



UNIUNEA EUROPEANĂ



GUVERNUL ROMÂNIEI  
MINISTERUL MUNCII, FAMILIEI  
ȘI PROTECȚIEI SOCIALE  
AMPOSDRU



Fondul Social European  
POSDRU 2007-2013



Instrumente Structurale  
2007-2013



MINISTERUL  
EDUCAȚIEI  
CERCETĂRII  
TINERETULUI  
ȘI SPORTULUI

OIPOSDRU



Universitatea  
POLITEHNICA  
din Bucuresti

# Towards Service-Oriented Systems and Cloud Computing Environments

Anca Daniela Ionita

University POLITEHNICA of Bucharest

**Strategic Program for Promoting Innovation  
in Services by Open and Continuous Education (INSEED)**

POSDRU/86/1.2./S/57748

*The Project co-financed by the Social European Found by Sectoral  
Operational Programme Human Resources Development 2007-2013*

FONDUL SOCIAL EUROPEAN

Investește în  
OAMENI



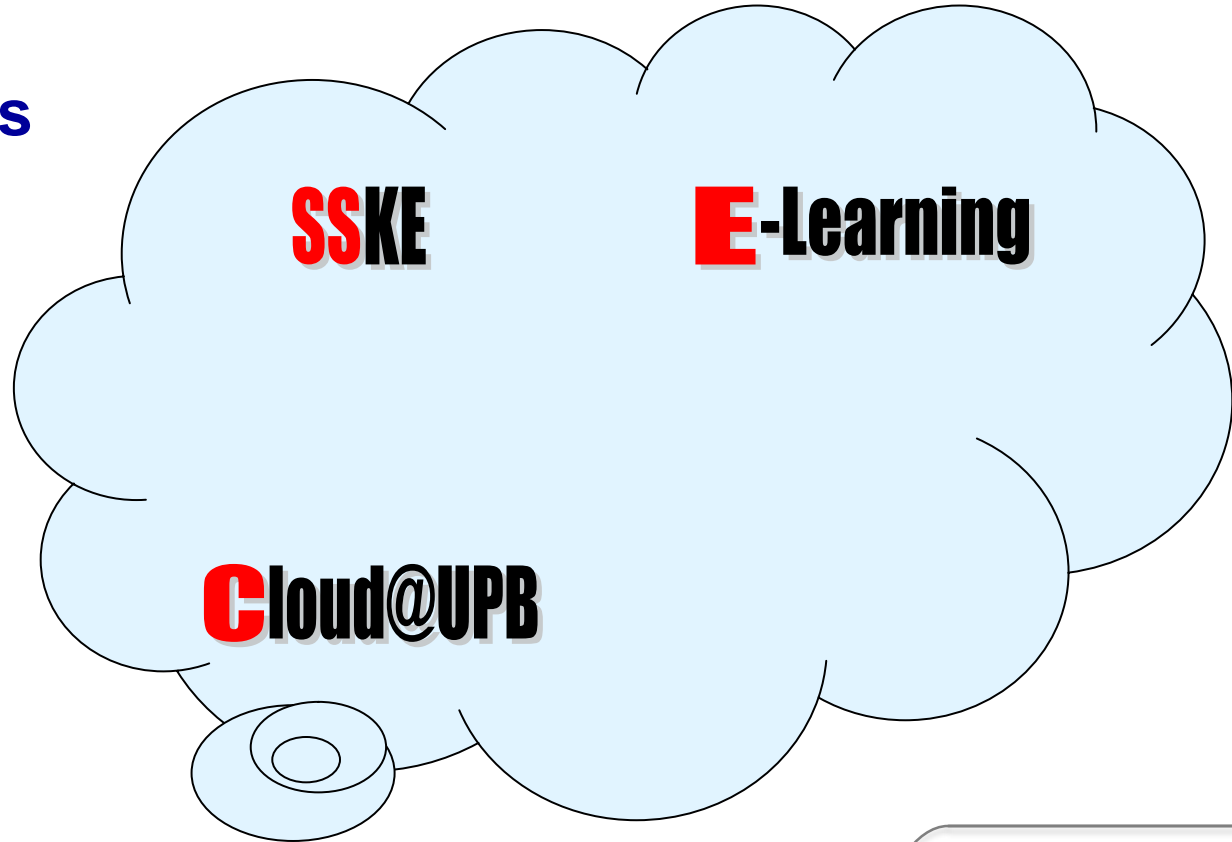


## Summary

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






## Components







## 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 - European Platforms for Services

## Common Action Programme

[INSER@SPACE link](#)

The screenshot shows the INSER@SPACE platform interface. The top navigation bar includes: Home, Domain Fundamentals, Service Support, Learning, Service Innovation, Service Sectors, and Contributors to the SSKE. Below the navigation bar, a breadcrumb trail reads: Last visited: Learning | Contributors to the SSKE | Cloud@UPB | INSER@SPACE – EIPKIS Common Action Programme. The main content area is titled "INSER@SPACE – EIPKIS Common Action Prog..." with a "More" dropdown menu. On the left, a vertical navigation menu lists various categories: 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, and INSER@SPACE – EIPKIS Common Action Programme. The main text area contains the following content:

