

Software Services at UPB-NCIT

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Plan of the Presentation

- Service as a paradigm
- Early projects
 - CoLaborator, SINTEC
 - eBusiness & eLearning projects
- eServices
 - in eGovernment
 - with eCaesar
- Grid services
 - EGEE, See-GRID
 - MonALISA, Monarc 2
 - GridMOSI, MedioGRID, Pegaf
 - P2Pnext, Sensei
- Services – the human factor
 - COOPER, LTfLL
- Research groups and topics
- References



Service as a paradigm

Architecture - how various components of a system are organized and how they interact^(*)

Object-based Systems

- everything is an object
- clients can invoke methods to get services

File Systems

- everything is a file
- allow processes to share data over long periods of time



Document-based Systems

- servers manage collections of documents
- clients provide a friendly access to documents

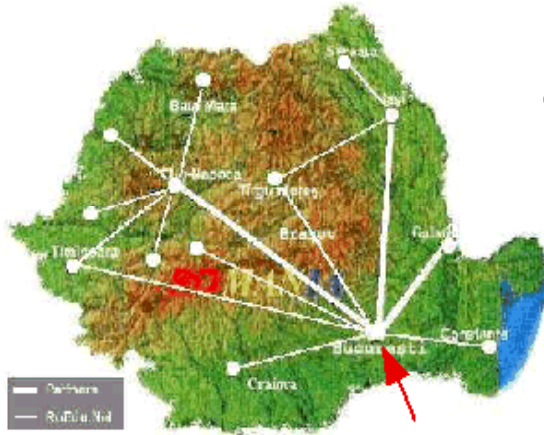
Service Oriented Architecture

- everything is a service
- more abstract than previous categories

(*) A.S.Tanenbaum, M.Van Steen *Distributed Systems. Principles and Paradigms*, 2nd Edition, Prentice Hall 2007

Early projects

CoLaborator Virtual Environment for Education and Research



CoLaborator Services

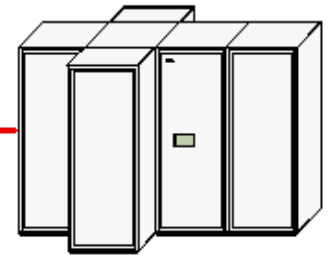
Web access to HPC tools for program development, and to HPC applications

Collaborative services to support the research teams

- Consultancy
- Cooperation
- Knowledge co-construction

Collaborative services for

- Class management
- Course management



HPC Tools, Programs, and Applications



Server

Knowledge Repository

Collaborators

services offered to the scientific community

tools for

integrating the others' knowledge

Internet

CoLaborator

Workshop Ro-NeSSI - 30 April 2010, Timisoara, Romania



eLearning Services for EBA Courses

Courses

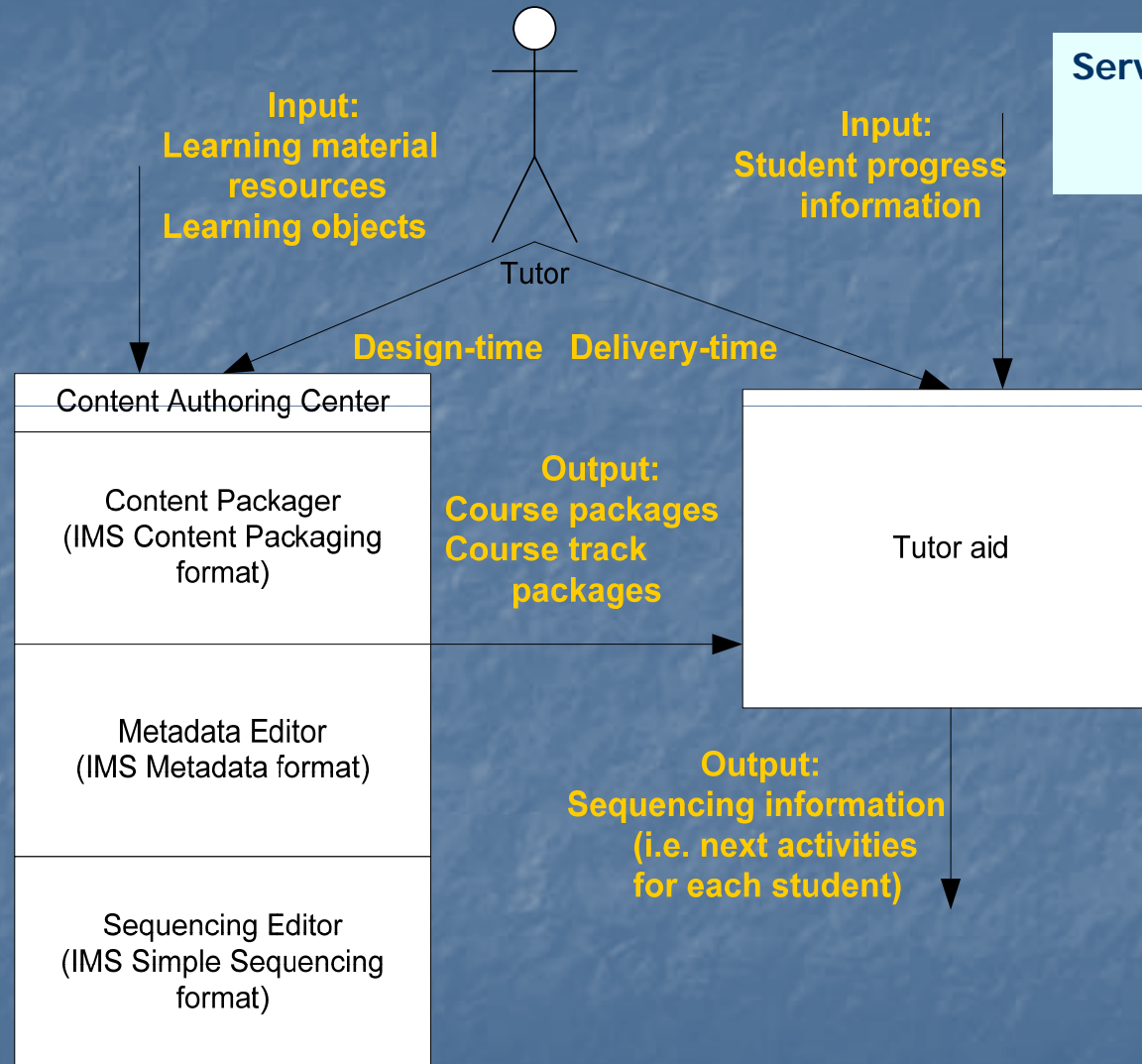
Web Application Dev.
XML Application Dev.
Enterprise Applications Dev.
Advanced Java Progr.
Visual Progr. with WSAD
Linux OS
Advanced TCP/IP
Apache Web Server
Databases

