enables to induce high-level research and academical cooperation.

Interviewer: How are bi-lateral projects between France and South Africa integrated into the system of the projects organised between South Africa and the European scale (ERA), in particular the FP7 projects and how do you collaborate with the other Embassies in bi-lateral projects in South Africa?

Samuel Elmaleh: Most of the programmes that we support, if not their totality, are designed to set up Franco-South African networks easily becoming Euro-South African that

facilitate the submission of projects to the Framework Programme. A few examples will clarify this concept. The first programme, which is a rather an old one, called Protea belonging to, according to the jargon of the French ministry for foreign affairs, the category of Hubert Curien Partnership, enables to support two-year projects in any discipline. These projects are considered successful when they open the path to a European project. Obviously, a two-year project per se does not have enough time to integrate a European project. We therefore facilitate the integration of the South African teams to the European networks of their French partners. We have another programme called SAFe Water (South African French Programme on Water Science and Technology) composed of four-year projects involving a high number of partners on both sides. Its main objective is to create perennial French-South African networks on a well defined project, then to facilitate the inclusion into ERA to finally crystallize on a successful European project. It is then obvious that with ERA-oriented programmes, we support the EU collaboration with South Africa.
Concerning the second part of your question related to our relationships with the others Embassies, of course we are coordinated. At the European level, the Science and Technology working group is coordinated by the Finnish Embassy. We are also coordinated with Germany which has similar programmes or with Italy in the field of grid-computation or in the synchrotron applications. I would say that each country brings its own sensitiveness. For instance, Finland is very

interested in ICT for development and its consequence on local governance, while feel closer to research, development and technological innovation in ICT. Even if the coordination could appear insufficient, efforts for a better harmonisation should be counterbalanced by the need of a healthy diversity.

Interviewer: So, is this not only for the sciences domain or also for the cultural one?

Samuel Elmaleh: Well, in the cultural domain things are slightly different. As you might be aware a network called EUNIC (European Network of Institute for Culture) has its headquarters in Europe, while local clusters can be set up by the founding members. The cluster can then admit associated members which are other European institutions than the founders. EUNIC, at least in the approach of the Delegation, targets essentially a cultural cooperation involving capacity building and strengthening of infrastructures in South Africa. On the other hand, South Africa is a country of vibrant culture with world-renowned artists, capable operators, international events and an interested public. South Africa is essentially willing to promote its art and culture throughout the world and to welcome on its soil cultural diversity. This means again that South Africa needs not a cooperation exclusively designed for developing countries.

Interviewer: what does your embassy does to promote the regional collaboration in the Sub-Saharan Africa, through e-Infrastructures?

Samuel Elmaleh: At the infrastructures level, investments and collaborations have been established, as several of these infrastructures benefit from fundings issued by the French Agency for Development (AFD) which operates at a regional level. Now, as far as the cooperation in science and technology is concerned, unfortunately not much is being done and we are still operating on a bi-lateral approach. Hopefully, our various programmes will be extended to other countries in the region. But still, it is very unlikely that this could be implemented in the short term.

Interviewer: Are there other bi-lateral projects between Sub-Saharan Africa (such as Namibia, Botswana, etc.) and France?

Samuel Elmaleh: Well, no, the problem is that we have to understand the structure of the French bi-lateral cooperation. France has official S&T cooperation, coordinated by an Attaché for Science and Technology, in countries whose scientific capabilities are well established. South Africa is one of them and its achievements in S&T are well acknowledged throughout the world. However, an unofficial cooperation is carried out with the other Southern African countries by the CNRS, IRD, CIRAD and French universities.

Interviewer: But is this possible through the activities of French agency for development (AFD)?

Samuel Elmaleh: Well, the French agency for development is principally interested in development in the conventional sense of the term which includes infrastructures, big fundings, sustainable development, energy, etc. As far as trainings is concerned, the AFD is interested in some fields, for instance in water management.

Interviewer: We have noticed a qualitative evolution in the collaboration between Europe and South Africa in the sense that previously collaborations were performed between individuals while they are now performed between institutes and infrastructures. Would you like to comment on this?

Samuel Elmaleh: Yes. In South Africa collaboration between individuals has been the basis of cooperation and it is still strong, at least with the UK, but it is evolving. As you may be aware, we have, in this country, a representative of the CNRS which is the principal institution for research in France, a representative of the IRD (Institute of research for development) and we have a representative of CIRAD (International centre of agronomical research for development). Their presence induces a strong cooperation between institutions, independently of the institutional relation between governments. Moreover the Embassy, along with the DST, encourages institutional collaboration. It is clear that an institute like the CNRS has its own logics. We are informed of their agreements with the National Research Foundation, but we cannot control their cooperation .

Interviewer: And do you wish to make any changes or is it working well this way?

Samuel Elmaleh: Absolutely no. Each entity has its own logic. At the end of the day putting everything together create a more robust cooperation because diverse and complex.

Interviewer: In your work in South Africa, which obstacles have you identified to implement the e-Infrastructures, to gain benefits from them, and what have you done to overcome this obstacles?

Samuel Elmaleh: Some difficulties were met at the very beginning: for example French researchers can ignore the resources available in South Africa and feel shy in cooperating with this country. As soon as they discover South African facilities and peers they change their mind. INRIA, for instance, has a relatively important collaboration with North Africa, West Africa and is now starting collaborating with South Africa. In fact, when INRIA met the South African teams in the occasion of a seminar to launch the programme SAFeTI they completely changed their approach.

Interviewer: And I think that the French Embassy has instruments to voice what happens in South Africa and support the enlargement of knowledge focussing particularly on French researchers.

Samuel Elmaleh: Yes, well, what we usually do, once the DST and ourselves identify a domain where it would be interesting to have a collaboration, is bringing French researchers and their South African counterparts into a brainstorming. It generally works very well because French researchers discover a research of high quality as well as a lot of potentials, while young South Africans appear very interested in spending some time in Europe and then coming back with new expertise.

Interviewer: So we are now talking about more possibilities than obstacles?

Samuel Elmaleh: Indeed. There are no real obstacles. The only difficulties, as I said earlier, are related to an unawareness of the South African offer by some French researchers. And this obstacle is overcome quite quickly. We also have to say that on the South African side, the DST is so efficient and so active that there cannot be difficulties on the South African side!

Interviewer: This is good to hear! Thinking to the future, what emerging scientific applications do you consider as having priority for the EU collaboration with South Africa?

Samuel Elmaleh: I would say that two domains seem to have priority. The first domain, and this is evident, is the one which

will be linked to radio-astronomy. There are two possibilities: South Africa may or may not win the bid for the Square Kilometre Array. If it wins it, the needs in terms of signal treatment, materials, communication are going to be such that all fields surrounding radio-astronomy will become of utmost importance. But if South Africa does not win, the many efforts placed in Astronomy and Space Sciences will make of these fields a forefront for the development of the country.
The second point which seems very interesting is that this country has deployed huge means for the benefits of research development even if, so far, this country does not necessarily obtain in return the expected commercial interests. We are often talked of the technological chasm which affects South Africa. Therefore an adequate cooperation domain concerns innovation management (ie: how to pass from an idea born in the laboratory to a commercial application). And this is not something which can be done in the short term. Financial means as well as regulatory means are necessary.

Interviewer: Last question: Grids have generated high interest in several Sub-Saharan African countries. Is it necessary to establish a mechanism which would coordinate the development of e-Infrastructures in the Sub-Saharan Africa in order to avoid a fragmentation and which role France could play by implementing such a mechanism of coordination?

Samuel Elmaleh: I think that Europe should coordinate the activities of the different countries in the e-Infrastructures sectors. It appears very clearly the importance of having a very precise cartography (mapping) of the e-Infrastructures in order to understand who can do what. Europe can be present as an advisor, but I think that South Africa and Africa in general should organise their proper coordination to manage the e-Infrastructures. Another point which shall be taken into consideration is the fact that, companies and/or research institutes need the cloud computing or use servers which are not necessarily visible to our eyes and Africa will have the possibility to avail of the experience which Europe already gained in this sector.

Interviewer: Do you think that there is an African structure able to carry out such a role? The parliament maybe or even the SAGrid?

Samuel Elmaleh: Nowadays, considering how Africa is structured, I would say either the Council of ministries or this could come from the initiative of one of the most advanced countries (for example South Africa). I know very well that every time that South Africa take an initiative in this domains the other countries say "fine but before we go ahead let's be careful, etc…" but I think that this is part of the game. South Africa is well ahead of the other countries and the other African countries should take advantage of this. I say take advantage but not suffer from it. But this should be decided through a series of dialogues between South Africa and the other African countries.

Interviewer: Do you, then, think that someone should take the responsibility to promote the idea of e-Infrastructures throughout the continent?

Samuel Elmaleh: Well you know, each time something incredible has happened in the history (we can think about the discovery of America, the adjustment of the world finance, informatics) one man or some men where necessary to encourage and support the events. It is thus vital that, somewhere in Africa or in South Africa (South Africa is still Africa), some persons stand up saying: "here is what we can do together, here are the potential consequences, who is going to give us the political power to do it?".

Interviewer: Could you please give us your opinion concerning the new service of external actions of the European Union and how do you think this could evolve in the system of bilateral collaboration with the European scale (this may be linked to one of the questions asked earlier).

Samuel Elmaleh: I think this is the normal evolution of the Commission and then of the European Union. In a few years will the different member states of the European Union need to have or will have a foreign policy? Will they still need to have a common position? Are we going to have a European Union president elected through the universal suffrage?… We do not know yet. But what is very clear is that today, the scientific services of the French Embassy, of the Italian Embassy, of the British High Commission do what is in their possibilities. This said, all these countries are all linked by an adventure which goes beyond our control which is the European adventure. We know that the European Union still has many challenges to face. The unification procedure is expensive and that the return on investment is not necessarily at the level of what has been invested. But there is a mechanism for this story. History has changed and single European countries cannot count that much anymore in the world scale. Which are the two countries who are going to count the most on the economic and thus the technological and thus the cultural futures of our countries? USA and China. If all European countries stay together, they constitute a certain power. If they split, they become marginal. So I believe that one day, we will have a unified scientific and technological service of the European Union level and that it will not be necessary anymore to have a service in the Embassy of France of Italy etc. Eventually, this unified service will lead the policy of the European attractiveness and will lead the policy of the European unified technological cooperation. We hope that this procedure will not take us/EU a long time to become reality.

Interviewer: Maybe this evolution will play the role of a catalyst and will accelerate this implementation?

Samuel Elmaleh: Yes perhaps, we will see! What can be said is that today, the political power which has been granted to the European Union is a political power which has given with one hand what it has removed with the other hand.

