Towards Service-Oriented Systems and Cloud Computing Environments

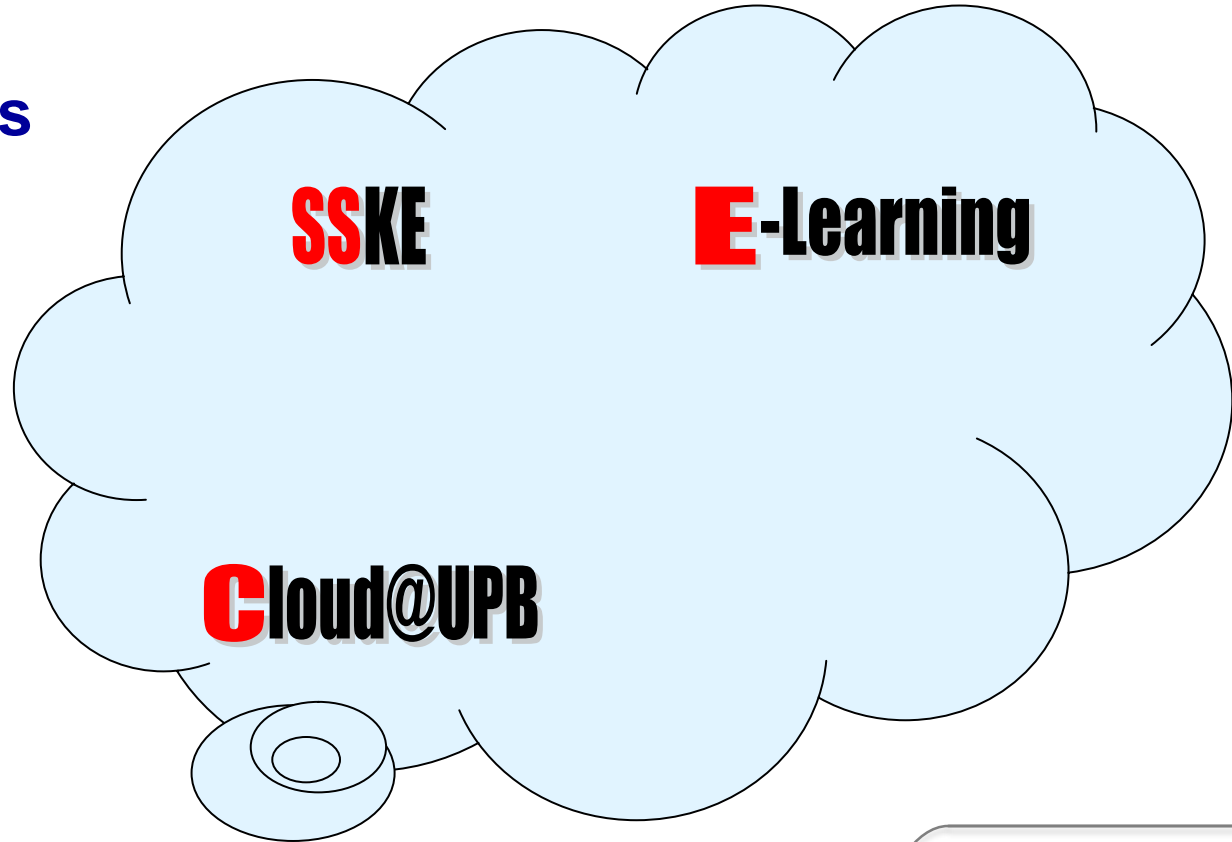## Anca Daniela Ionita

University POLITEHNICA of Bucharest

Summary

- INSER@SPACE Platform
- Towards Service-Oriented Systems
- Towards Cloud Environments
- Education for Services and Cloud
- Networking. Towards a Larger Scale

Components

SS KE

E-Learning

Cloud@UPB

INSER@SPACE Platform

Common Action Programme

INSER@SPACE Platform

- SSKE Semantic Wiki
- e-Learning Cloud
- Educational programs support

European Innovative Platform for Knowledge Intensive Services (EIPKIS)

- Europe INNOVA
- Europa 2020

European Strategic Framework

- Europe 2020
- Horizon 2020

InSeED

INSEED - European Platforms for Services

Common Action Programme

[INSER@SPACE link](#)

Domain Fundamentals | Service Support | Learning | Service Inovation | Service Sectors | Contributors to the SSKE

Last visited: Learning | Contributors to the SSKE | Cloud@UPB | INSER@SPACE – EIPKIS Common Action Programme