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



# Towards Service-Oriented Systems



- **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

The screenshot shows the SSKE website interface. At the top, there are navigation links for 'Data Explorer', 'Query Interface', 'Change view', and 'Log in'. A search bar is present with the text 'Search this wiki' and a magnifying glass icon. Below the search bar is a 'New page' button. The main navigation menu includes 'Domain Fundamentals', 'Service Support', 'Learning', 'Service Innovation', 'Service Sectors', and 'Contributors to the SSKE'. The current page is titled 'Service Science Knowledge Environment' and is marked as '(Redirected from Main Page)'. The page content includes a 'Last visited' section showing 'Cloud@UPB' and 'Service Science Knowledge Environment'. A sidebar on the left lists various categories: Keywords, Documents (Articles, Books, Journals, Reports & Thesis), Projects (Research, Studies, Education, Commercial), Patents & Standards, Events (Workshops, Conferences, Virtual Exhibitions), and Company Solutions (Solutions, Technologies, Products, POC & Demos, Training). The main content area contains three paragraphs of text describing the Service Science Knowledge Environment (SS-KE) and its goals.

SSKE

Data Explorer | Query Interface | Change view | Log in

New page Search this wiki

Domain Fundamentals Service Support Learning Service Innovation Service Sectors Contributors to the SSKE

Last visited: Cloud@UPB | Service Science Knowledge Environment

Service Science Knowledge Environment More

(Redirected from Main Page)

The service sector accounts now for over 70% of the activities and employment in the more advanced economies, and has been growing in all countries. Innovation in services is critical for sustainable societies, and there is an increasing support from Information Technologies in providing new services. Service Science is an interdisciplinary approach to the engineering of services systems in which specific arrangements of people and technologies take actions that have value for others.

The main goal the **Service Science Knowledge Environment (SS-KE)** is to implement a collaborative environment that would gather together different academic partners with the overall aim of creating a modern educational framework in the areas of *Science, Design and Management of services*, while promoting *service innovation* in different *service sectors*.

The **Service Science Knowledge Environment (SS-KE)** targets also at creating a solid knowledge-based link between academia, industry and government, along with other European institutions. It supports sharing relevant information on Service Science that would be stored in a structured way based on a common vocabulary using an integrated ontology. From the technological point of view, wiki technologies are used for enabling the collaborative aspect of the environment.

The **Service Science Knowledge Environment (SS-KE)** is delivered as a service in the cloud. It approaches the conception and development of an open, collaborative, interactive environment to gather around universities, industry, governmental agencies and European institutions in order to foster service innovation by means of information / proves / technological transfer of the research results aiming to develop sustainable service systems innovation solutions.

<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

Domain Fundamentals | Service Support | Learning | Service Innovation | Service Sectors | Contributors

Home | Domain Fundamentals | Service Science Knowledge Environment | Learning | Contributors to the SSKE | Cloud@UPB

### Cloud@UPB

The purpose of the **INSEED Cloud@UPB** is to make available certain virtual machines (VMs) at no charge. You must accept the **Agreement for INSEED Cloud@UPB** to you, a "Registered Faculty Member" or a "Registered Graduate Teacher". You accept the terms of this Agreement by completing the registration process and returning the signed document by mail at the address specified in the document.

In order to obtain access to the Cloud you will need to:

1. Register
2. After obtaining the username and password consult the [Cloud Offerings](#).
3. Login to the [Cloud@UPB Self Service Interface](#) and create requests. The Self Service Interface may be accessed at <https://141.85.204.6/SimpleSRM/>

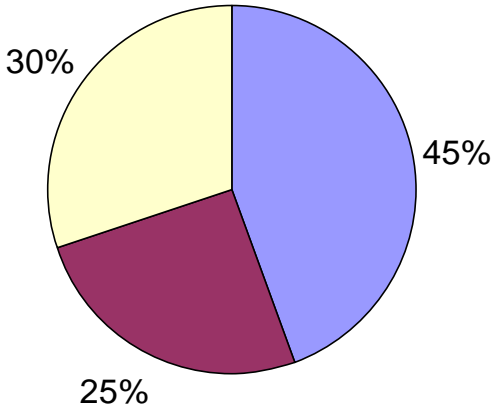
The Self Service Interface is described in [Tivoli Service Automation Manager User's Guide Chapter 2](#). Please consult the document if you need help in using the interface.

For support regarding the usage of the system please contact Florin Anton ([inseedcloudatupb@cimr.pub.ro](mailto:inseedcloudatupb@cimr.pub.ro))

# Education for Services and Cloud



## INSEED Educational Offer



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



# Education for Services and Cloud



## Service Engineering and Management

Master Program



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



# 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





## 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



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

# Networking. Towards a Larger Scale



## 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](#)



# Networking. Towards a Larger Scale



## INSEED Collaboration Network



# Towards Service-Oriented Systems and Cloud Computing Environments

---



Thank you!  
Thank you!