Interviewer: Well on these note and thoughts, we thank very much, again, Prof. Elmaleh for his time and interest and wish to the Zero-In readers a very inspiring read!

GOVERNANCE ISSUES FOR e-INFRASTRUCTURES

By Fotis Karagiannis, Independent Consultant AUEB/e-IRGSP2, Greece

According to Wikipedia "governance" is the "activity of governing, relating to decisions that grant power, verify performance and define expectations". For an organization or a project, "governance relates to consistent management, cohesive policies, processes and decision-rights for a given area of responsibility".

Equally, governance of major e-Infrastructures relates to the structures and policies responsible for their sustainable operation and innovative development. This article outlines major European and national e-Infrastructure governance models, together with related governance issues.

CURRENT SITUATION

The European e-Infrastructure consists of different service components that are separately organised and operated. If presented in layers, the research networks would constitute the bottom layer; computing and storage facilities would sit on top of networks; and the data component would sit on the top-most layer. Computing and storage e-Infrastructures can be further sub-divided into "grids" and "supercomputers". Grid middleware, which used to be included in the computing and storage layer, is gradually moving towards autonomy. Other sub-layers such as "cloud computing" are about to appear.

e-Infrastructures usually start as isolated islands (with emphasis on innovation) and gradually consolidate and mature (with a shift in emphasis towards interoperability). The different layers have different maturity levels: the network (on the bottom) is most mature, while the data layer (on the top) is least mature.

Given Europe's federated approach – involving a series of nations – e-Infrastructures tend to be distributed, integrating national resources into a common pool. In addition to European and national levels, other levels can also exist, such as regional (either multi-country or intra-country) and campus levels. Thus a hierarchy of levels, each injecting some appropriate management structure, forms each component of e-Infrastructure's "picture puzzle".

The above e-Infrastructure components can be associated with corresponding European and national initiatives and related projects:

- Research networks: GÉANT and the National Research and Education Networks (NRENs), along with their TERENA association
- Grids: EGI and the National Grid Initiatives (NGIs)
- Supercomputers: the PRACE initiative and National Supercomputing Centres
- Grid Middleware: EMI and Middleware Consortia

Although these components have predominantly self-governing structures, there are sound interactions between them. For the data component, although there are related flagship projects, there is still no clear governance model. The e-IRG e-Infrastructure Roadmap identifies this issue, which will gain interest in coming years (see also the joint e-IRG-ESFRI e-IRG Data Management Task Force report and the vision for a Global Research Data Infrastructure 2020).

ISSUES AND CHALLENGES

Some obvious governance issues come to mind when considering this e-Infrastructure ecosystem:

- How firm are the boundaries of the different e-Infrastructure layers? Should these layers be kept separated or integrated? History indicates a trend for separation, an example being the new independence of the grid middleware component, which has spun-off from the grid world. However, an integrated approach to e-Science services should be gaining space, yet this is not yet visible. A top-down user-centric approach could be also considered for the developing data layer. At the national level, integrated approaches are more frequent.
- Should there be centralised or decentralised governance of each of the components? And to what degree? Current approaches demonstrate equilibrium between centralised and decentralised governance: most national entities maintain their own independence, while the European structures carve wider policies and strategies.
- How are different stakeholders, including users, represented? There is no homogeneous approach that characterises the different components. The gravity of users towards some components (posing their requirements) can define their representation. Policy stakeholders, such as the e-IRG and ESFRI, play important roles in shaping strategies. Notably, e-IRG will be preparing a report provisionally named the e-IRG "Blue Paper", focusing on effective approaches to developing and implementing ICT tools across the range of Pan-European research infrastructures.
- Federated vs. other approaches? Federated approaches currently dominate the different e-Infrastructure components, however other approaches are possible. "Cross-border fibres" is one such approach, and currently co-exists with the federated approach.
- What about funding and business models? Should service fees be introduced? How will innovation and industrial involvement be promoted? These are very hot issues without easy answers. In some cases, such as that of EGI, business models are being developed (following the EGI blueprint) in which

service charges will be gradually introduced, but industrial involvement is still a challenge. PRACE is actively cooperating with industry in developing supercomputing prototypes, while new instruments such as Private Public Partnerships (PPPs) and Joint Technology Initiatives (JTIs) supported by the EC may fertilise such collaboration.

EUROPEAN AND NATIONAL GOVERNANCE MODELS

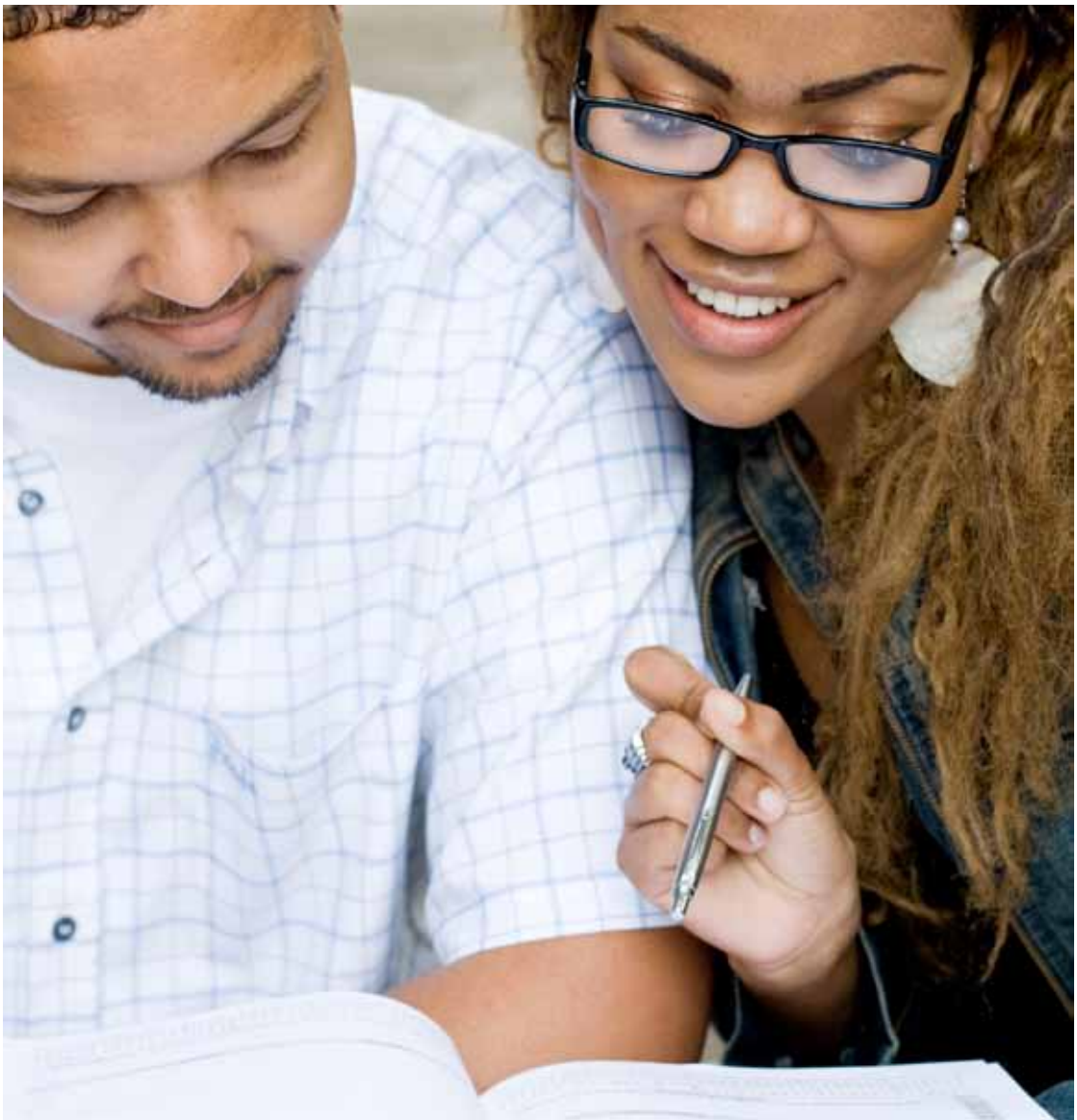
Governance models for major European e-Infrastructures, such as GEANT, EGI and PRACE, were presented at the EGEE'09 conference and at the 7th e-Infrastructures concertation meeting. Interesting examples of national e-Infrastructure governance models include the following:

- Germany has created a new legal entity to play the role of German NGI (a distinct approach)
- Greece has expanded its NREN to cover the grid and supercomputing components (an integrated approach)
- The Netherlands are moving towards improved coherency, positioning all e-Infrastructures under the same SURF umbrella (a coordinated approach)

CONCLUSIONS

Governance models are not yet well established. The governance of the European e-Infrastructure ecosystem will take shape in the years to come and should be carefully worked out by all stakeholders, aiming towards integrated service offerings for user communities (i.e. focused on infrastructure as a service). The role of the European Commission is vital in this. The EC has already taken steps to bring all stakeholders around the same table to discuss the future. Finally, a new legal instrument has been created – the European Research Infrastructure (ERIC) – as a flexible response to some of the above issues.

Disclaimer: The views expressed in this talk reflect the opinions of the author and not necessarily of the referred project or organisation



GOVERNANCE CONSIDERATIONS FOR SOUTHERN AFRICAN E-INFRASTRUCTURE

By Bruce Becker, South African National Grid, on behalf of SAGrid JRU: Prof. C. J. Wright, Prof. J. W. A. Cleymans, Prof. J. Tolmie, Mr. A. Juyn, Mr. A. Vorster, Mr. I. van Rensburg, Dr. Z. Z. Vilakazi, Prof. F. Joubert

South Africa stands as a potential scientific leader in the Sub-Saharan region, thanks in part to its position on e-Science and related e-Infrastructures. Since these areas are rapidly evolving, technology can leap ahead in terms of functionality and quality of service. However, there are also associated risks: choosing immature technologies, for example, can lead to irrelevance or isolation. How then, are South Africa's e-Science investments best governed?

CENTRALISED VS DISTRIBUTED

Perhaps a defining feature of e-Infrastructure is that it is distributed. Distribution can be seen to be synonymous with "dilution"; however, it is precisely this feature that provides key strengths: elasticity, resilience and adaptability. A distributed infrastructure is "governed" as opposed to "managed". Instead of one point of governance with a strict hierarchy, it has a flatter structure, reflecting the nature of activities that e-Infrastructures support: predominantly collaborative, cross-disciplinary and integrative. e-Infrastructures are also enabling, providing researchers who would otherwise be excluded with access to remote and interoperable resources. This is acutely significant in Sub-Saharan Africa, where often there is no such research infrastructure. Such exclusion limits research output and subsequent innovation, negatively affecting society, quality of life and GDP. e-Infrastructures tend to level the playing field, lowering barriers to entry and providing access to more researchers from a variety of disciplines. Thus, a sophisticated governance model is required to recognise these users and the special role that e-Infrastructures play in their activities.

