INSEED: A model of interdisciplinary, open education & research in the service domain

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Project Consortium

Coordinator:

- University Politehnica of Bucharest
  - Faculty of Automatic Control & Computer Science
  - Faculty of Electronics, Telecommunications and IT
  - Faculty of Power Engineering
  - Faculty of Electrical Engineering

Partners:

- University Transilvania of Brasov
- Academy of Economic Sciences of Bucharest
- University of Medicine and Pharmacy Carol Davila of Bucharest
General Objectives

- To create a modern framework in higher education for competencies and skills in service engineering and management.

- To foster service innovation in partnership with national and EU Higher Education Institutions, professional organizations and companies.

- To promote new types of services: knowledge intensive, IT-based using advanced computational and software technologies.

- To qualify T-shaped professionals as adaptive innovators for the new service economy.
The project aims at creating an open, on demand higher education system to prepare T-shaped graduates for the service sectors: society and economy.
The Higher Education Model

[Generated by the need to grow and innovate IT-based services]

Service Consumer  Stakeholders

Service Needs

- Attractive user experiences at front stage
- Lower cost

Service Competencies

- Vertical competencies (service process oriented)
  - Service support
  - Service product
  - Service fulfillment
  - Service billing

- Horizontal competencies (service stakeholder oriented)
  - Managing customer
  - Managing infrastructure
  - Managing employee
  - Managing Supplier/partner

Service Resources

- Service contents
- Customers’ Static/dynamic data
- Service delivery (platform) resources
- Channel/distribution resource

Activities for services:
- Core: marketing, design & dev., operations management, delivery
- Support: general- & HR management, technology development
- Performance evaluation of services, metrics, KPIs
The Higher Education Model

Competency pillars for the 3-layer service framework
The Higher Education Model

A new fundamental domain: Service Sciences

Two new study domains:
- Service Engineering
- Service Management

Master Programs:
- General (ITC, OMM, PSO)
- IT Oriented: Services Computing; IT Services, Software Services
- Business Oriented: Business & Services Mgmt
- Sector (Industry) Oriented: Healthcare, e-Gov, e-Admin, manufacturing, supply chains, energy supply, telecom, IT, mobile, metrology
Service Science programs align to open education roadmap

- Open Architectures (PaaS) and Technologies (Cloud)
- Open Access for All (INSEED partnerships)
- Open Business Processes (resource sharing, partner contributions)
- Open Learning (On demand, SSKE)
- Open Society
- Open Research
- Improved Outcomes, Innovation, and Skilled Workforce
- Employers, Service Industry, Digital Communities

A Student/Employee/Citizen View
The Educational Continuum

- Educational Continuum
  - Economic Impact of Education, Single View of the Student e-Portfolios, Analytics, Workforce Development

- Open and Aligned Learning, Innovation in Research
  - Open Learning Services: Collaboration & Learning Management
  - Learning Content Repositories
  - Digital Content: M-SEM, SOEA, Compact, LLL

- Effective and Efficient Administration

- Secure and Flexible Infrastructure
  - Cloud Computing, Virtualization, VM access: UPB, UTBv, Cloud@UPB
  - Cyber-Infrastructure
  - SOA, Digital Communities, Safety & Security

Employers, Service Industry, Society

InSeED
Global Results

- An open, continuous and on demand education model, with flexible institutional framework to create and maintain skills and competencies for the design, implementation, execution and management of complex services with IT support.

- 17 new master programs, 15 compact learning modules and 16 long life learning courses in different sector services: IT, manufacturing, supply chains, telecommunication, energy supply, metrology, e-health, e-administration, e-government, business management.

- New type of educational services through resource virtualization, using cloud technologies: e-learning and remote laboratories.

- Ontology-based knowledge environment to support service innovation and promote growth and visibility of service companies.
Competencies and skills

Graduates: T-shaped professionals, capable to produce viable solutions in their specific domains (engineering or management), but also having the capability to understand and interact with specialists from a wide range of disciplines and functional areas. They combine expert thinking (depth in one or more areas) and complex communications (breadth across many areas):

- Orientation towards services
- Modelling, design and management of service systems with IT support
- Analyze and enhance value co-creation
- Core activities of services: design and development, operation and management, marketing, delivery
- Service life cycle management (SLM)
- Developing new services
- Communication skills and team work
- Knowledge intensive services
- Business modelling and management
- Product-service extensions After-sales services
- Service innovation
Competencies and skills applied to...

- Systems that focus on flows of things
  - Transportation & supply chain
  - Water & waste
  - Food & products
  - Energy & electricity
  - ICT & cloud

- Systems that support people’s activities
  - Retail & hospitality
  - Banking & finance
  - Healthcare & education & work

- Systems that govern
  - City
  - Secure
  - State
  - Scale
  - Nation
  - Laws

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**Stakeholders** (Customers, Providers, etc.)

- Customer
  - Behavioral sciences
    - E.g., marketing
    - Management sciences
      - E.g., operations
    - Political sciences
      - E.g., public policy
    - Learning sciences
      - E.g., game theory
    - And strategy

- Provider
  - Cognitive sciences
    - E.g., psychology
  - System sciences
    - E.g., industrial engineering
  - Information sciences
    - E.g., computer science
  - Organization sciences
    - E.g., knowledge management

- Authority
  - Social sciences
    - E.g., econ & law
  - Decision sciences
    - E.g., statistics

- Competitors
  - Run professions
    - E.g., knowledge worker
  - Transform professions
    - E.g., consultant
  - Innovate professions
    - E.g., entrepreneur

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**Resources** (People, Technology, etc.)