Standards

IMS Content Packaging
IMS Metadata
IMS Simple Sequencing

Services

e-courses
e-projects



e-Services

e-Services in the eGovernment UPB-IBM laboratory

Pilot projects

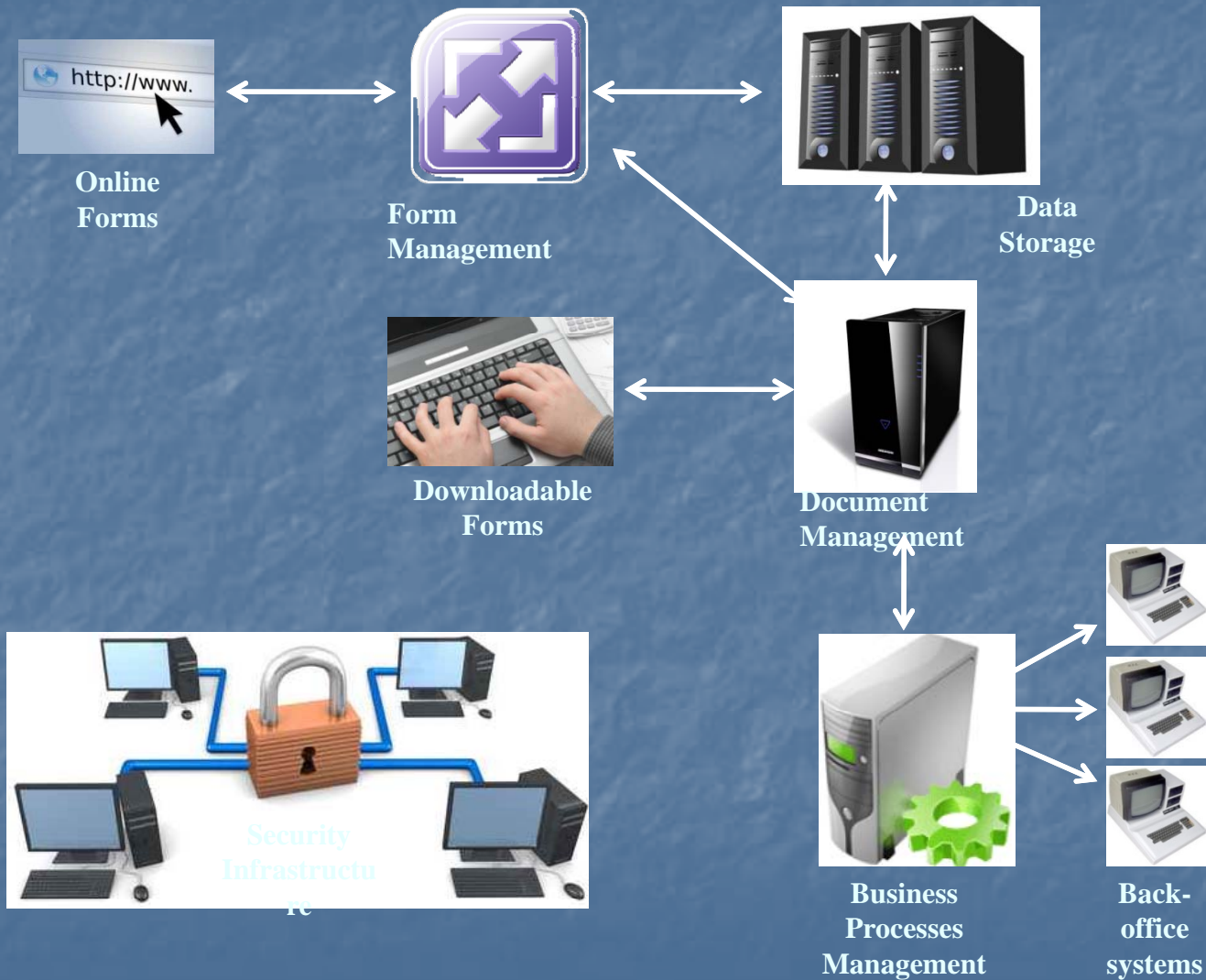
- eMall
- csJobs
- ePetition
- Certificate Authority
- mediHelp
- eBanking
- ePublisher
- eCash
- Traffic view
- simShareMarket
- mobileGuide