WHY GOVERNANCE?

Governance structures and policies exist to address issues such as:

- sustainability and certainty of future activities
- inclusion and fairness of use
- quality of service, as well as corrective or preventative action
- engagement of new user communities, to ensure relevance of these services and resources
- long-term development and improvement of services and resources
- appreciation, protection and proper exploitation of research output value, and the encouragement of the production of such

CHOOSING A GOVERNANCE MODEL

Perhaps the best model for the governance of e-Infrastructures is that of a federation, with a (possibly rotating) central component and several confederates providing a similar level of resources. Such a model highlights the cohesive nature of governance.

However, we may also use the metaphor of an ecosystem, which highlights the collaborative nature of the infrastructure. Focussing on cohesion and collaboration as fundamentally positive aspects, we reach a scenario where:

- divergence is naturally avoided, since each confederate (organism) is dependant on the others to provide a whole that is stronger and better equipped than could be achieved individually or in any other combination
- a large degree of freedom is permitted to the confederates (organisms), since there is no single point of failure or control; the departure or temporary shortcoming of one does not imply failure for the federation (ecosystem) as a whole, providing resilience
- so long as a minimum level of participation is respected, further participation is encouraged and beneficial, since it adds more resources for a minimal investment by the confederate (organism), relative to the total investment of the federation (ecosystem)

- sustainability is encouraged due to the mutually dependant co-investments made by the confederates (organisms)
- strong coordination and reliable execution of activities by the central component encourages – and stems from – an appreciation of the benefits of collaboration and resource sharing
- well-managed and credible technical coordination encourages uptake of services by user communities, which in turn justifies the initial investment, favours expansion, and contributes to sustainability of the infrastructure
- the self-interest of user communities promotes self-organisation and hence more efficient exploitation of the infrastructures

We have of course painted a biased and rosy picture of the effects of governance in a specific model. Counterpoints not considered here, given the space constraints, are the separation of responsibilities for governance activities, including the need to consider conflicts of interest or expertise.

EXECUTION, EXPLOITATION, EXTENSION AND MANAGEMENT

Governance of public research infrastructures is generally guided by two groups: those providing the service and those using the service. Yet this is not a one-way producer/consumer relationship:

- the consumers often fall under the same institutional boundaries as the producers and are sometimes the same group of people
- the infrastructure is generic, widely appealing, and therefore of great interest across scientific domains

Research support structures exist to satisfy the needs of research communities. Thus governance, no matter its form, should take its cue from these users. An organised and responsible User Form is essential to the ultimate success of e-Infrastructures, as is mutual understanding between the users and providers of e-Infrastructure services.

CARING FOR RESEARCH, NOW AND FOR YEARS TO COME

By Steven Newhouse, EGEE-III project, Switzerland

It is a thrilling time to be a researcher. This fall at CERN, Europe's organization for particle physics research located in Geneva, Switzerland, the world's most powerful particle accelerator, the Large Hadron Collider, successfully re-started.

In our best estimates, LHC researchers will have enough data for solid analysis to make a confident announcement of the Higgs Boson (if it is there) in 2012, give or take a few years. If the Higgs is nowhere to be found, this could yield something even more interesting: a complete revolution in our understanding of how space and time are woven together. Peering beyond the horizon of particle physics however, is a rich landscape of exciting research: observatories, machines, projects and research facilities still in their infancy, but similar in ambition to the LHC. These projects appear on the European Strategy Forum on Research Infrastructures (ESFRI) roadmap and are as high profile in terms of data as the LHC at CERN. LHC experiments and researchers use distributed computing resources managed by the Enabling Grids for E-sciencE project. This same infrastructure – made of distributed computing clusters and storage devices connected via high-speed networks – also supports research in the earth sciences, life sciences, humanities and more. It is very probable that many of the data-intensive ESFRI projects will also use this infrastructure for their data storage and computing needs.

BUT HOW TO RUN IT?

In April 2010, EGEE will draw to a close. Care for this infrastructure will be continued by a new organisation: EGI.eu. EGI.eu will be initially supported by the EGI-Inspire project and is tasked with coordinating the European Grid Infrastructure. In this new phase, the longevity of the high-quality production infrastructure will be ensured as funding for its operations switches from short-term project cycles to a permanent organisation. The current state of e-Infrastructures like that coordinated by EGEE mirrors what we saw in research networks twenty years ago: these high-speed dedicated research networks began

CERN's Globe of Science and Innovation on a spring evening. Photo by Maximilien Brice, image courtesy of CERN.

as independent systems, using protocols and tools as different as the grammar and punctuation in different languages. Trans-network tasks were difficult if not impossible.
Independent national initiatives led to the EU-EC promoting common standards, resulting in the GÉANT network infrastructure and the creation of the DANTE organization in 1993. As a result, these high-quality networks have assumed an essential role in European and global scientific cooperation.
As e-Infrastructures become more formalised, the issues related to their governance are not technology-specific, but issues that any organization must make decisions about. This is a signal of their maturity. Broadly speaking, these issues are sustainability of funding, sharing of power, and security of usage.

SUSTAINABILITY OF FUNDING

Just as a nation relies on taxes to fund itself, e-Infrastructures need steady sources of money for operation and maintenance. EGEE has been dependent on project funding from the European Commission, reapplying for this every two years. The European Grid Infrastructure will become more sustainable by moving towards the self-sufficiency of its central coordinating organisation EGI.eu. EGI.eu will support the organisational, technical and operational governance of Europe's production-quality distributed computing infrastructure by asking its members (the representatives of national or community resource providers) to make a financial contribution to the organisation's running costs. During the transition to the EGI model, EGI.eu will be supported by the EGI-InSPIRE project, funded by the EC. EGI.eu is expected to explore other mechanisms for distributing the cost of the non-profit organisation, such as service charging.

SHARING OF POWER

e-Infrastructures, like any sovereign group, must set rules for power sharing. EGI members are all represented in the EGI Council, which controls EGI.eu – deciding each year on the longer-term priorities and direction of the organisation. The EGI.eu Executive Board, which forms the legal representation of EGI.eu, provides regular guidance to EGI.eu and the EGI.eu Director. The governance of EGI.eu reflects that of many public companies: the shareholders (the EGI Council) elect a board of directors (the EGI.eu Executive Board) that supervises the work of the senior managers (the EGI.eu Director and staff). As within a company, in the EGI Council the number of votes is related to the financial contribution each member makes to the running of the organisation.

SECURITY OF USE

Security is the last primary issue e-Infrastructures will come to grips with, balancing efficiency for all users with an appropriate level of caution. As EGI.eu and the activities it represents assume a higher profile, they need to fit within national legal structures and global political safety issues. We must be prepared to deal with complicated questions: Who is allowed to view data? Should all countries have access to e-Infrastructures, regardless of their politics? Should all data move freely across national boundaries and between different legal jurisdictions? These infrastructures are potential targets—how do we safeguard them? Who is accountable when something goes wrong?
None of these issues represent an unscalable barrier to the establishment of a sustainable pan-European infrastructure, and through the work of projects such as EGEE, possible solutions to many of these issues have been established. As EGI establishes itself with the national legal frameworks of the European Union, its member states and international collaborators, it will inevitably adjust and finetune itself to best serve the needs of the research community.

'TOWARDS-REACH': PREPARING THE FINLTSER NETWORK FOR THE E-INFRASTRUCTURE ERA

By Helena Karasti, University of Oulu, FinLTSER Network; Minna Isomursu, VTT Technical Research Centre of Finland; Taru Peltola, Finnish Environment Institute; Sanna Talja, University of Tampere, Finland

The Finnish Long-Term Socio-Ecological Research (FinLTSER) Network is preparing to meet the imminent challenges and steep learning curve associated with e-Science Infrastructures. LifeWatch, an ESFRI initiative of interest to the FinLTSER Network (http://www.environment.fi/syke/lter) due to its participation in the LTER-Europe Network, is scheduled to begin operations in 2014. LifeWatch is currently in a preparation phase of constructing and bringing into operation an e-Science infrastructure for comprehensive biodiversity research supporting understanding of life on Earth.

To prepare for this challenge, FinTSER Network has commenced a proactive 'reach-towards' approach to e-Science infrastructures, based on integrating learning and capacity building in its ongoing research activities.

Flexible, mashable, configurable, amenable

FinLTSER has chosen to work with Web-based collaboration tools, since they are amenable to bottom-up approaches, easy to adopt and use, foster open communication and information exchange, and empower end users by providing open interfaces and the possibility for mash-ups and content creation. Further, as researchers learn to use and appropriate these flexible, lightweight, easily configurable and rapidly deployable Web-based technologies, they can also modify their own research to take advantage of e-Science's visions. Adopting new Web-based collaboration tools can pave the way towards large-scale e-Infrastructures that still need time and effort to mature into functional and effective environments.

Starting from Skype

As a first step, a preliminary study involving a small educational component was conducted to gain an understanding of FinLTSER participants' current use, experiences and views of Web-based tools. Interviewees were asked to view a presentation on Research 2.0 tools and services to enhance their awareness of the tools available and encourage reflection on their usefulness. Some of these tools were then integrated into the subsequent interview process, e.g. Slideshare for distributing presentations, Doodle for scheduling, and Skype for conducting the interviews. Interview findings confirmed the need for learning and assistance in getting started with the tools. Aligned with Open Science ideas, a forum was then used to elicit ideas and find research partners with a suitable mix of expertise (http://tutkimus.parvi.fi).

Participatory design

We have applied for R&D funding for an interdisciplinary project that will integrate ethnography, participatory design and technology development. In this setting, from the point of view of learning and capacity building, a participatory design forum is essential.

- LTSER participants will bring to the table their particular experience as working scientists, information managers and technicians
- ethnographers, having studied actual work practices within the FinLTSER network, will submit detailed descriptions of work and identify common problems and critical development needs;
- technology designers, in addition to the Web-based tools, will contribute innovative technologies as props for generative design thinking;
- science and technology studies (STS) researchers will contribute consideration for disciplinary differences and issues of interdisciplinary working.

Throughout the four intended action research cycles, participants will engage in

- co-analyzing research work to identify needs and transformations in existing practices,
- learning about and assessing available tools, and
- co-creation to uncover ways in which new forms of knowledge are being (or could be) generated by creative use of Web-based technologies and digital resources.

