Co-ordination & Harmonisation of Advanced e-Infrastructures

Operational and organisation aspects of the Advanced Computing Services over national, regional and international networks

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CHAIN project supports intercontinental Grid collaboration and resources sharing

Main facilitator for efficient organisational and operational model: Layered infrastructures: national-regional-international

Outline:
- CHAIN project brief overview
- National Grid Initiative guidelines
- Best Practices for regional organisation
- Sustainability suggestions for Sub-Saharan Africa
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Pan-EU e-Infrastructures vision

- The Research **Network infrastructure** provides fast interconnection and advanced services among Research and Education institutes of different countries.

- The Research **Distributed Computing Infrastructure (Grid, HPC)** provides a distributed environment for sharing computing power, storage, instruments and databases through the appropriate software (middleware) in order to solve complex application problems.

- This integrated environment is called **electronic infrastructure (eInfrastructure)** allowing new methods of global collaborative research - often referred to as **electronic science (eScience)**.

- The creation of the eInfrastructure is one of the key objectives to facilitate building of the European Research Area and its collaborations across the world.
CHAIN: global coverage

Coordination & Harmonisation of Advanced eInfrastructure
Project objectives

- Define a strategy and a model for external collaboration, in close collaboration with EGI.eu which will enable operational and organisation interfacing of EGI and external eInfrastructures.
- Validate this model, as a proof-of-principle, by supporting the extension and consolidation of worldwide Virtual Research Communities.
- Explore and propose concrete steps forward towards the coordination with other projects and initiatives (e.g. EGI.eu, EUMEDGRID-Support, EUIndiaGrid2, LinkSCEEM2, NKN & Garuda, etc.)
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Key NGI documents

- **NGI & sustainability guidelines** documentation available at:

Key SEE-GRID documents

- DNA2.2 - NGI cookbook (detailed NGI setup guidelines, distributed to all other regions)
- DNA2.1 - NGI metrics specification (44 detailed metrics, quarterly reporting and analysis)
"NGI is an open consortium of legal entities or a legal entity acting on their behalf that, for the benefit of research and education community, coordinates, promotes and implements Grid activities at the National level, focusing on Grid deployment and operations, according to a National strategy / research and deployment programme for this field."
NGI: steps

1. Get in touch with diverse research institutes interested in scientific computing (i.e. HEP, Biomedical, Computational Chemistry, etc.), large computing centres, and National Research Network and get consensus towards common strategy for Grid development in the country.

2. Sign a MoU which would define common goals

3. Write together a national strategy document

4. Approach relevant ministries and try to get support

5. Establish a legal entity or make sure an established legal entity represents NGI on behalf of the consortium.

6. Official inauguration event of the NGI

7. Seek national funding programme

8. Consider technical aspects

9. Define and adopt the national-level policies

Organisational, operational and policy aspects
Organizational: NGI

- JRUs are research laboratories/infrastructures created and owned by two or more different legal entities in order to carry out research.
- The JRU has to meet the following conditions: scientific and economic unity; last a certain length of time; recognised by a public authority
- JRU agreement + ministry support letter
- **First step towards NGI creation**
Organizational: NGI

- NGI definition as above
- MoU + recognition letter
- Wider scope than JRU
- Typical membership: national infrastructure providers, the key national user communities, NRN
- Coordinating body
- NGI models: task force, consortium, national project, professional association and legal entity.

Juridical status

- Decision mechanisms
- Funding: balance between national and regional/EC
Operational: NGI planning

- Detailed assessment and planning of the national Grid should be done periodically.

- Inventory of the existing computing and storage resources by members of the NGI

- Capture of Grid computing, storage and related requirements by the national user communities

- Proposal for NGI Resource Centres (RCs), hosted by the NGI members

- Proposal for new hardware purchases, based on the analysis of user requirements

- Adoption of technical management, operational and policy documents

- Establishment of technical coordination and management bodies

- Deployment plan for RCs
Operational: NGI management; VO and user support

- **CA and RAs**
- **Core Grid and VO services** (information systems, workload management, file catalogues, authorisation services) – some can be provided by regional operations centre
- **Testing and monitoring of Grid services**
  - Static information database
  - Service availability monitoring
  - Information system monitoring
  - Accounting portal
- **National helpdesk**
- **Overall Grid Management**
- **National portal and user registration facility**
Operational: NGI management; VO and user support

- Depending on the size of the NGI and already existing tools on regional/continental level, some of the management tools can be deployed on the regional instead of national level.

- User, application and VO support is crucial. Support should be provided to multi-disciplinary communities.
Policy: 3 sets of documents

- NGI should be defining/adopting and implementing a coherent configuration of policy documents in several domains

- National strategy document
  - Policy documents that deal with relations between NGI-administered infrastructure and other relevant entities (NREN, other Grid infrastructures, VOs, application providers, users).
  - Operational policy documents that deal with control of the operations and usage of grid resources
Policy: National Strategy Document

- State major objectives of NGI
- Its activities towards achieving its mission
- Establish its vision
- Implements its authority at the national level in setting up, development and operation of the national Grid infrastructure.