INSER@SPACE – EIPKIS Common Action Prog…   More ▾

- Keywords
- **Documents**
  - Articles
  - Books
  - Journals
  - Reports & Thesis
- **Projects**
  - Research
  - Studies
  - Education
  - Commercial
- **Patents & Standards**
- **Events**
  - Workshops
  - Conferences
  - Virtual Exhibitions
- **Company Solutions**
  - Solutions
  - Technologies
  - Products
  - POC & Demos
  - Training
- **Institutions**
  - Academic
  - Business
  - Government
  - Professional Organizations
- **Persons**
  - Professionals
  - Professors
  - Researchers
  - Students
- **Service Science Community**
- **International Society of Service Innovation Professionals**
- **INSER@SPACE – EIPKIS Common Action Programme**

INSER@SPACE, as an open collaborative space for promoting service innovation and technological transfer, has the important role in maintaining the connection to the European Innovative Platform for Knowledge Intensive Services (EIPKIS).

INSER@SPACE is composed of three important parts:

- a learning management platform

- a semantic wiki dedicated to service science

- a set of Cloud services

EIPKIS is a generic concept, represented by multiple European platforms, like Europe INNOVA ⚹, EU Cluster Observatory, Europe 2020 ⚹, as well as professional organizations and communities concerning services and innovation.

The INSER@SPACE – EIPKIS Common Action Programme was developed based on the experts' experience and on the extensive documentation and research performed within the project. It aims at assuring the sustainability of our actions and of our development even after the end of the project, in order to support service innovation and continuous education. The programme has five main objectives, presented below in detail.

Objective A: A. Aligning INSER@SPACE actions with the European Commission strategy

Objective A Details:

A.1 Participating to events organized by the European Commission

A.2 Comprehending the strategies, programmes and organisms related to the European Commission

A.3 Involvement in activities organized at European level on the topic of services

A.4 Enrollment of INSEED consortium institutions in initiatives and organizations at European level

Objective B: B. Contribution of INSEED experts and institutions to activities of initiatives and scientific communities at international level

Objective B Details:

B1. Adherence to professional and technical organizations in the domain of services

B2. Participation as active members in technical-scientific communities

Programme Objectives

- **A.** Aligning INSER@SPACE actions with the European Commission strategy

- **B.** Contribution of INSEED experts and institutions to activities of initiatives and scientific communities at international level

- **C.** Collaboration with foreign professors and researchers on the topic of innovative services

- **D.** Sustaining education activities in the domain of services and in correlation with the European framework

- **E.** Promoting the INSER@SPACE collaborative space

INSEED Results

■ Community

- EU Cluster Observatory
- Enterprise Europe Network
- KIS Innovation Platform
- TM Forum
- International Society of Service Innovation Professionals (ISSIP)
- IEEE Computer Society Cloud Computing Special Technical Community (CS CC STC)

■ Collaborations

- University of Porto
- Institute for Manufacturing, University of Cambridge (IfM)
- GDR MACS (Groupe de Recherche Modélisation, Analyse et Conduite des Systèmes Dynamiques)
- Paris 1 Panthéon – Sorbonne

■ Contributions

- INSER@SPACE offer: education, knowledge, virtual resources
- DG CONNECT public consultation E2 Software & Services, Cloud
- EU Metrics Survey, scientific literature

- Reuse
  - Reuse existing classes and methods in an existing object-oriented system as web services in a service-oriented architecture
  - Build the reused services into new business processes
- Web services maintainability
  - RESTful vs. SOAP-WSDL
- Maintenance of software services tests
  - Automatic Web Service Change Management
  - Efficient regression testing of web services by selecting the relevant test cases to construct a reduced test suite from the existing one, built for a previous version of Web services

Towards Service-Oriented Systems

Service Science Knowledge Environment SSKE

http://sske.cloud.upb.ro

**Migration
to SOA
Environments**

- A complete migration process
  - Technological, organizational and business perspectives
- Challenges
  - Business-IT alignment
  - Componentization
  - Infrastructure engineering
  - Automated toolsets
  - Determine optimal granularity
  - Service versioning

- Availability, reliability, data integrity, energy efficiency

- Challenges
  - Location specific – domain and legal experts
  - Strategy for moving back
  - Migration education – lack of knowledge and skills

- Types of migration
  - From in-house to cloud resources
  - From one provider to another / or to multiple others

Cloud Monitoring

- Orchestration and choreography
- Adaptation of the monitoring infrastructure to keep track of the environment evolution
- Functional and non-functional service monitoring (check the SLA)
- Multi-source monitoring for adaptive SLA following the evolution of the Cloud infrastructure