To achieve this we will use methods from the participatory design tradition. With roots in the Scandinavian countries of the 1960s and 1970s, participatory design is an approach to technology design that actively involves all stakeholders to ensure that the technology designed meets the needs of and is usable by its intended users. Mutual learning is an important part of collaboration that recognizes the different areas of expertise of different stakeholder groups; it thus allows, for instance, for design professionals to learn about the actual use context, and for users to learn about possible technological options.

Participatory design methods promote a practice where both technology and work are in focus, and where users are able to take an active part in technology design. Concrete methods include organizational games, future workshops, mock-up design and cooperative prototyping.
Thus, starting with a small-scale, bottom-up approach, the intention is for FinLTSER participants to become more knowledgeable and demanding future participants in the forward-facing, large-scale e-Science Infrastructures.

VOLUNTEERING FOR A BETTER WORLD: HARNESSING TECHNOLOGY AND WILLING CITIZENS

Using the strengths of distributed computing, researchers and citizens can participate in a new way of doing science

By Danielle Venton, CERN, Switzerland

We live in a time when nearly all information is available to nearly all people everywhere. We are entering an age where all types of people can also contribute to many types of information. A bus driver in rural Romania may be part of a biomedical research project; a banker in Los Angeles might moonlight as a collaborator in an astronomy project.

This new movement, called "citizen science," allows non-specialist volunteers to participate in global research. The projects are diverse: from backyard insect counts (the Firefly Citizen Science Project) and galaxy classification (GalaxyZoo), to studies of malaria (MalariaControl.net) or prime number searches (PrimeGrid).
The marriage of distributed computing with citizen science represents a potential revolution: it gives scientists access to more resources and makes "cybercitizens" active participants in the research process. With a few mouse clicks and 20 minutes to spare, a person can aid scores of projects. They can assist in as many or as few projects as they like, and their involvement does not damage the performance of their own computer. Considering the average desktop is idle about 80% of the time, its spare computing cycles represent a large resource. After downloading the needed software, a computer's spare analytical power is harvested to work on small pieces of a large problem, sent from the project's server. Once completed, results are sent back to the project. Sharing large tasks in this way can reduce the time needed to solve complicated problems.

Where to start?

Many of these projects use the common software platform BOINC (Berkeley Open Infrastructure for Network Computing). The BOINC site points to nearly 50

projects covering climate change, astrophysics, earthquake monitoring, epidemiology, the search for extraterrestrial life and more. BOINC's volunteers – about a third of a million people – donate an average of 4,540.83 TeraFLOPS in 24 hours.
Other citizen science portals include World Community Grid and EDGeS. World Community Grid, sponsored by IBM, has nearly half a million members and promotes humanitarian and medical applications such as Nutritious Rice for the World and FightAIDS@home.
The EDGeS project, or Enabling Desktop Grids for e-Science, links publicly funded service grids, such as Enabling Grids for E-sciencE (EGEE), to BOINC-based volunteer or "desktop" grids. This means that researchers can put their service grid applications on volunteer grid systems, and volunteers can contribute to applications on service grids.

Human computing: distributed thinking

An intriguing sub-variety of volunteer projects call for "volunteer thinking." These projects share out tasks that require human intelligence for accurate processing. For example, the human brain is able to recognize galaxy shape and type more quickly and accurately than any computer. Thus, Galaxy Zoo volunteers are working to manually classify images of the near quarter million galaxies that have been collected through the Sloan Digital Sky Survey. This work helps astronomers understand how galaxies form. Similarly, a UNOSAT (the United Nations Institute for Training and Research Operational Satellite Applications Program) project called AfricaMap. The purpose of this project is to produce updated georeferenced data. It will rely on volunteers to mark roads, bridges, rivers, fields and such using satellite images of rural Africa, thus updating old maps and creating new maps for previously unmapped areas. Accurate maps will help aid workers to reach remote areas and scientists to track the progress of climate change. This project, and others like it, are being collected under the umbrella of the Citizen Cyberscience Centre, a partnership between the University of Geneva, the UN Institute for Training and Research, and CERN (the European Organization for Nuclear Research).
Interest in contributing? Visit Africa@home, BOINC, EDGeS or World Community Grid .

EXTENDING e-INFRASTRUCTURES GLOBALLY THROUGH REGIONAL COOPERATION

By Alberto Masoni, INFN Cagliari, Italy, and Federico Ruggieri, INFN Roma Tre, Italy

The European Commission is investing in the extension of European e-Infrastructures to other regions of the world. A number of different collaboration models have been established, with impacts typically focused on specific regions.
Thus although big steps have been taken to extend European Grid technology and principles to other regions, the results have to be leveraged and customised to provide an overall model for sustainable interoperation between the European Grid Initiative/Infrastructure and external e-Infrastructures.

The state of the art

Over the last decade, the European Commission has provided separate funding for different e-Infrastructure layers and their interactions with different world regions. Coordination of different these grid efforts has been restricted to the exchange of basic operational, organisational and technological know-how. In some cases, know-how has been collected in common repositories with the aim of discussing and possibly pushing for interoperability.
Non-European e-Infrastructures generally fit into one of three regional situations:

- The region is a completely green field and must be supported from scratch (e.g. sub-Saharan Africa with the possible exception of South Africa)
- A regional e-Infrastructure has been started and there is already a promising level of awareness (e.g. the Mediterranean, Latin America, and the Caribbean).
- The region has autonomously invested in e-Infrastructures and is willing to interoperate with European initiatives (e.g. China, India, USA, Japan, etc.).

In each case, the role of European partnership differs, whether it be in the choice or number of possible activities (training, dissemination, interoperations, standardisation, etc.), or in the mode of addressing these activities (training of users and/or technical people, dissemination towards high level policy and/or communities, etc.).
Two examples are India and Mediterranean.

India

India has two main e-Infrastructures: the GARUDA National Grid Initiative and the National Knowledge Network. The FP6 EU-IndiaGrid project, whose partners were key actors in GARUDA and NKN, worked to coordinate collaboration between these initiatives and existing European e-Infrastructures. This collaboration will be furthered by the FP7 EU-IndiaGrid2 project, which started in January 2010. The project was launched at the EU-India workshop on Research Infrastructures and opened with a speech from Dr Chidambaran, Principal Scientific Adviser to Indian Government. In this same month, the Government of India accorded in principal approval for the establishment of the full National Knowledge Network infrastructure. The NKN will have multi-gigabit/sec bandwidth capability, two orders of magnitude more than that provided thus far to India's scientific and academic community. The infrastructure currently connects about 50 research institutions.

The NKN is another step forward in India's march towards a "developed" country status. This electronic digital network – with its high bandwidth (comparable to that available in developed countries) and low latency – will facilitate interactions between institutions, enabling remote access to computer resources, databases and even advanced research facilities

GARUDA, the National Grid Initiative of India, has been operating since 2004 and aims to provide for the requirements of data- and compute-intensive science in the 21st century. The GARUDA project is coordinated by Centre for Development of Advanced Computing (CDAC) and is operated by ERNET (Indian Education & Research Network). Most of the GARUDA network is now operating within the NKN.

Mediterranean and Middle East

Co-funded by the EC within the Sixth Framework Programme and coordinated by INFN, the EUMEDGRID project supported the development of a grid e-Infrastructure in the Mediterranean area and promoted the porting of new applications on the grid platform, thus allowing Mediterranean scientists to collaborate more closely with their European colleagues. EUMEDGRID promoted grid awareness and competency across the Mediterranean and identified new research groups, helping them to exploit grid's enormous potential EUMEDGRID aimed to improve the technological skill and know-how of computing professionals across the Mediterranean. A pilot Mediterranean grid infrastructure, today composed of 25 sites in thirteen countries, was set up, and this grid is interoperable and compatible with that of the EGEE project and related initiatives. A new project, EUMEDGRID-Support, began in January 2010 with the aim of consolidating and building on the results of the EUMEDGRID project.

Measuring the benefits of e-Infrastructures

To date there has been limited focus on evaluating the quantitative impact of e-Infrastructures and their influence on research, the economy, and industry.

Qualitatively, e-Infrastructures are actively:

- enhancing international and inter-field collaboration by supporting geographically distributed communities.
- increasing participation in high quality research by improving access to scientific resources.
- fighting the digital divide and brain drain by stimulating local scientific and technical development; network connectivity allows scientists to work from their home laboratories and with local universities.
- improving circulation, cross-fertilisation and validation of new ideas and activities across the continents.
- improving industry's access to research products, developed faster and using fewer dedicated resources.
- enhancing the use of ICT technologies and progress towards effective liberalisation of communication and education, thus contributing to the global economy.

Is it hard to quantify these qualities and produce indicators that mark the success of the investments made? Of course it's not easy, and one of the issues is how to identify those improvements that are due to e-Infrastructures and not to different economic or political situations.

Two projects have been making attempts in this direction: the EARNEST foresight study, funded by the European Community through the Sixth Framework Programme, and the ERINA study, which looks at extending the use of research infrastructures to e-Health, e-Learning and e-Government domains. Follow-up projects ERINA4Africa and EUMEDGRID-Support plan to work in cooperation to survey relevant North African and Middle-Eastern case studies.

INNOVATIVE COMPANIES AND CLOUD COMPUTING

By Aake Edlund, BalticGrid/KTH, Sweden

To maintain a competitive advantage through innovation, companies of today must handle increasingly dynamic environments and increasingly rapid innovation cycles.

Cloud computing is addressing many of these challenges, especially the possibility of rapid and cost-efficient prototyping and scaling. In this report we describe an example of how an EU-funded academic grid project supports small and medium enterprises (SMEs) and startups through a cloud service.

Grids and SMEs

The uptake of grid technology by small and medium-sized companies has not been as high as anticipated. One reason is possibly the complexity of the underlying problem: sharing resources in a seamless fashion requires complex techniques to ensure security and control.

In many ways the grid offering is useful from a business perspective (for example, in establishing new markets for resources), but users are still required to work hard to join grid environments and to port applications. In addition, the concept of sharing resources is still a barrier in many industries and also within corporations; security, especially mutual trust issues, is usually the first obstacle mentioned. Another issue is the overall quality of the open source middlewares, still considered too low for many companies.

Clouds - a new way to attract SMEs

Compared to grid, cloud services are less ambitious and thus less complex, resulting in a reduced barrier for the user, as well as higher security, availability and quality.

These simplifications, along with cloud's high degree of flexibility, have stirred great interest from industry, and while open grid efforts are lead by academia, cloud computing is to a high degree driven by business.

For smaller companies flexibility is the key: the ability to quickly launch and de-launch, or to move capital investments (buying hardware) to operation expenses ('hiring' infrastructure, pay-per-use). Larger companies are more hesitant, trying clouds in a stepwise manner, combining private clouds with public-clouds-when-needed, the so-called hybrid clouds.