Challenges

- Application interoperability
 - Web services, open source software
- Semantic interoperability
 - Semantic Web, metadata, Knowledge management
- Enterprise architecture
 - process modeling, frameworks
- Environment
 - policy, standardization

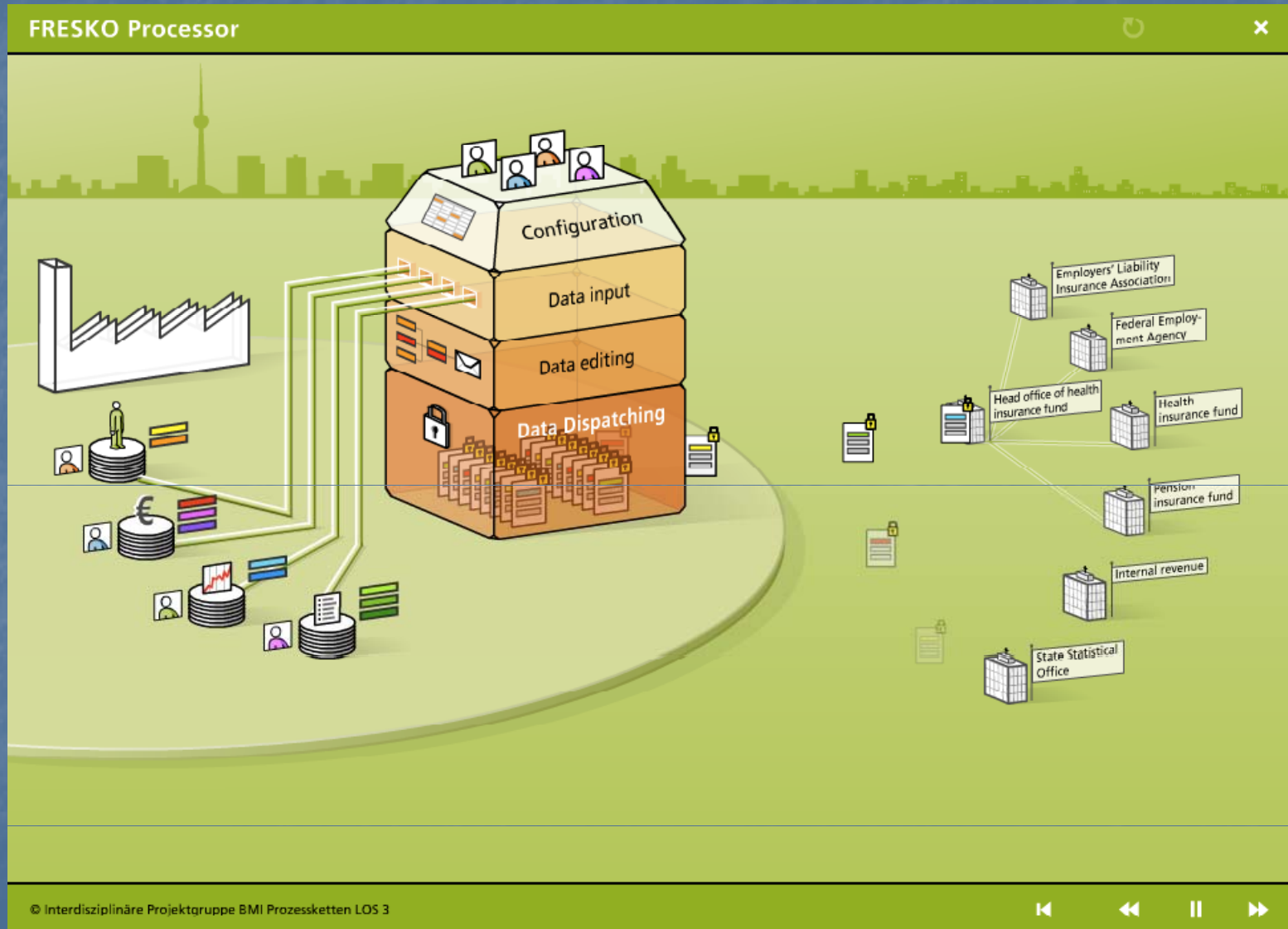


EU Service Directive



Pro Project

UPB and E-CAESAR
in the context of
Romanian
e-Service market



© Interdisziplinäre Projektgruppe BMI Prozessketten LOS 3

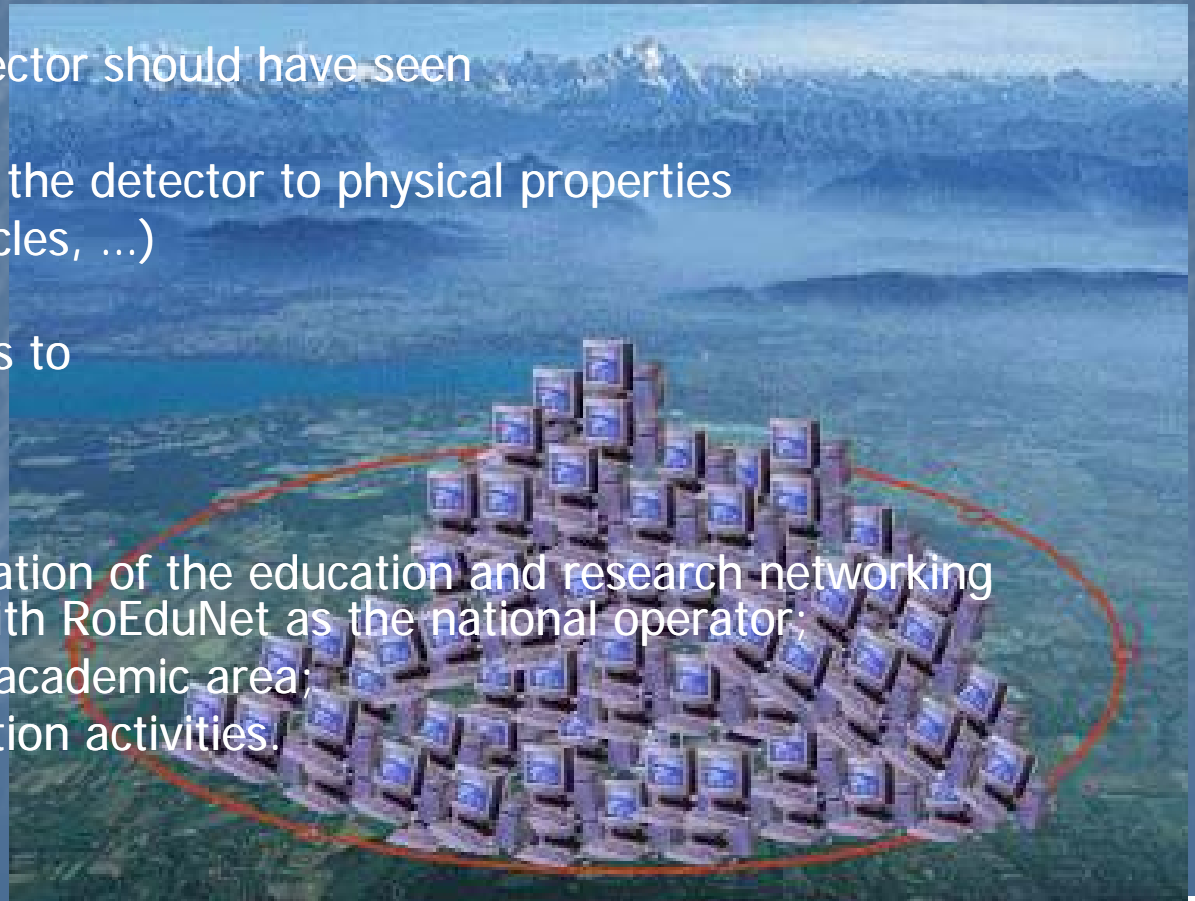


Grid Services

EGEE – Enabling Grids for E-scienceE

Challenge: providing support for processing data from LHC (Large Hadron Collider) experiment

- 40 million collisions per second
