Building European Consensus on Sustainability

e-Fiscal workshop

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e-IRG
e-Infrastructure Reflection Group

Aim of the presentation

1. **Present** the trends, needs, recommendations identified by e-IRG (following the consensus between EU country representatives)

2. **Discuss** them from a perspective of building future research agendas of individual teams

Contents

Part 1:

- **e-IRG & its papers**
- **Governance recommendations**
- **Service orientation of future e-Infras**

Part 2:

- Case study

e-IRG

- **Mission**:

  to pave the way towards a general-purpose European e-Infrastructure

- **Vision for the future**:

  an open e-Infrastructure enabling flexible cooperation and optimal use of all electronically available resources

- **Organization**:
  - Inter-governmental policy body
  - Recognized as an advisory body by the EC
  - National delegates appointed by the member state ministries from more than 30 EU Countries
  - Representatives from the EC

e-IRG methods

- **Workshops (2 per year):**
  - open forums to present, debate & consolidate e-Infrastructure best practices and policies
  - incubators for feeding new information and trends into the e-IRG plenum work
- **Papers**
  - summarizes on-going discussions around key e-Infrastructure areas and topics that require immediate policy actions
  - forms the basis for proposing formal e-IRG recommendations at the national and EU levels

Task force on sustainability of e-Infras

Recommendations (2006):

1. governments & EC should develop **policies & mechanisms** to encourage increased investment in a more coherent and interoperable way across EU
2. the existing e-Infrastructure projects must be superseded by **integrated sustainable services** at national & EU levels
3. e-infras must be **application-neutral** & open to all user communities & resource providers; national funding agencies should fund **multi-disciplinary** & inclusive infras
4. e-Infrastructures must **inter-operate** & adopt international **standard** services and protocols in order to qualify for funding
5. EC should, within FP7, develop a **pan-European e-Infrastructure** which explicitly encourages further integration of national e-infra initiatives

General trends (2011-2012)

Sustainability of current e-Infras has become a global concern

- The key role is played by their **governance**
- **E-Infrastructure landscape is changing** to comply with the *service oriented paradigm*, enabling:
  - increased innovation potential
  - cost-efficient access from a widening range of users

Topics of the white paper (2011)

1) **what are the appropriate governance models for e-Infras**;
2) how to advance research networks;
3) how to facilitate access;
4) how to deal with the increasing energy demands of computing;
5) what software is needed to fully harness the power of future HPC systems;
6) how to adopt and implement new e-Infrastructure services;
7) how to discover and share of large and diverse sources of scientific data.

e-Governance Management - Needs

- **Governance policies should support the free movement of knowledge across the world**
  - An e-Infrastructures' ecosystem to meet the challenge of an effectively and efficient governing
- **E-Infra governance should shift towards a user-driven approach**
  - Users need to have the choice for the best available services regardless of national boundaries, public or commercial commodity services,
  - Users need to actively participate in strategic governance decisions concerning e-infrastructures

e-Governance Management: Trends and measures

- **Trends**:
  - shift from mere resource provisioning to a system of infrastructure services

- **Characteristics of good governance**
  - Efficient : obtaining value for money
  - Effective : getting results
  - Transparent : resulting in broad stakeholder support
  - Accountable : identifying responsibilities

e-Governance Management: Recommendations (1/2)

1. **Establish a user-community-centric approach in strategic e-Infra governance**
   - including the appropriate funding mechanisms making distinction between the funding of service provision and of innovation activities.
2. **Define the long-term financial strategy for e-Infrastructures**
   - aimed at a sustainable operation of services in a flexible and open environment that includes offers from commercial service providers.
3. **Address the problems of cross-border service delivery**
   - quickly remove as many of these as possible

e-Governance Management: Recommendations (2/2)

4. **Introduce governance models that provide**
   - efficient and effective coordination mechanisms at all levels (regional, national, European, global)
   - the possibility for public and private research and cooperation.
5. **Investigate the impact of strategic changes in e-Infrastructure governance and financing on the operation of and access to international research infrastructures**
   - Investigation to be done by important players in the use of e-Infrastructures
6. **Investigate the effectiveness of legal structures for e-Infrastructures**

e-Infrastructure Services: Trends and needs

- **Trends:**
  - emergence of e-Infrastructure as a service is requested and accepted by the users
- **Needs:**
  - upgrade/refine the present services & develop/introduce new services;
  - improve the governance/management of e-Infrastructure operations offered as services;
  - extend/intensify cooperation and collaboration in e-Infra area;
  - establish & introduce a sustainable business model for e-Infra operation and services.

e-Infrastructure Services: Recommendations

1. **Involve user communities in the definition & exploitation of services**
2. **Use virtualisation and service-orientation when developing & introducing new services**
   - Define and deploy services applying: simplified access, transparent service offerings, customized support, standardization, improved governance models & sustainable business models
3. **Promote cooperation between public sectors in e-Infra arena**,
   - like government and healthcare,
   - to exploit economies of scale & intensify the contribution of e-Infras in facing societal challenges
   - boost innovation by public-private partnership activities