Startups and clouds

Many startup companies have no alternatives but to use all means of cost minimization, and here cloud computing fits very well. Startups don't have time to build their own infrastructure, and usually don't know what they will need in the near future. Here cloud computing offers a quick launch, and de-launch, when needed. Investors also benefit from this shift in cost models: initial risks are lower, proof-of-concept is faster, and in the case of early success, solutions are highly scalable.

BalticGrid Innovation Lab

Within the BalticGrid project a focused effort to attract SMEs and startups to use the regional e-Infrastructure was made, resulting in the creation of the BalticGrid Innovation Lab. The BalticGrid Innovation Lab (BGi) aims to educate early stage start-ups in the use of BalticGrid resources, mainly through the use of BalticCloud, a cloud interface based on open-source solutions (Eucalyptus, OpenNEbula). At BGi companies learn how to leverage cloud computing to change their cost model and possibly lower their internal IT costs, as well as to prepare short-term pilots, and to prototype novel services

for their customers. BGi is also a business networking effort, all with BalticGrid in common.

Lesson learned

BGi, together with BalticCloud, shows a way to attract SMEs and startups in the region, and the experience so far is very positive. Early examples stem from the movie production industry (rendering on BalticCloud) and larger IT infrastructure companies preparing cloud services for startups. The project has also produced a number of cloud consultancy firms and there is growing interest in cloud support for innovation services (e.g. incubators) in the region.

SUPERCOMPUTERS, GRIDS, OR CLOUDS?

By Wolfgang Gentzsch, DEISA2 and Open Grid Forum, Germany

Now that we have a new computing paradigm – cloud computing – will clouds replace supercomputers, just as we thought grids might (and then did not)? Are grids dead, now that we have clouds?
Despite all the promising developments in the grid and cloud computing space, and the avalanche of publications and talks on this subject, many people still seem to be confused about High Performance Computing (HPC) versus grids versus clouds, and hesitant to take the next step. I think there are a number of issues driving this uncertainty:

Grids didn't keep all their promises.

Grids did not evolve (as some of us originally thought) into the next fundamental IT infrastructure for everything and everybody. The diversity of computing environments meant we had to develop different middlewares and face different usage models with different benefits. Enterprise grids were (and are) providing better resource utilization and business flexibility, while global grids are best suited to complex R&D collaborations with resource sharing. For enterprise usage, setting up and operating grids was often cumbersome. For researchers, this was seen to be a necessary evil. Implementing complex applications on supercomputers has never been easy. So what.

Grid: the way station to the cloud

After 40 years of dealing with HPC, grid computing was indeed the next big thing for the big-science researcher, while for the enterprise CIO, grids were a way station on the road to the cloud model, which provides all the missing pieces of a utility: ease to use, economies of scale, business elasticity, and pay-as-you-go accounting (thus reducing capital expenditure). In cases where security matters, there is always the private cloud, run within an enterprise's firewall. In more complex enterprise environments, where different applications are run under different policies, private clouds can easily connect to (external) public clouds, creating a hybrid cloud infrastructure that balances security with efficiency.

Different policies: what does that mean?

No application job is alike. HPC jobs differ by priority, strategic importance, deadline, budget, and IP and licensing characteristics. In addition, a specific code (and its inherent algorithms) often requires a specific computer architecture, interconnect, operating system, memory, and so on. These differences strongly influence where and when a job will run. For any job, this set of specific requirements will determine the specific policies that must be defined and programmed, such that the job will only run in accordance with these policies. Ideally, this is guaranteed by a dynamic resource broker that controls submission to grid or cloud resources, be they local or global, private or public.

Grids or clouds?

One question remains: how do I find out (and then 'tell' the resource broker) whether my application should run on an HPC grid or in a cloud?
This answer, among others, depends on the algorithmic structure of the program, which might be intolerant of the high latency and low bandwidth typical in today's clouds. These performance limitations are exhibited mainly by tightly coupled data-intensive applications running in parallel on hundreds or thousands of processors or cores. The good news is, however, that many HPC ap-

plications do not require high bandwidth and low latency, and thus can easily run on the cloud. Examples are parameter studies often seen in science and engineering, where the same application is executed for many parameters, resulting in many independent jobs (such as analyzing the data from a particle physics collider, identifying the solution parameter in optimization, ensemble runs to quantify climate model uncertainties, identifying potential drugs, studying economic model sensitivity to parameters, and analyzing different materials and their resistance in crash tests, to name just a few).

HPC needs grids and clouds.

According to the experience of the DEISA Extreme Computing Initiative (DECI), there are still plenty of grand-challenge science and engineering applications that can only run effectively on the largest and most powerful (and thus most expensive) supercomputers.

The DEISA HPC grid (also called an HPC Ecosystem) comprises eleven of the fastest supercomputers in Europe. Today, nobody would build an HPC cloud for these particular applications: it simply wouldn't be profitable as the "market" (composed of just the HPC users) is far too small. In some science application scenarios, with complex workflows of different tasks, a hybrid infrastructure might make sense: cloud whenever possible, and HPC grid whenever necessary, providing the best of both worlds.

CREATING VIRTUAL CLOUD INFRASTRUCTURES

By Mauro Campanella, FEDERICA project, GARR, Italy

In recent years, telecommunication networks have evolved into global communication infrastructures, comprising not only data transmission circuits and network equipment, but also computing elements and the associated software to control, monitor and manage the services they offer to users. The National Research and Education Networks (NRENs) are excellent examples of this evolution towards hybrid (packet- and circuit-based) modern communication infrastructures.

Virtually clouds

Recently, "virtualization" and "clouds" have become hot topics. Virtualization is considered in FEDERICA as the ability to create a virtual instance of a physical resource, both in terms of computing and network environments. Virtual resources (e.g. virtual circuits, disk partitions, virtual computers) are usually created by segmenting (or 'slicing') a physical resource. Recent advances in virtualization technologies have been enabled by powerful ASICs and CPUs. Using the hardware of a single computer, it is easy to host multiple virtual machines, each with their own operating system. All machines can also be active at the same time, and fair sharing is enhanced by the virtualization-aware hardware.

The key enabler is usually a thin software layer (e.g. XEN, VMware or KVM), which abstracts the physical resources to a standard (virtual) system. Such advances create more degrees of freedom for end users, allowing e.g. migration to a different hardware platform without the need to upgrade or modify their operating system or application.

Virtualization also enables optimal use of physical resources, the ability to collapse services whilst maintaining dedicated (virtual) machines for each service, and new functionalities, such as better resilience, by using live migration capabilities in the case of failures. Virtualization is also applicable to networks, where the routing, switching and control functionalities can be virtualized. More than one Virtual Router can be active in the same node without influencing other processes. Network virtualization technologies like MPLS (Multiprotocol Label Switching) and VLANs are examples of circuit virtualization already common in commercial networks.

In computers and networks, virtualization technologies have enabled new service models in which the physical infrastructure can be quickly organized into virtual infrastructures and user services. These services are easily accessible through the network and can be effortlessly adapted to a wide range of user requirements (different operating systems, numbers of hosts, applications and even network topologies). Such offerings are known as "cloud services" and are based on computing elements. The term "cloud" denotes their 'virtual' nature, since they are decoupled from a physical location.

Introducing FEDERICA

The EC project FEDERICA is an example of a large-scale infrastructure in which virtualization is a foundation: it is available in all its elements. The project is similar to other initiatives, such as PlanetLab and OneLab Europe that are also based on system virtualization but it extends the capacities offered to full network control and arbitrary topologies between the virtual nodes.

FEDERICA has the scope to support experiments on the current and future Internet. It "slices" its

substrate according to users' requests, providing "virtual infrastructures" (slices) made up of virtual computing and network resources. Users may fully configure and control the resources in their assigned slice, also performing disruptive experiments. The project also places a particular focus on the reproducible behaviour of each resource: a key issue in a virtual environment. Such polymorphic capabilities of the substrate offer a working example of the role of virtualization in the future Internet, and how "cloud" infrastructures made of virtual computing and network resources can be created on-demand.

IaaS, PaaS, AaaS

Cloud services are usually referred to as services of three types: Infrastructure as a Service (IaaS, e.g. Amazon Amazon EC2); Platform as a Service (PaaS, e.g. Windows Azure); and Application as a Service (AaaS, e.g. Google apps). An infrastructure based on the FEDERICA architecture can offer basic samples of all three by creating an appropriate slice, also in the Wide Area environment. When massive amounts of resources are requested, a large computing centre or a commercial offering may be needed.

These exciting developments and new virtualization capabilities bring associated research and implementation challenges: interoperability between different types of "clouds" in different administrative domains requires new standards. Guaranteed Quality of Service implies an understanding and control of virtual resource behaviour. And finally, avoiding the complexity of the global physical infrastructure can simplify management of the resources required for applications.

BRIDGING AND PRESERVING WORLD CULTURES THROUGH GLOBAL e-INFRASTRUCTURE

By Faridah Noor Mohd Noor, Dept of English, University of Malaya, Malaysia

Introduction

Culture is the epitome of every civilization. It represents what people think, do and produce.1. Hence, this will include "language, ideas, beliefs, customs, taboos, codes, institutions, tools, techniques, works of art, rituals, ceremonies, and symbols". Each society has its own socio-cultural system which is practised, preserved and transmitted to the next generation. As time moves on, people and their societies change. Cultural change is also inevitable. Therefore, these cultures need to preserved in their traditional form as much as possible before they get intermingled with modern practices and are slowly forgotten.

Digital repositories of these cultures can be created with each nation depositing their archives for world cultural repositories. Works of arts, artifacts and even cultural performances can be digitized and archived for future retrieval. A new world order must bridge and enhance understanding among different cultures of nations and with today's technologies of high speed advanced network and massive cloud storage, live world cultures and their digital archives can be remotely experienced, shared and exchanged.

Global e-Infrastructure

Asia Pacific Advanced Network (APAN) and TransEurasian Information Network (TEIN) are two major dedicated advanced networks for research and education connecting various regional National Research and Education Networks (NRENs) of countries in The Americas, Europe, Asia, and Australasia. APAN is a non-profit international consortium established on the 3rd of June 1997 and the network covers the expanse of Asia Pacific Region from North America, Europe, Australia and New Zealand with multiple connectivity that concentrate on intra-Asia economies. TEIN was launched on 5th of December, 2001 as the link between Korea (KOREN) and France (RENATER) with the former serves as a gateway to APII and the latter to GÈANT. Subsequent generations of TEIN saw the expansion of large-scale research and education network linking GÈANT/GÈANT2 to national networks in nearly all Asian countries including Australia and New Zealand (TEIN3).