 - After filtering, 100 collisions of interest per second
- Simulation
 - compute what the detector should have seen
- Reconstruction
 - transform signals from the detector to physical properties (energies, charge of particles, ...)
- Analysis
 - use complex algorithms to extract physics
- **UPB specific roles:**
 - development and operation of the education and research networking infrastructure, along with RoEduNet as the national operator;
 - supporting users from academic area;
 - training and dissemination activities.



Control Services in See-GRID- SCI

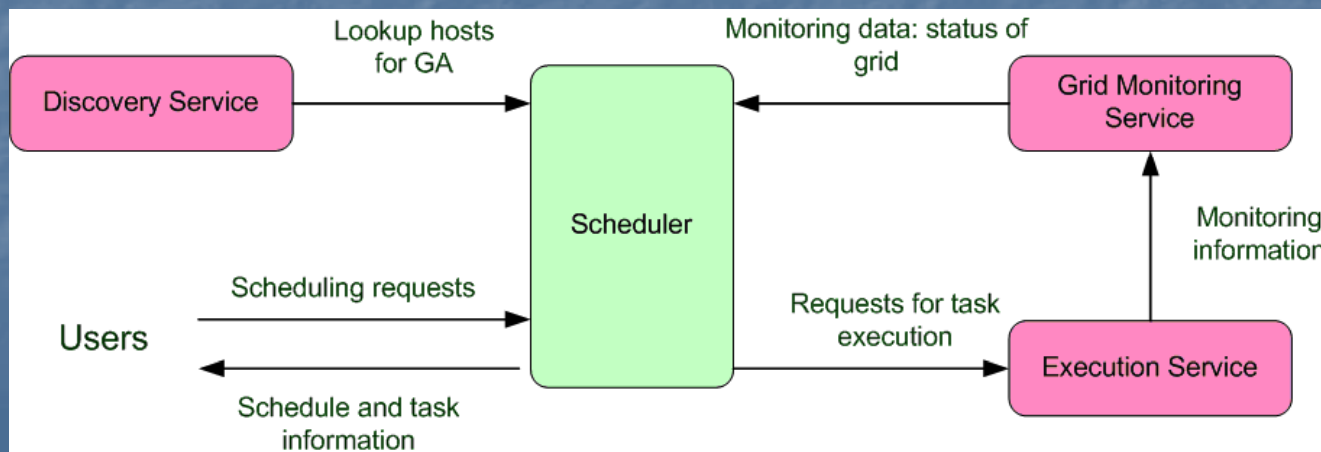
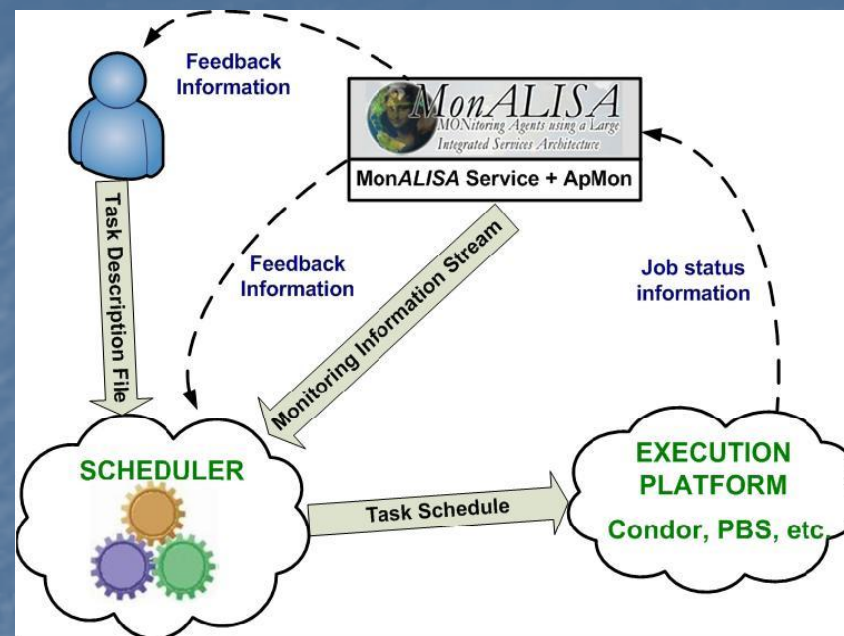
FP7 Project, 2008-2010, 3.2M€ funding