- Early in the lifecycle

- Contents: General information; NGI presentation; Brief overview of main achievements at the national level; Main NGI strategic lines for NREGI development.
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- Sustainability suggestions for Sub-Saharan Africa
Grid infrastructure in SEE
Infrastructure management

Overall availability of services >90%
User communities: cross-section

- Seismology, meteorology, environmental protection – 12 applications
- Comp Chemistry, Comp Physics, Life Sciences – 26 applications
- Cross-border user communities and beneficiaries
Regional Multi-model, Multi-analysis Ensemble Prediction System
- BOLAM, MM5, NCEP/Eta, and NCEP/WRF-NMM
- SEE-wide scale detailed forecasts
- Coordinate, collect and analyze the outputs from all models for the generation of probabilistic forecasts
- Very complex; very CPU-intensive
User communities: meteorology example

DATA Download (Initial Conditions) → Pre-Processing → Model Run (BOLAM MM5 WRF/NMM NCEP/Eta) → Post Processing → Probabilistic Forecast

N.O.M.A.D.S NCEP-GFS (USA)
NGI status in SEE

Before SEE-GRID-SCI

During SEE-GRID-SCI
High-Performance Computing

- 120 Tflops aggregate
- 2 BlueGene machines
- Bulgaria, Romania, Serbia, Hungary, FYRoM offering resources
- Procurements coming - Greece and Serbia

- 26 applications in 3 VRCs

- Envisaged as bridge to PRACE

- Joint operations centre studied and assessed
HPC Systems in the region
Producing results / scientific publications
Flexible AccessMechanisms

- **Pilotcallfor access to resources**
  - Call closed -> 5th of October
  - Resources to be offered: 4.6 M Core hours, 1.8 M GPU hours
  - Allocations for 1 year – starting December 2012
  - Peer review based
  - Access to the resources from all countries of the region

- **Fast track access mechanism**
  - Limited resources provided
  - 2 Month allocation period
  - Suitable for: New user communities – Non experienced users
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- **Sustainability suggestions for Sub-Saharan Africa**
Sustainability Analysis

- Sustainability analysis was carried out for the Sub-Saharan Africa.
  - internal and external audits,
  - directional policy matrices,
  - SWOT analyses,
  - strategy formulations.
### SWOT

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<th>Strengths</th>
<th>Weaknesses</th>
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| - The Africa & Arabia ROC is functional and the technical know-how exists there  
  - UbuntuNet Alliance is a trusted agent on the African continent with a wide network of contacts  
  - There are attempts at regional dissemination of advanced computing services particularly through the training carried out through EPIKH.  
- The EU–funded AfricaConnect project building the regional backbone (with UbuntuNet Alliance as local implementing partner) has the potential to be a major catalyst to collaborative eInfrastructures-based research  
- The implementation of the SKA | - The absence of Regional Body for Grid Coordination;  
- There is a huge legacy of underfunding of tertiary education and research;  
- Brain drain;  
- Loss of critical mass of researchers to consultancies and the NGO sector; and therefore not a huge body of research to gridify  
- The current underdevelopment of the network.  
- Inadequate human capacity to address requests for development and training |

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<th>Opportunities</th>
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| - Visibility of research communities in areas that demand high processing power such as genomics/bioinformatics  
- The existence of SAGrid, from which a great deal can be learned and shared  
- Because of coming late on the scene, opportunity to learn from early adopters and avoid earlier pitfalls  
- Willing partners across the globe  
- Existing regional coordination bodies for NRENs which could be tasked with creating and stabilizing the RBGC in various regions. | - Tough economic times for certain sectors  
- Lack of awareness by the political cadre of the opportunities available  
- Nationalistic rather than regional or global embracing by national decision makers  
- Lack of sustainable funding model for computing resources  
- Perceived fragmentation of international DCI's  
- Slow response to many researchers' requests due to capacity constraints could present a negative picture of the RBGC |
Main lines of action

- UbuntuNet Alliance should work with Africa and Arabia ROC to provide coordination and management functions.
- Efforts will be made to convince the Grid stakeholders in Sub-Saharan Africa to support this process.
- VRC champions should be identified.
- National / NGI support should be ensured, most probably with NRENs.
Conclusions

- **National**-level Grid development crucial for further regional and international collaborations
  - Engagement by wider community
  - Governmental support

- **Use of regional** vehicles is crucial
  - Using the Africa&Arabia ROC momentum
  - Using the CHAIN momentum

- CHAIN and CHAIN-REDS as the intercontinental initiative can and will provide further support
Thank you for your attention!