The availability of these heterogeneous and geographically dispersed NRENs at various points in countries of the world will enable the exchange of digital data between these points. They can facilitate world communities to interactively participate by contributing and sharing media content containing research data, information, and cultural content. Moreover, live performances such as concerts, theatres, and dances can be enjoyed simultaneously by audiences at different venues across

continents. Cultural contents include, as examples, digital archives of museum artifacts, audio and video recordings of culture, and 3-D motion-captured of dance movements.

Digital Culture and Heritage Initiatives

APAN and TEIN share common goals in promoting not just advanced network but also applications that include applications in the social sciences, arts and humanities. Since its inception in 2004, e-Culture Working Group of APAN is slowly gaining prominence. Recent meetings have been able to attract even researchers in the sciences and engineering. The topics discussed range from large-scale digitization of Angkor Watt using laser technology, farming traditions of rice farmers, social impact studies of Tsunami-hit areas, to issues in social computing of Second Life, Facebook and Twitter. TEIN, on the other hand, has been promoting cyber-performance starting from streaming uncompressed DV-format of live Mak Yong Dance (A Malay Dance Theatre) during the launch of TEIN2 and the recent intercontinental dance performance between Kuala Lumpur and Stockholm during TEIN3 extension to South Asia.

Concluding Remarks

In conclusion, global e-Infrastructure breaks geographical divide and bridges world cultures by bringing together different cultures across continents with the hope of promoting mutual respect and understanding and the preservation of world cultures.

A STRATEGIC APPROACH TO THE OPEN AGENDA

By Malcolm Read, JISC Executive Secretary, United Kingdom

The sharing of research openly for the benefit of society and industry has long been an essential part of the ethos of research and education. The outcomes of public funded research are usually made freely available for the benefit of society and industry; and the sharing of knowledge and experience underpins scientific endeavour. Similarly the open transfer of knowledge and tools benefits much of the ICT infrastructure essential to researchers. The Internet and World Wide Web are both infrastructure examples of the value of openness.

Open Access to the outputs of public funded research in the form of scholarly papers, articles and monographs is hard to argue against and greatly improves the effectiveness of knowledge transfer. The World Wide Web provides the platform for open access to such resources but in practice the peer review process (which is essential) is carried out by publishers who obviously rely on sales of their journals to remain as viable businesses. As a consequence access to the outputs of research is restricted to those with ready access to libraries that can afford to subscribe to relevant journals. Even the wealthiest universities cannot afford to provide all journals. The transfer of scientific knowledge is therefore very imperfect, particularly to less wealthy institutions such as universities in the developing world. The same lack of access faces students in smaller higher educational institutions and the public at large. And this last community is of growing importance as the proportion of the population enjoying the advantages of higher education increases; on leaving university they are suddenly denied ready access to a wealth of scholarly and academic material. Although impossible to quantify the currently restricted access to the output of research hampers innovation and development in both developed and, especially, developing countries.

One of the most effective ways of promoting open access is through repositories, whether discipline based or owned by a university or research institute. However deposit of papers, and it must be the full text, is considered by most researchers to be a burden providing little return in terms of career progression. They may be mistaken in holding this view as wider availability leads to wider readership and higher citation rates: this will lead to greater recognition and reward. The employing institution also reaps the benefits of greater recognition of the outputs of their research staff if their repository holds the text of papers and articles written by their staff. For these reasons the deposit of papers produced by staff in institutional repositories (and discipline repositories where required by research funding bodies) should be mandated, and enforced, and thus become part of recognised good practice in the research process.

Open educational resources represent a significant movement in higher education. A large number of universities now make available course material and there are international organisations dedicated to making these materials available in an organised way. The benefits to students and informal learners are obvious and there are real opportunities for teachers and lecturers to make use of those resources and reduce time spent on preparing their course material. There is also an increasing amount of open educational material available in other educational sectors. The real need here is to contextualise

the material in pedagogically useful ways. Clearing third party property rights is a big issue but this will ease a new material is prepared within a digital open environment.

The need to curate and preserve research data has also stimulated debate and consideration of the benefits of making research data more widely available within an open context where this makes sense. Clearly much research data will not be made openly available due to ethical, security and commercial considerations. In some disciplines such as environmental and the social sciences long term curation is common and the opportunity in other disciplines, particularly the biosciences partly stimulated by genome sequencing, is being seriously explored in many countries. It is expensive to curate data and much work remains to be done to identify which data has the potential for re-use. And again it is not part of normal research best practice to describe and curate data in all disciplines. Yet the benefits are enormous: one day a "data review" will be as common as a literature review before conducting a new research project.

Open source software is widely used by researchers, and is often developed by them. This can lead to commercial products and frequently benefits the research process by leading to open standards. The recent growth in e-science processes and applications has been largely based on open source software and has been responsible for many developments in such software. The advantages are choice, flexibility and cost, but against this must be offset the costs of software development, often done by the researchers themselves, and the difficulty in identifying generic software solutions due to the multiplicity of choice and the, often strong, passions and sense of ownership that can be created around particular software platforms. Adequate investment is seldom available to make open source software robust and reliable until a significant user base exists, when opportunities for the private sector become available through the provision of support services and new applications. There is a need to develop a suitable professional and career path for software developers supporting the research process; this will lead to better software and free up researchers to do their research. A greater professionalism in the open source software environment has the opportunity to benefit research through greater efficiency and create a sounder foundation for commercial development based around open standards.

Finally Web 2.0 technologies are stimulating Open Research where collaboration during the research process can take place, and whether it will have long term significant impact. Examples are the use of community generated and owned resources (known as "community source"), informal publishing by the general public, software to create data banks of community experience and solutions ("crowd sourcing"), and share public involvement in large scale computing problems such as the search for extra-intelligent life. It remains to be seen how widespread this will become but it presents an exciting new development in the open world.

GÉANT AND TEIN3: BRINGING CULTURES TOGETHER ACROSS CONTINENTS

By Domenico Vicinanza and Melanie Pankhurst, DANTE, United Kingdom

In December 2009 two continents and two cultures on opposite sides of the globe were joined through a music and dance performance made possible by the high-performance GÉANT and TEIN3 research and education networks. Showcased at the GÉANT launch event in Stockholm, Sweden, and the TEIN3 gala dinner in Malaysia, Kuala Lumpur, the unique performance was an exciting collaboration of artists and networks.

The GÉANT pan-European network offers the performing arts community the challenging and fascinating ability to create new genres of artistic events,

transcending distance and fusing experiences and cultural backgrounds. GÉANT has speeds of up to 10Gbps across 50,000km of European network infrastructure, and interconnections with other global networks extends its reach to over 80 countries worldwide.
December's performance was a collaboration between GÉANT and TEIN3, the Asia-Pacific's research and education network, able to connect researchers in the region with their counterparts in Europe at speeds of up to 2.5 Gbps.

Two locations, 9,300km, one virtual stage

The performance took place in two different locations, brought together to form a "virtual stage" linked by the GÉANT and TEIN3 networks and locally by SUNET (the Swedish NREN) and MYREN (the Malyasian NREN). Bandwidth was reserved locally on both events' venue networks to ensure the required capacity was available when needed, and to ensure high-quality sound and images. Despite the need for standard resolution due to latency issues, the dance could be projected to the Stockholm audiences on a screen nine feet wide and six foot nine inches high, with minimal loss of image quality.

A world-first artistic performance

Kuala Lumpur provided the stage for the dancers, who performed live at the TEIN3 Gala Dinner as part of the ASIA-Europe Meeting workshop. Their musical background was provided by musicians performing at the GÉANT Launch, held at the Modern Art Museum in the Swedish capital of Stockholm. The music was composed especially for this event using traditional Western musical scales, and written for a combination of Western instruments and two "extinct" instruments. The dance performance was choreographed using a fusion of traditional and modern Malaysian moves. By uniting these different elements, the event celebrated the differences in the cultures and demonstrated how ancient and modern techniques and distant cultures can work together.

DVTS enables music and dance performers to interact

The two sites were connected with a bi-directional audio-video channel set up using DVTS (Digital Video Transport System) over the TEIN3 and GÉANT links. DVTS is a multi-platform video/audio streaming application and hardware solution relying on high-bandwidth, low-latency network infrastructures. It enables digital quality video and audio to be transmitted across an IP network using a fixed network bandwidth and inexpensive consumer-grade video and audio equipment.
The DVTS connection enabled the dancers in Malaysia to hear the music played in Sweden with almost zero time delay, while the musicians at the Modern Art Museum in Stockholm played their instruments following the video images of the dancers. This was the first occasion that this system has been used to create a live music and dance performance across the 9,300 km distance.
DVTS is also used in the Arts and Humanities communities for music master classes and conferences.

Instruments of the past play their part

The background layer of the music piece was created using data on the traffic across the GÉANT and TEIN3 networks. This network data was converted into sounds and transformed into melodies using a data sonification process originally created to help predict volcanic eruptions.
Over this, musicians played the flute, harp, percussion and two "lost" instruments – the Epigonion and the Barbiton – that have been resurrected through the ASTRA project. No real (physical) copies of these Ancient Greek instruments remain today, and they are thus "played" using a keyboard linked to a computer housing the sounds of the instruments. This concert was the first opportunity for the Barbiton to be heard after centuries of si-

lence. The high-quality sounds were created by processing archaeological and historical data through a computer-modelling procedure, powered using the GILDA and EUMEDGRID grid infrastructures via the GÉANT and EUMEDCONNECT research networks. The performance was the result of collaboration between several organisations, including DANTE, MYREN (Malaysian Research & Education Network), Consortium GARR (Italian Research and Education Network), SUNET (Swedish University Network), NORDUnet (Nordic Research and Education Networks), Arts Exchange in Asia, University of Malaya and ASTRA/Lost Sound Orchestra Musicians.
You can watch the video of the performance on the GÉANT website.