Objective: **eInfrastructure for regional eScience**

Partners include: CERN, GRNET, SZTAKI, ICI, TUBITAK

UPB involved in:

- monitoring the Grid infrastructure using MonALISA and specific modules
- development of scheduling algorithms for computational Grids: **DIOGENES** Framework



Monitoring and Simulation Services

MonAlisa

- a globally scalable framework of services to monitor and help manage and optimize the operational performance of Grids, networks and running applications in real-time.

Monarc 2

- performs realistic simulation and modelling of the distributed computing systems, customised for specific Grid applications.

Extensions

- A Distributed Agent-Based Storage and Retrieval Mechanism
- Intelligent strategies for scheduling in distributed systems



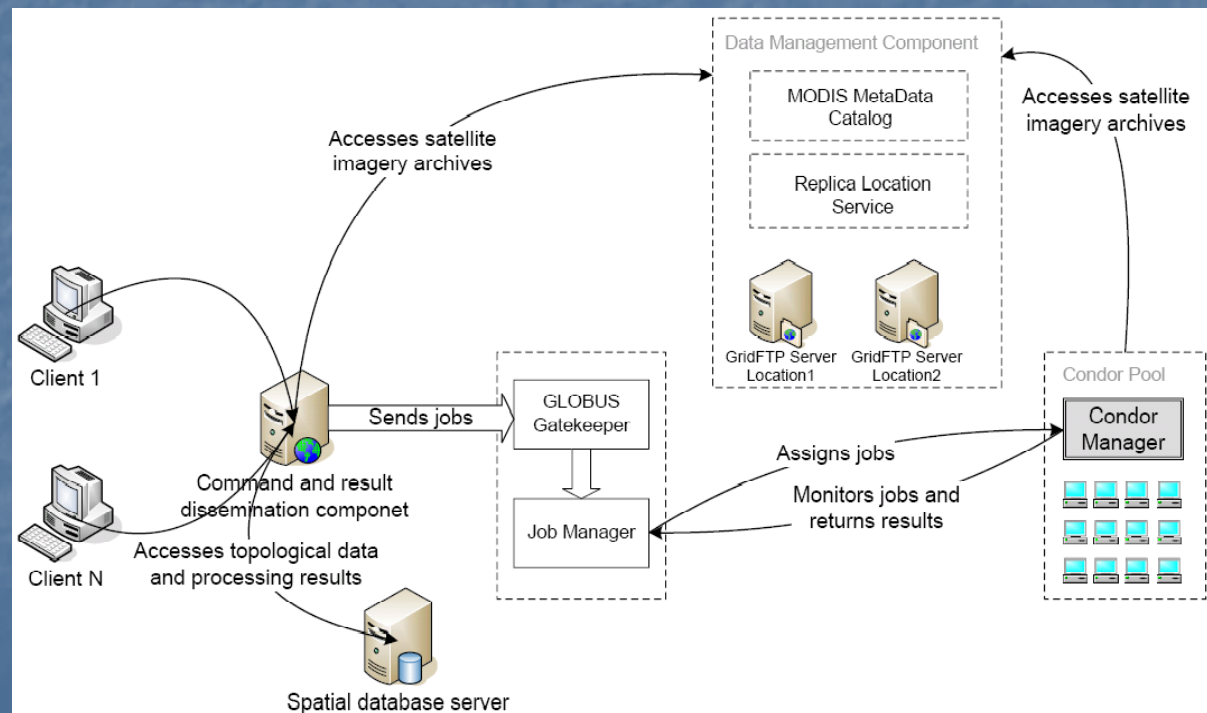
GridMOSI

- Funded in the CEE X programme
- Objectives
 - consolidate the Grid resource centers at the level of partner organizations, operate and maintain the project Grid infrastructure;
 - set-up the virtual organization for the MOSI domain as the first contribution of this kind to the national research infrastructure, demonstrate the feasibility and benefits of this approach;
 - migrate to the Grid environment a relevant set of the available MOSI applications selected from the project partners' offer.
- Partners
 - ICI, UPB, INCAS, UTCN, UVT
- UPB contribution
 - distributed, fault-tolerant, scalable and efficient method for optimizing task assignment in Grid environments (first version of DIOGENES)