Service-orientation of the Future Open e-Infrastructures

- **Two decades of basic e-Infra services**
  - such as computing, security&authentication, communication&conferencing
  - developed as individual services based on dedicated equipment and unique software components
  - their interoperability has became a problem
- **Needs:**
  - for shared international access to remote resources, increased security, economies of scale for shared use
  - users are not interested in the pure infra part but rather in e-Infra services
    - which services are delivered and with what quality
  - a combination of services running on various resources spread world-wide
    - creates the premises to bring researchers together in international VOs

Service-orientation of the Future Open e-Infrastructures

- **Infrastructure-as-a-Service - IaaS**
  - emerging in both academic research and industry
  - provides an on-demand provision of requested resources for a widening spectrum of appls,
  - stimulates a service-oriented approach to software development & deployment
  - most of the higher-level complex services are based on well-defined interoperable and distributed lower level services

- **Major implication of the services shift: the changing division of responsibilities between the user and the supplier:**
  - responsibility of linking the service demand to the user need is moved to the supplier
  - It means widening the distance of the users to the physical resources

Governance of service-oriented e-Infras Recommendations (1/2)

1. Elaborate a system of metrics to establish the value & costs of services & delivery systs
2. Formalize the quality & management aspects of service provision practices
3. Support cross-organizational SLM need by governance structures
4. Develop open & adaptable standards for using heterogeneous e-Infra
5. Integrated user access to the various international e-Infra services
6. Appl-oriented, easily accessible, open & flexible services to adapt to changes & user needs

Governance of service-oriented e-Infras Recommendations (2/2)

7. Offer special services by establishing service portals dedicated to specific user communities
8. Coordination to exchange & share services among e-Infr providers, joint tendering/ licensing
9. Contentious governance issues impacting IaaS must be addressed: transparency, privacy, security, availability, performance, data protection, adoption of open standards
10. Apply SLM tools & procedures in service provision practices allowing users, providers & funding agencies to investigate e-Infra services from a perspective of individual use cases
11. Protect innovative of e-Infra services involving research & edu users in service development

Details can be found

- e-IRG White Paper 2011
  www.e-irg.org

- Drawing the line on Part I:
  - e-Infrastructure provision
    - is directed by the needs of the research community
    - is based on its requirements to carry out major global research efforts
  - Users want to be involved in the governance of the networks
    - Service-orientation opens new doors

Contents

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- Service orientation of future e-Infra(structures)

Part 2:

- **Case study**

Case study: from top to the bottom

How to apply the recommendations to a small/emerging HPC center?

Extract the ideas that can be applied:

- **Organize:**
  - inter-operable; use standard services & protocols; support on-demand provisioning; introduce new services; use virtualisation & service-orientation
- **Support:**
  - application neutral & serve several user communities, multi-disciplinary; involve users in governance; cross border service delivery; public-private cooperation
- **Cooperation:**
  - be included in national e-Infra initiatives & pan-European e-Infra
- **Sustain:**
  - long term financial strategy; promote cooperation between public sectors

Case study: small/emerging HPC center

BlueGene/P rack with 1024 CPUs
(4096 cores)
11.7 TFlops

Team topics: HPC, Grid, Cloud, AI

IBM BladeCenter-H
with 50 CPUs
(400 cores),
20 TB

http://hpc.uvt.ro

Case study / Organize

Topics	Compliant	Not-compliant
inter-operable with others	Checked in the frame of EC projects, e.g. HP-SEE, mOSAIC, SPaCiOS and former SCIEnce, DEHEMS, AVANTSSAR	gLite [small] cluster/EGI only for connectivity purpose due to the low no. of requests in NGI
use standard services and protocols	Support services as requested by the project collaborations	No use of Cloud emerging standards
support on-demand provisioning of the resources	- Cloud-IaaS/PaaS:mOSAIC, AMICAS - Grid: RO-NGI, EGI - HPC: HP-SEE	Not anonymous request
introduce new services	-Cloud open-source PaaS - HPC in the Cloud	Alpha version Design phase
use virtualisation and service-orientation	- Use Eucalyptus & own tools - Focus to provide services for academic use mainly	No industrial usage yet

Case study / Support

Topics	Compliant	Not-compliant
application neutral and serve several user communities, stimulate multi-disciplinarity	-Earth Observation: image classifications -Simulations for physics: raising crystals -Simulations for producing plastic materials	Multi-disciplinarity low No. discipline low
involve users in the governance	Center part of a Environment Institute of the university	Not yet effective
cross border service delivery	More than 50% jobs from outside country	Not anonymous request
public-private cooperation	Companies involved in the EC projects are using the resources	Restrictions in what concerns the usage for R&D, not production