A GENERAL TOOL FOR A SPECIAL USE: SUPPORTING THE ARTS AND HUMANITIES WITH E-INFRASTRUCTURES

By Danielle Venton, CERN, Switzerland

In its early days, the Web was primarily an exclusive, though not a closed, party. Its main attendees were elites in the physics and computer science communities. Today the bulk of the developed and developing world is involved. Every sector of society puts the Web to use: your local dance company, church and city council likely all have Web sites, allowing all-new levels of communication and sharing.
Similarly, the use of e-Infrastructures (such as distributed computing systems) to manage data was initially confined to specialised communities. Today, however, nearly all researchers, including those in the arts and humanities, can use distributed computing, and every year more do. And, like the Web, this technology is enabling research in ways that were previously impossible.
While the application an archaeology researcher uses might be field-specific, the e-Infrastructure used to support that application is probably the same as that used by their colleague in the physics department.
Consider the work of Nicolas Ray: a researcher at the Computational and Molecular Population Genetics Lab at the University of Bern, Switzerland, Ray reconstructs early human migrations using the genetic diversity of current populations. Ray says that new statistical tools, larger data sets and the robust computing power of computing grids mean he can now examine human migration in greater detail than ever before.
"This is a very exciting field right now—we have so much to study," he says. "The technology required to obtain genetic data is much cheaper now. We can acquire a large number of genetic markers in many individuals, and obtain data much more rapidly than before."
In a similar case, Nick Malleson, a researcher at Leeds University, depends on the UK's National Grid Service (NGS) to power a computer model he has designed to forecast burglary rates. While an imperfect science, Malleson's model attempts to identify general trends based on a neighbourhood's social structure, geography, proximity to public transportation, and the presence of security systems. Malleson hopes this will help neighbourhoods to predict and prevent crime.
The computing systems used by both Malleson and Ray are also used by physicists, computational chemists and geologists. The best way for a national e-Infrastructure to support researchers is therefore by supporting general e-Infrastructure.
Existing infrastructures present a good starting point for the next crop of large-scale research infrastructures. Many of these infrastructures, detailed in the European Strategy Forum on Research Infrastructures (ESFRI) roadmap, will concentrate on human culture and preservation. For example:
The Common Language Resources and Technology Infrastructure (CLARIN) will interweave digital archives across Europe with language data and tools for computer-aided language processing.
The European Social Survey, initiated by the European Science Foundation in June 2001, monitors social values in Europe over time and is now seeking continuation and expansion. This project is improving the rigour of comparative sociology in Europe and beyond.
The Digital Research Infrastructure for the Arts and Humanities (DARIAH) will collect and support digitally enabled documents and images for research across the humanities and arts.
Each of these initiatives is examining Europe's existing public grid infrastructure in closer detail.
"These existing platforms automatically fulfill the vast majority of a new research community's needs, and the remaining requirements can be customized and tailored individually," says Steven Newhouse, EGEE technical director and EGI.eu16 interim director. "This is a huge advantage for projects in all fields looking to fill their data needs. Plugging into existing systems allows the next generation of research projects to focus on their science rather than on infrastructure provision."

DEVELOPING TECHNOLOGIES: DEVISING STRATEGIES FOR THE ADOPTION OF E-INFRASTRUCTURE

By Zack Kertcher, University of Chicago; Ralph Schroeder, University of Oxford; Franz Barjak, University of Applied Sciences Northwestern Switzerland; Simon Robinson & Tobias Hüsing, Empirica, Germany

Hundreds of projects from dozens of countries are pursuing the development of e-Infrastructures, yet these technologies are still not as simple as using a cell phone or surfing the Net. As part of the European Commission-funded eResearch2020, we researched e-Infrastructure adoption barriers and strategies, aiming to identify ways to enhance technology adoption and facilitate the creation of global virtual research communities. This article reports our key findings.

The Diverse technological terrain

e-Infrastructures span continents, scientific and professional practices, and technologies. To effectively analyse such a heterogeneous population, we selected 18 case studies, based on their development scope, geographic range, maturity, and number of participating organizations. Using interviews and archival analysis, we identified common themes and, furnished with results of a qualitative cross-case comparison, designed a survey. We first surveyed relevant users and developers, then distributed the survey further to persons who had participated or shown interest in e-Infrastructure-related activities. Over 400 individuals completed the online questionnaire. This multi-stage design afforded a wide-ranging perspective on the development and adoption challenges of e-Infrastructure technologies.

Development and adoption challenges

Pointing to cultural differences between developers and users, our respondents reported some challenges at the early development stages. These difficulties manifest when developers have little understanding of specialized user practices, resulting in communication problems and the pursuit of divergent objectives (such as when developers aim to work on cutting-edge technologies, while users seek basic and robust services). Respondents also noted barriers in reaching out to new users. Frequently mentioned challenges were users' negative attitude toward computer-enhanced research environments and a reluctance to spend the time and resources required to learn the new technology. Other adoption barriers were that e-Infrastructures had insufficient technical capabilities, as well as low usability and organizational barriers. Despite these challenges, which cut across our sample, respondents generally lacked knowledge of adoption barriers, or detailed information about their users. One reason for this is that some infrastructures do not distinguish between individuals and organizations. Users also often register with an infrastructure, but some infrastructures only monitor access to their website, wiki or portal, but not actual use.

Strategies that work

e-Infrastructure projects commonly accommodate cultural differences between developers and users by improving communication channels: conducting routine meetings and telephone conferences to aid the development of common ground. The cases we studied employed a variety of strategies to enhance user adoption. We distinguished between passive strategies, involving limited user engagement, and active strategies, which focused on ongoing interaction with users. All cases recruited users by disseminating information to potentially interested organizations and individuals, and by presenting at conferences of potentially interested user communities. These more passive user recruitment methods were limited in scope. Several projects had also ventured into more active recruitment. An effective vehicle was the use of "engagement teams" to work with leading users in diverse communities. "Brokering," the use of key individuals and organizations specializing in e-Infrastructure and a user domain, was another successful method for canvassing adopters. This had been used by a number of European and US projects. For example, the US TeraGrid ran a program in which "campus champions" served as institutional mediators for recruiting users and as local technical experts. The European D4Science and the US-based Open Science Grid used third-party organizations offering e-Infrastructure technology, along with other services, to dedicated user communities. Respondents suggested that more active user recruitment methods build a communication channel between e-Infrastructure stakeholders, sensitizing developers to users' needs and to potential adopters, and helping adopters derive more benefit for their research.

Another strategy for enhancing adoption involved reducing the cost of learning the new technology. Passive approaches shared by the infrastructures were refining documentation, using wikis and Web 2.0 mechanisms, and running training workshops. Like with user recruitment, active cost reduction

strategies appeared to be advantageous. Relying on brokers, some projects had achieved good results by obtaining knowledge about targeted adopter communities and then designing virtual environments that simulate their users' typical computational environment, for example, through domain-specific portals. Another approach involved masking e-Infrastructure complexity by relying on third parties to provide specialized virtual technologies supported at the back end. A small minority of e-Infrastructures was pursuing this type of brokerage, but it may offer considerable benefits in the long run. After all, mostly due to its complexity, only a small number of early adopters used the Web prior to the introduction of a broker called a "Web browser."

For further information about e-Research 2020, including its findings, please see http://www.eresearch2020.eu/

GRIDUSP AS A CENTRAL FACILITY TO E-SCIENCE IN BRAZIL

By Alberto Camilli, University of São Paulo, Brazil

The University of São Paulo (USP) has campuses in several cities across São Paulo state, encouraging a decentralized research environment in which every department is responsible for its own resource acquisition and deployment. This situation is similar to that of many universities around the world, and it arises because research resources cannot come completely from the university's own budget, but must be supplemented by sponsoring agencies that privilege the relative merit of the research, ranked according to the prestige of the leading researcher. From a researcher's perspective, enabling hardware´s exclusive utilization is a shorter way to achieve the desired results. Nonetheless, this model promotes competition around existing infrastructures: space, energy and administrative labor are shared and limited resources. In fact, when grants are requested, these infrastructures are rarely included in the specifications, which frequently push to maximize processing power. Yet these infrastructures are naturally bound by local limits, and thus this decentralized model frequently leads to low availability systems, poor management and unsustainable practices.

Thus, enhancing the use of common infrastructures is paramount to productivity gains, since it will help scientists to focus on the subject of their research instead of researching the infrastructure itself. GridUSP is driven by USP's central IT campus management board (CTI) to promote e-science through a better utilization of existing IT infrastructure.

GridUSP architectural premises

GridUSP is a central facility housed at CCE (Centro de Computação Eletrônica), the main data center at USP. It is a cloud-based premier experience providing a 24/7, stable, monitored, flexible, interoperable and powerful environment for researchers from USP. Its conception was based on the necessity to match the needs of users of parallel processing programs (for which high performance network specific cluster-based solutions are the only solution), and collaborative and/or asynchronous serial users (for which grid-based solutions are needed). The main premises of GridUSP are:

- It should provide on-demand high performance configured clusters. Usual HPC users should run MPI jobs transparently, as if a dedicated cluster was available. Initially seeded by centrally acquired modern hardware hosted at CCE, the architecture should enable aggregation of other clusters at CCE as well as researchers' "donated" hardware, remotely administered (this latter is only available after scrutiny of the hardware's benefits and available network connections by CCE staff). Therefore, contrary to usual grid models where Virtual Organizations are the resource owners, central administration is considered essential to achieve minimum quality standards for service levels.
- It should be able to interoperate with other grid environments. Basically, every node in GridUSP comprises several preformatted virtual "images" that can be loaded upon request by a job scheduler. This preserves the simplicity of the user interface while allowing for collaboration in grid environments.

The current core implementation of GridUSP comes from the OpeNebula/Reservoir project (EGEE).

Example use cases

- User of a weather forecasting model (WRF) demanded an arbitrary number of nodes requiring intense inter-processor communication overhead. After experimenting with several on-demand configurations, the optimum performance was achieved using four nodes (32 CPU) with 16GB RAM/node running MPI jobs (Linux Debian OS).
- User of a GIS agriculture research model needed an environment to run under a Windows system. Two nodes (16 cores) with 5 GB/node of RAM was scheduled, accessing 1.8 TB of the

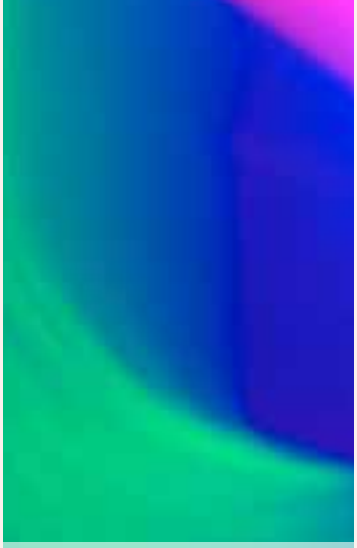
cloud-shared storage (Lustre) for data repository.

- User of USP central administration requested the configuration of nodes for testing a prototype system for processing student enrollments. Student requests are multiplexed through a virtual network infrastructure and seen as only one application. Since the application loads are seasonal, central administration (Linux Ubuntu OS) must be able to easily preschedule and configure the required number of available machines in the cloud. In this task, some GridUSP nodes can be requested by Integrade (a grid kept by another USP's research group), running asynchronously to accomplish up-to-date cross references in professors' curriculum database publications (Lattes base), as an aid to help student choices.