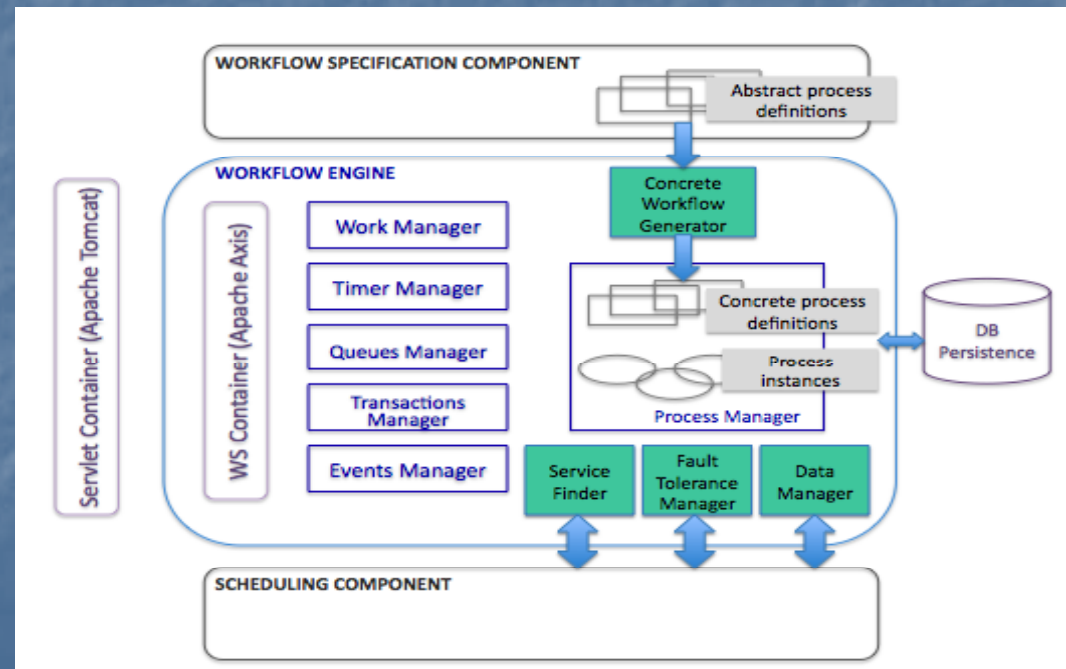
Management and computation services in MedioGRID

- Parallel and distributed processing of geographic and environment data
- UPB contributions
 - distributed algorithms for critical areas detection, change detection in satellite images
 - fault tolerant scheduling framework
 - Grid Services for Environmental Data Retrieval and Disasters Detection Based on Satellite Image Analysis
 - distributed algorithms for Multispectral Image Segmentation
 - platform development



PEGAF

- National Project, 2008 - 2010
- Partners include: ICI (coordinator), UPB, UVT
- Objective: **develop a workflow management platform for distributed systems, targeted to scientific applications**
- 4 components:
 - a high-level module that will provide a user interface for defining abstract workflow, and that will manage domain-specific ontologies
 - a middle-level module that will have the role of a **workflow engine** (UPB);
 - a low-level module that will be in charge of **scheduling the workflow** activities and services onto the distributed system's physical resources, relying upon the available middleware (UPB)
 - basic OGSA (BES, JSDL, GLUE) services and grid middleware (Globus, gLite) + applications (MapleSim - modelling&simulation)



P2P Next

- FP7 Project, 19M€ funding, 2008 - 2012
- Objective: building a next generation P2P content delivery platform
- Partners include: TUDelft, University of Lancaster, Sapienza University of Rome, VTT Finland, BBC, Pioneer
- UPB involved in
 - **Peer-to-Peer and IPvNext Networking Fabric (technical core of P2PNext)**
 - **Living Lab Trials: deploy test-beds/trials across Europe in order to evaluate the effectiveness of the P2P-Next approach when applied to a variety of services, across a heterogeneous networking infrastructure targeting various user terminals/devices.**
 - **Upload Bandwidth Estimation**
 - new, non-intrusive method for estimating the (available) upload bandwidth of a peer
 - **Living Lab Testing Framework**
 - framework for BitTorrent testing using virtualization and Linux kernel modules for traffic control
 - MonALISA monitoring infrastructure is used to collect results in the framework.
 - Goal is to enable performance evaluation and test scenarios on different BitTorrent implementations.

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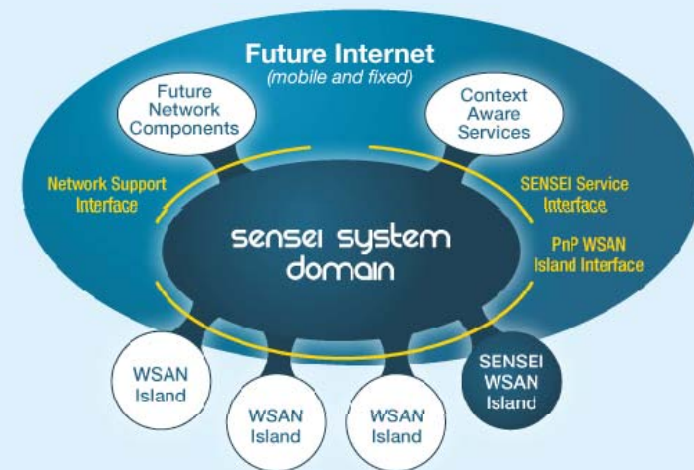