INSEED Cloud Environment

IBM Cloudburst

INSEED Educational Offer

30%

45%

25%
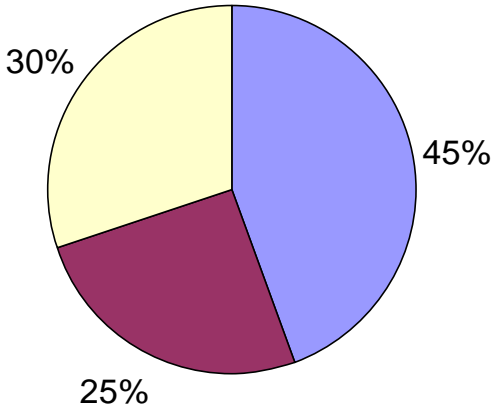
Program Type		Lecture Hours	Practical Work Hours
Initial formation	Master	616	490
	Compact modules	347	316
Continuous formation	Developed programs	420	225
	Special programs proposed	100	84

Service Engineering and Management

Master Program

Bucharest

Porto

Bucharest

University POLITEHNICA of Bucharest
SEM Director: Professor Theodor Borangiu

Service Science, Design and Management Educational Model

- Increased job offer in service sectors
- Need for high quality services for a better life
- 3 types of systems: execution, transformation, innovation
- 3 service innovation levels: requirements, competences, resources
- Defining curriculum for the multi-level framework
- Diverse knowledge areas
- Initial and continuing education
- Migrating towards jobs from other category of systems
- On demand, national access to educational programs

InSeEd

Education for Services and Cloud

SEM Master Program Description

Fundamental Domain: Engineering Science
Study Domain: System Engineering
Program Type: General Master, MS-T or MS-E
Knowledge Areas:
- Formal methods; Modeling
- Economic science; Management; Marketing
- Sociology; Communication; Service science
- Service system engineering
- Information systems; System architecture; SOA
- Data security; Information management

Curriculum areas: service system analysis and design, TIC, service operations management and marketing, psychology and organizational communication, service financial management

Competences:
- Using concepts and scientific methods in interdisciplinary domains
- Integrating concepts and methods specific to economic science and marketing into service development
- Considering psychology and communication principles in service development
- Business process modeling and implementation within the service domain
- Designing architectures for service-oriented systems (SOA, ESB, SaaS)
- Developing IT applications for services using modern technologies

Qualification:
Service Engineering and Management

Possible occupations (according to COR):
214402 Automation engineer
213901 System engineer in informatics
213101 Analyst
213102 Programmer
213905 Software system engineer
250101 Researcher in informatics
251413 Researcher in computers
251416 Researcher in automatic control
231001 Professor assistant
241919 Project manager

New occupations to be introduced in COR:
- Information systems consultant
- Business process consultant
- Architect for service systems based on TIC
- SOA consultant
- Service operations expert
- Customer relationships management expert

InSeED

Agreements

Double degree diploma

Students that have been enrolled to study abroad at FEUP and have had a minimum of 6 months of study there, will get not only a degree from the Faculty of Automatic Control and Computers but also for the Faculty of Engineering from the University of Porto.

SEM Service Engineering and Management

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MESG Master on Service Engineering and Management

- Problems
  - Processes evolve continuously: structuring and automation
  - The size of systems – business processes at large scale – workflows in systems of systems are hidden
  - Processes going through many applications – up to 200
- Automated processes in a very large scale context
  - Towards a centralized workflow platform
  - Combine SOA and BPM for a system of systems

Documentation and transfer of experience in INSEED

- Eindhoven University of Technology, The Netherlands
- University of Passau, Germany
- European Commission DG CONNECT E2 - Software & Services, Cloud, Brussels, Belgium
- Institut National Polytechnique Toulouse, France
- Invest Northern Ireland, United Kingdom
- London Metropolitan University, United Kingdom
- Óbuda University of Budapest, Hungary
- Pantheon-Sorbonne University, Paris 1, France
- University of Bergamo, Italy
- University of Cambridge, United Kingdom
- University of Cassino, Italy
- University of Coimbra, Portugal
- University of Ghent, Belgium
- University of Ljubljana, Slovenia
- University of Lorraine, France
- University of Maribor, Slovenia
- University of Porto, Portugal
- University of Prague, Czech Republic
- University of Valenciennes and Hainaut-Cambrésis, France

**INSEED
Collaboration
Network**

Thank you !

Thank you !