These examples show the GridUSP infrastructure transparently accessed in a variety of configurations and in practical e-Science situations.

Conclusions

While keeping the term 'grid' in its name, GridUSP is provided as a cloud, taking advantage of existing campus infrastructure and focused on functionality. GridUSP is a pragmatic response to USP's scientific user community and can be replicated by other groups to leverage e-Science in their campuses, and possibly as a component to promote consolidation of global e-Science infrastructures.



NEWS

South Africa's observation capacity in the Southern Ocean now on international standard

Web link: http://www.csir.co.za/enews/2009_climate/05.html

When the SA Agulhas sets out on its annual trip to the Antarctic in December this year, it will have R6-million-worth of state-of-the-art equipment of the Southern Oceans Carbon and Climate Observatory programme on board.

The programme is a CSIR-led consortium, which, up to now, includes the University of Cape Town, Stellenbosch University, the Department of Environmental Affairs and the Applied Centre for Climate and Earth Systems Science (ACCESS). Funded by the Department of Science and Technology (DST) and CSIR, the new equipment will enable the SA Agulhas to become a sampling platform of international standard. This investment in the carbon and climate capability of the Southern Ocean is closely linked with DST's Global Change Grand Challenge science plan and the equipment will later form part of the planned SA National Antarctic Programme (SANAP) and Polar Entity National Facility, including the new polar ship to be launched in February 2012.

e-IRG Data Management Task Force: Final report and recommendations endorsed by e-IRG and ESFRI

Source: e-IRGSP2 project
Web link: http://www.beliefproject.org/

In 2008, the e-IRG decided to launch a task force to investigate the numerous European activities related to the management of scientific data, and to contribute to the definition of common and shared policies in this field. After months of intensive discussion and work, the task force released its final report investigating the issue in a comprehensive way, and setting a few recommendations. The final report and the recommendations were jointly endorsed by the e-IRG, on 30 November 2009, and by ESFRI, on 11 December 2009.

NeISS Press Release: Virtual world predicts dire future for British cities

Source: http://www.geog.leeds.ac.uk/projects/neiss/news.php

A SimCity like computer simulation which enables social scientists to understand how real life populations react to change has predicted a depressing future for British cities by the year 2031. Researchers at the universities of Leeds and Manchester used new, powerful simulation software to create a virtual Leeds, revealing a worrying picture of how the city's congestion and deprivation could mushroom over 30 years.

Researchers from the MoSeS project, part of the ESRC funded National Centre for e-Social Science (NCeSS) coordinated by University of Manchester, also showed how co-dependent couples (two adults in a single household, both aged over 65) become hugely prevalent across the Yorkshire City by 2031. A new £1.4 million project at NCeSS funded by the Joint Information Systems Committee (JISC) will take the MoSeS project a stage further by creating video simulation for any British city. It was launched in April 2009.

European interoperability goes global

Source: EGEE web site
Web link: http://www.eu-egee.org

In October this year, OMII-UK and the NGS began work on a demonstrator to show that open standards adopted by different middleware platforms are the route to interoperability across service providers – potentially from around the world. This month, the Japanese-based NAREGI grid infrastructure provider joined our European-wide interoperability demonstrator, and allowed us to take one step closer to a future of globally integrated computing. E-Researchers who can harness more compute and data resources will solve scientific problems more quickly. Interoperability could provide researchers with access to the combined resources of service providers from around the world.

PRACE Benchmark Suite Finalised

Source: PRACE project
Web link: http://www.prace-project.eu/news/prace-benchmark-suite-finalised

PRACE, the Partnership for Advanced Computing in Europe, selected 22 applications for the final PRACE application benchmark suite. The benchmark suite covers application areas from the PRACE Research Infrastructure's future user base, ranging from particle physics through computational chemistry and fluid dynamics to earth sciences and astronomy. The selected applications have enough scalability potential to run on petascale systems and beyond.

EVENTS

International Symposium on Grid Computing (ISGC) 2010

5th-12th March 2010, Taipei, Taiwan

ISGC 2010 will focus on data driven e-Science, highlighting use cases and successful applications. Developments to establish sustainable infrastructures and the long-term support of e-Science communities will be an underlying theme.

For further information please visit the website at http://event.twgrid.org/isgc2010/.

OGF28

15th-19th March 2010, Munich, Germany

OGF returns to Europe for its first event of 2010, and will assemble in Munich, at the Ludwig-Maximilians-Universität München.

For further information please visit: http://ogf.org/OGF28/

IEEE Infocom 2010

15th-19th March 2010, San Diego, CA, USA

The IEEE Conference on Computer Communications addresses key topics and issues related to computer communications, with emphasis on traffic management and protocols for both wired and wireless networks. Material is presented a program of technical sessions, tutorials, panel discussions and workshops. The first INFOCOM conference took place in 1982 and has since taken place at many locations around the world - Italy, Japan, Israel, Spain, Brazil, as well as most regions of the US. For further information please visit the website at: http://www.ieee-infocom.org/

Joint UJ/Wits School for Grid Application Porting

15th -26th March 2010, Johannesburg, South Africa

The second grid application development school in South Africa will be held in Johannesburg, organised jointly by SAGrid, University of Johannesburg and University of the Witwatersrand, in collaboration with GILDA and EGEE.

For further information please visit the website at: http://indico.sagrid.ac.za/conferenceDisplay.py?confId=64

Eighth Annual IEEE International Conference on Pervasive Computing and Communications

29th March - 2nd April 2010, Mannheim, Germany

PerCom 2010 will provide a high profile, leading edge forum for researchers and engineers alike to present state-of-the-art research in the respective fields of pervasive computing and communications. The conference will feature a diverse mixture of presentation forums including core technical sessions, several targeted workshops, demonstrations, keynote speeches and panel discussions from domain experts.

For further information please visit: http://www.percom.org/index.shtml

EGEE User Forum Exhibition

12th-16th April 2010, Uppsala, Sweden

This event offers a prime opportunity for academic sectors, EC-funded projects and EGEE Collaborating Projects to showcase leading technologies in distributed computing. At this last EGEE User Forum two demo/poster/exhibition sessions will be organised to optimise the visibility for exhibitors and demo presenters as well as to give more time for discussion.

For further information please visit the website at http://egee-uf5.eu-egee.org/index.php?id=693

EuroSys 2010

13th-16th April 2010, Paris, France

The EuroSys conference series brings together professionals from academia and industry. It has a strong focus on systems research and development: operating systems, data base systems, real-time systems and middleware for networked, distributed, parallel, or embedded computing systems. As a highly recognized conference - rank 11 out of 581 in terms of 2007 CiteSeer impact factor - EuroSys has become a premier forum for discussing various issues of systems software research and development, including implications related to hardware and applications.

For further information please visit the website at http://eurosys2010.sigops-france.fr/index.html

1st ERINA4Africa Workshop

21st April 2010, Kigali, Rwanda

Further information will be available soon on www.erina4africa.eu

e-IRG Workshop

21st-22nd April 2010, Barcelona, Spain

The e-Infrastructure Reflection Group organises workshops twice a year in collaboration with the country holding the EU presidency. Workshops are open to all, and function as incubators for feeding new information and trends into the e-IRG plenum work. Internal meetings for the e-IRG delegates are also scheduled four times a year.

For further information please visit: http://www.e-irg.eu/

DEISA & PRACE symposium

10th-12th May 2010, Barcelona, Spain

The programme will be available soon.

For further information please visit: http://www.deisa.eu/

9th International Conference on Information Technology Based Higher Education and Training (ITHET 2010)

29th April - 1st May 2010, Cappadocia, TURKEY

ITHET2010 aims to provide an environment for experts to discuss the current state of the art for learning both in industry and universities. Virtual environments, e-training and e-learning will be topics of particular interest.

For further information please visit: http://www.ithet.org/

International Conference on Computational Science 2010 (ICCS 2010)

31st May – 2nd June 2010, Amsterdam, The Netherlands

The International Conference on Computational Science 2010 (ICCS 2010) aims to bring together researchers

and scientists from mathematics and computer science as basic computing disciplines, researchers from various application areas who are pioneering advanced application of computational methods to sciences such as physics, chemistry, life sciences, and engineering, arts and humanitarian fields, along with software developers and vendors, to discuss problems and solutions in the area, to identify new issues, and to shape future directions for research, as well as to help industrial users apply various advanced computational techniques.

For further information please visit: http://www.iccs-meeting.org/iccs2010/index.html

e-INFRASTRUCTURE

The new generation of integrated ICT-based infrastructure. E-Infrastructures, which exploit and seamlessy interconnect several separate components and layers, such as networks, supercomputers and other computing resources, storage, and other remote resources.

eSCIENCE

An innovative approach to research, thanks to the use of advanced technologies of communication and regardless to geographical location of instruments, resources and last but not least, brains. Today, the paradigm is used in several application fields: Astrophysics, High Energy Physics, Computational Chemistry, Biomedicine, Earth Sciences, Metereology, Environmental Sciences but also Finance, Cognitive Sciences and Archaeology.

GRID

Grids are a set of services over the Internet, allowing geographically dispersed users to share computer power, data storage capacity and remote instrumentation. The term Grid was coined in the mid-1990's to indicate the "coordinated resource sharing and problem solving in dynamic, multi institutional virtual organisations". Although Grids are still in a prototype phase, experts believe that they will have a dramatic impact, comparable to WWW, in the next few years.

MIDDLEWARE

A software layer able to manage and allocate resources in an optimal way to all users and applications that need them, just like the Operative System does with programs running on your PC.

NREN – NATIONAL RESEARCH AND EDUCATION NETWORK

A NREN is a unique organization that plans, manages and operates the IP telecommunication network infrastructure devoted to R&E in a country. They implement the network requirements of the scientific and academic community and are the privileged partner for dealing with Telecom operators and provider of apparatuses on their behalf.

NGI – NATIONAL GRID INITIATIVE

An NGI is an organization that coordinates on a national basis the Grid projects and initiative and is entitled to deal with counterparts worldwide on themes such as standardization and interoperability of middleware and procedures. It is the NREN-equivalent at a Grid level.

Review Panel

Stephen Benians, MTW, Italy
Donatella Castelli, CNR-ISTI, Italy
Alex Delis, NKUA, Greece
Johan Eksteen, Microsoft, South Africa
Bob Jones, EGEE-III, Switzerland
Wolfgang Gentzsch, DEISA2, Germany
Melanie Pankhurst, DANTE/GÉANT2, United Kingdom
Christy Burne, independent consultant, Australia
Ognjen Prnjat, GRNET, Greece
Timothy Stitt, PRACE project & Swiss National Supercomputing Centre

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