SENSEI

- FP7 Project, 2008-2011
- Objective: heterogeneous wireless sensor and actuator networks (WS&AN) integration into a common framework of global scale available to services and applications via universal service interfaces
- Partners include: CEA-LETI, University of Surrey, University Pierre Mendes France Grenoble, Ericsson, Nokia, NEC, SAP, Telefonica, Thales
- **UPB involved in:**
 - resource monitoring for advanced automatic reconfigurability and adaptive topology control
 - scheduling of task-based networks and self-healing algorithms in heterogeneous WS&ANs
 - specification of the implementation and evaluation plan of European test platform for efficient WS&AN Islands prototypes based on selected mechanisms and technology

- A highly scalable architectural framework with corresponding protocol solutions that enable easy plug and play integration of a large number of globally distributed WS&AN into a global system – providing support for network and information management, security, privacy and trust and accounting. An open service interface and corresponding semantic specification to unify the access to context information and actuation services
- Efficient WS&AN island solutions consisting of a set of cross-optimised and energy aware protocol stacks
- Pan European test platform

Figure 1: Concept and scope of SENSEI.



DataCloud@work

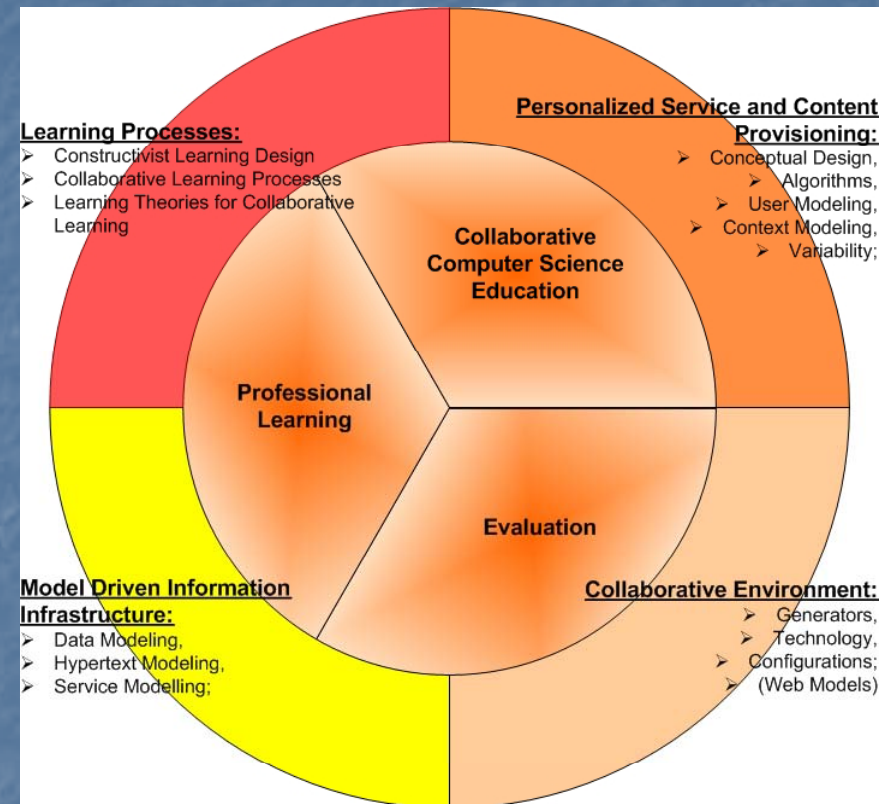
- INRIA Associate Team project
 - <http://irisa.fr/kerdata/projects/associate-team-upb/associate-team-submission-form.html>
- Goals
 - explore how to build an efficient, secure and reliable storage IaaS for data-intensive distributed applications running in cloud environments by enabling an autonomic behavior, while leveraging the advantages of the grid operating system approach (such OS-support for virtual organizations)
 - Validation by experimental prototypes to be implemented based on the BlobSeer data-sharing platform (designed by the KerData Team), on the XtremOS grid operation system (designed under the leadership of the PARIS Team) and on the MonALISA monitoring framework (using the expertise of the PUB Team)



Services – the human factor

How good is the service?