Case study / Cooperation & Sustain

Category	Topics	Compliant	Not compliant
Cooperation	be included in national e-Infra initiatives	Part of Ro-NGI Part of ARCAS (HPC)	No Cloud initiative yet
	be included in pan-European e-Infra	EGI HP-SEE	Not in PRACE
Sustain	long term financial strategy	Environment institute plans for 10 years	Opportunistic Lack of financial plan
	promote cooperation between public sectors	SEED for e-Gov on Clouds	

Special services of the e-Infra/projects

Project	Funding	Status	Service
mOSAIC	EC FP7-ICT	On-going	Open source Platform as a Service
HP-SEE	EC FP7-Infra	On-going	Classification of satellite images (scalable on BG/P)
SEED	EC CIP-IST	On-going	Feeds display: Government announces for the citizens
HOST	EC FP7-REGPOT	On-going	HPC services on the Cloud
MODAClouds	EC FP7-ICT	To start	Tools for model-driven software engineering on Clouds
AMICAS	RO PN II	On-going	Services for Cloud providers: Automated management in Cloud and Sky environmant

Hints on the new services: mOSAIC PaaS

- **Reasons for designing it:**
  - offer services to a large [scientific] community
- **What is providing:**
  - Portability of codes between IaaS
  - Elasticity at the level of application components
  - Open-source PaaS
- **Research:**
  - Eg. auto-scaling mechanism, scheduling in heterogeneous environment
- **Details:**
  - Official site: www.mosaic-cloud.eu
  - Codes: https://bitbucket.org/mOSAIC
  - Documentations: http://developers.mosaic-cloud.eu
  - Demos: search “mOSAIC Cloud computing” on YouTube

Invitations

High Performance Computing Service Center

West University of Timisoara, Romania — http://host.hpc.uvt.ro

Forthcoming HOST event: **Workshop on HPC Services**

Date: 27-29 September, 2012 **Place:** West University of Timisoara, Romania

In conjunction with: SYNASC 2012 – 14th Symposium on Symbolic and Numeric Algorithms for Scientific Computing http://synasc12.info.uvt.ro

Topics include:
- Parallelization of compute- or data-intensive tasks in scientific applications
- Cluster, Grid and Cloud computing in scientific applications
- Multicore/manycore architectures and GPU support for scientific applications
- Programming paradigms/tools/environments for high-performance scientific computing

Including:
- HPC training
- Grid tutorial

Important dates:
- Full paper submission: 20 July 2012 Notification: 15 August 2012

Publication:
- selected papers will be included in SYNASC 2012 post-proceedings (IEEE CPS)
- extended versions of selected papers to published in SCPE journal

http://host.hpc.uvt.ro/events/wohs/

Open positions: HOST team is looking for

- a researcher with experience in Cloud Computing technologies for HPC service exposure

Preconditions:
- doctoral degree or at least four years of full-time equivalent research experience

To apply:
Submit by e-mail to the HOST project manager, Prof. Dana Petcu (petcu @info.uvt.ro):
- a CV
- a list of papers
- copies of the degree certificates
- two recommendations

Contact: Prof. Dana Petcu, petcu@info.uvt.ro
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Universitatea de Vest din Timişoara

What's New in European Research Area? Cloud Computing Topics

European Research Activities in Cloud Computing

Editors: Dana Petcu and José Luis Vázquez-Poletti

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44.99 £ Order it from the web site

Despite its widespread adoption, Cloud Computing still has critical problems to be solved. The European research and development community is searching for viable solutions. This book presents several European Research Projects covering different topics of Cloud Computing: services, management, automation, adoption.

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Content

Part I: Cloud Services

Open Computing Infrastructures for Elastic Services
by Yvon Jégou et al
Autonomic Mechanisms for Transactional Replication in Elastic Cloud Environments
by Paolo Romano et al
Data-intensive Storage Services on Clouds: Limitations, Challenges and Enablers
by Hillel Kolodner et al
Migrating legacy application to the Service Cloud Paradigm
by Parastoo Mohagheghi et al

Part II: Cloud Management

Towards Holistic Cloud Management
by Johan Tordsson et al
Privacy and Resilience for Internet-scale Critical Infrastructures
by Alysson Bessani et al

Part III: Cloud Automation

Agent Based Services for Negotiation, Monitoring & Reconfiguration of Cloud Resources
by Salvatore Venticinque et al
Self-adaptation in Service-Oriented Systems
by Elisabetta Di Nitto et al
Service Level and Delivery Management in e-Infrastructures
by Matti Heikkurinen et al

Part IV: Cloud Adoption

Cloud Distribution
by Charles Loomis et al
Business Application Governance and SLA Management in Platform as a Service context
by Francesco D'Andria et al
Reducing Time to Market with the e-Platform as a Service
by José Luis Vázquez-Poletti et al

Samples

FP7 projects dealing with Cloud Computing in "Invitation to a Journey in the ERA of Cloud Computing"

http://www.c-s-p.org/Flyers/978-1-4438-3507-7-sample.pdf

Videos

Follow the book authors presenting their projects and achievements, at 2nd WoSS: http://www.sprers.eu/events/2nd-WoSS

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