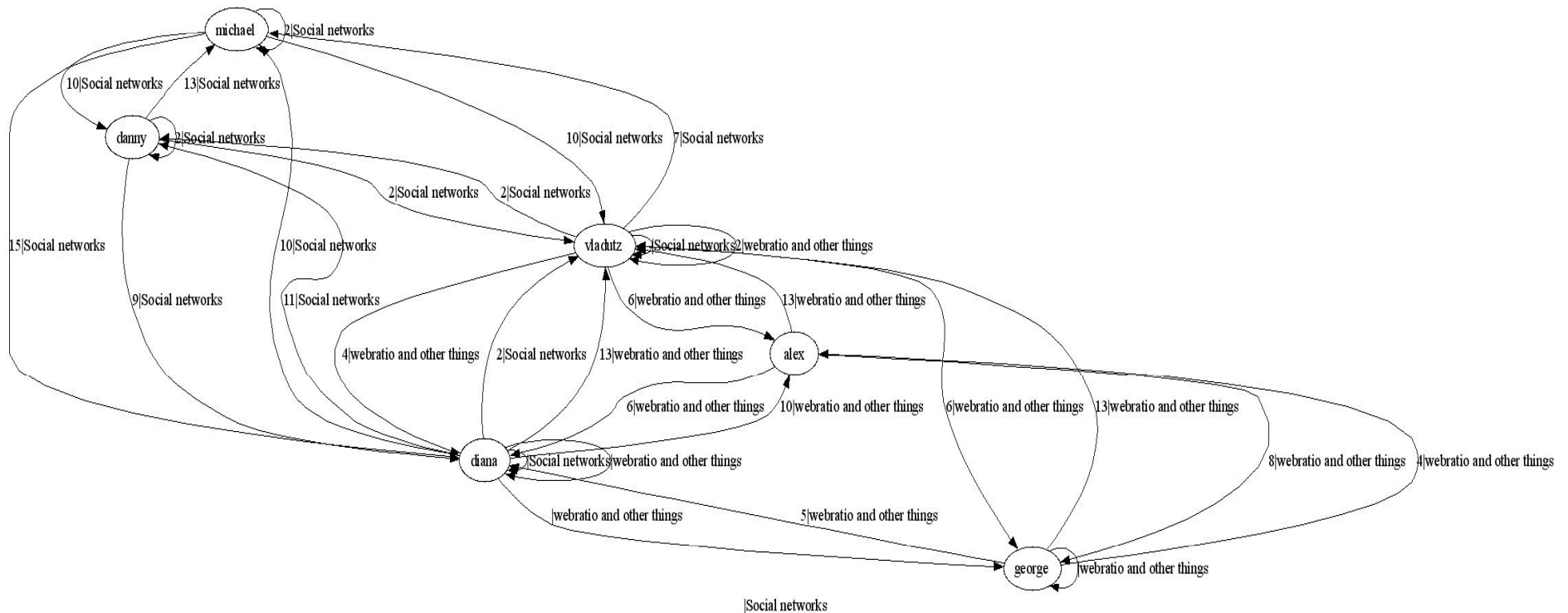
- Customer satisfaction relative to expectations
- Example – COOPER FP6 project
 - New concepts and technologies
 - Teamwork processes modeled in WebML + BPML
 - Generative approach to build adaptive Web applications dedicated to teamwork management
 - Knowledge Sharing and Recommender Service
 - Evaluating the impact
 - pre- and post- questionnaires to evaluate expectations and satisfaction
 - enforce with statistics collected online
 - use social network analysis
 - **evaluation tools integrated in the platform and delivered together**



COOPER - Collaborative Open Environment for Project-Centered Learning, FP6 STREP project

Evaluating the usage of services

- Gives information about customers' behaviour
- Criteria
 - the degree of collaboration
 - the cohesion of a customer team around a service
 - collaboration between customers and suppliers
 - the usage degree of a service



Service Science: Skills Required

- Communications across disciplines
- Service design
- Service management
- Service system modeling
- Service strategy through understanding value co-creation
- Service lifecycles to ensure quality
- Service supply and demand management
- Business project management
- Creative and critical thinking, analysis and synthesis.
- Business best practices
- Leadership, collaboration, and teaming.
- Business case development and analysis
- New service offerings
- Organizational change management
- Knowledge of marketing and sales

Service Engineering and Management Master at UPB

- Professional 2-year Master Program, industry-supported
- Provides the following components in the education of service professionals:
 - New technologies
 - the ability to design, understand and evaluate innovative technologies and processes
 - New interaction modes or services
 - understand user and consumer needs and be able to meet requirements and quality expectations
 - New business models
 - leadership and management capacity to meet stakeholder interests and the demand for organization flexibility, effectiveness and accountability
- 3 complementary training modules:
 - ICT (Information and Communication Technologies),
 - PSO (Psychology and Sociology),
 - OMM (Operations, Management and Marketing)



Research Groups

- e-Services (e-Business & e-Gouvernement)
 - V. Cristea, F. Pop, C. Dobre, D. Popescu, E. Apostol, V. Posea, T. Rebedea, M. Ionescu, M. Teler
- Distributed Systems & Grids
 - V. Cristea, N. Tapus, E. Slusanschi, F. Pop, C. Dobre, Al. Costan, M. Andreica, Al. Herisanu, C. Leordeanu, E. Tirsa,
- Computer Networks
 - N. Tapus, R. Rughinis, R. Deaconescu, G. Milescu, M. Bardac
- Collaborative Knowledge Development
 - S.Trausan-Matu, V. Posea, T. Rebedea, C. Chiru
- Artificial Intelligence and Multi Agent Systems
 - A. Florea, A. Mogos, A. Olaru, C. Gratie
- Company supported innovation and research laboratories: IBM, Oracle, Microsoft, HP

Research topics

- e-Services (e-business, e-government)
- Grid services and applications
- Monitoring services
- Data management services
- Semantic Web, e-learning
- Software services for mobile computing (vehicular networks, e.g. VNSim)

References

- NCIT <http://cluster.grid.pub.ro/>
- MonALISA <http://monalisa.caltech.edu/>
- FDT <http://monalisa.cern.ch/FDT/>
- EGEE <http://www.eu-egee.org/>
- SEE-GRID <http://www.see-grid-sci.eu/>
- P2P-Next (UPB) <http://cluster.grid.pub.ro/index.php/p2p-next>
- Sensei (UPB) <http://cluster.grid.pub.ro/index.php/sensei>
- LTfLL <http://www.ltfll-project.org/>
- CSCS <http://cscs17.ncit.pub.ro/>
- HiPerGrid <http://hipergrid.grid.pub.ro/>
- GridInitiative <http://gridinitiative.ncit.pub.ro/>
- CS Department <http://csite.cs.pub.ro/>

Thank You!