- People
  - Cognitive sciences
    - E.g., psychology
  - System sciences
    - E.g., industrial engineering
  - Information sciences
    - E.g., computer science
  - Organization sciences
    - E.g., knowledge management

- Technology
  - Cognitive sciences
    - E.g., psychology
  - System sciences
    - E.g., industrial engineering
  - Information sciences
    - E.g., computer science
  - Organization sciences
    - E.g., knowledge management

- Information
  - Cognitive sciences
    - E.g., psychology
  - System sciences
    - E.g., industrial engineering
  - Information sciences
    - E.g., computer science
  - Organization sciences
    - E.g., knowledge management

- Organizations
  - Social sciences
    - E.g., econ & law
  - Decision sciences
    - E.g., statistics

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**Change** (History, Future)

- History
  - Social sciences
    - E.g., econ & law
  - Decision sciences
    - E.g., statistics
- Future
  - Social sciences
    - E.g., econ & law
  - Decision sciences
    - E.g., statistics

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**Value** (Run, Transform, Innovate)

- Run
  - Run professions
    - E.g., knowledge worker
  - Transform professions
    - E.g., consultant
  - Innovate professions
    - E.g., entrepreneur
- Transform
  - Run professions
    - E.g., knowledge worker
  - Transform professions
    - E.g., consultant
  - Innovate professions
    - E.g., entrepreneur
- Innovate
  - Run professions
    - E.g., knowledge worker
  - Transform professions
    - E.g., consultant
  - Innovate professions
    - E.g., entrepreneur
Main Results (Education)

17 master programs
15 compact learning modules
16 long life learning courses
2 double degree master programs with the universities of Porto & Nancy

Cloud Learning Services
  Remote access laboratories (Cloud@UPB)
  e-Learning
1. Service Engineering and Management
2. Science, Design and Engineering of Services in Electronics, Telecommunication and Information Technology
3. Advanced Software Services
4. Management and Protection of Information
5. Automation and Industrial Informatics
6. Services Management for Business
7. Advanced Techniques for Data Management and Analysis for Business Sustainability
8. Information Systems and Services in Medicine
9. Service Oriented Enterprise Architectures
10. E-Government
11. Public Services Management
12. Services for Energy Efficiency
13. Quality Management in Electro Power Engineering
14. Service Engineering in Telecommunication Networks
15. Engineering of Electric Products and Services
16. Advanced Electrical Systems
17. Complex Signal Processing in Multimedia Applications
The Master Program Service Engineering and Management (SEM) is a program to educate professional engineers, i.e. graduates will be prepared to conceive, design, implement and operate complex, IT-based engineering systems for services.

SEM has a strong emphasis on:

- Understanding the innovation mechanisms required for sustainable service growth: (1) technological; (2) business model; (3) organizational-social; (4) demand (market)

- Understanding the functional and the experience requirements of people using services – the customer, for value co-creation

- Management of the service CDIOM lifecycle process and understanding its value:
  - Core activities for services: design & dev.; operations management; delivery; marketing
  - Support activities: general- and HR management; technology development
  - Performance evaluation of services: value, perception, metrics. KPIs
## SEM main topics

<table>
<thead>
<tr>
<th>ICT (Information and Communication Technologies)</th>
<th>PSO (Psychology, Sociology)</th>
<th>OMM (Operations, Management &amp; Marketing)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systems and networks security</td>
<td>Sociology of Organizations</td>
<td>Supply Chains Management</td>
</tr>
<tr>
<td>Information- and Content Management</td>
<td>Cognitive Psychology</td>
<td>Customer Relations- and Service Operations Management</td>
</tr>
<tr>
<td>Human-Computer Interaction</td>
<td>Communication</td>
<td>Marketing</td>
</tr>
<tr>
<td>Advanced software technologies: Web, Cloud</td>
<td>Information science and management</td>
<td>Financial management</td>
</tr>
<tr>
<td>Multimedia technologies</td>
<td>Design and Arts</td>
<td>Business Process Modelling</td>
</tr>
<tr>
<td></td>
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<td>Service design and development</td>
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</tbody>
</table>
# SEM Courses for topics (A&C, PUB)

<table>
<thead>
<tr>
<th>ICT</th>
<th>PSO</th>
<th>OMM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Foundations of Service Science</strong></td>
<td>Communication Management and Cognitive Psychology</td>
<td><strong>Mathematical Modelling of Economic Processes</strong></td>
</tr>
<tr>
<td><strong>Data Mining and Data Warehousing</strong></td>
<td>Knowledge Engineering and Services Ecosystem</td>
<td>Marketing and Financial Performance of Business</td>
</tr>
<tr>
<td><strong>Architecture of Service Oriented Information Systems</strong></td>
<td>Intellectual Property and Entrepreneurship</td>
<td>Supply Chain Management and Logistics</td>
</tr>
<tr>
<td><strong>Network and Systems Security</strong></td>
<td></td>
<td>Service Operations and Customer Relationship Management</td>
</tr>
<tr>
<td>Business Process Modelling</td>
<td></td>
<td>Accounting and Financial Management for Services</td>
</tr>
<tr>
<td><strong>Business Service Integration and IT Management</strong></td>
<td></td>
<td>Enterprise Integration and Management Architectures</td>
</tr>
</tbody>
</table>

*Courses with strong IT orientation*
## MESG Courses for topics (FEUP)

<table>
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<tr>
<th>ICT</th>
<th>PSO</th>
<th>OMM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Process Modelling</td>
<td>Organizational Behaviour</td>
<td>Service Operations Management &amp; Logistics</td>
</tr>
<tr>
<td>Information Systems</td>
<td>Human – Computer Interaction</td>
<td>Services Marketing</td>
</tr>
<tr>
<td>Enterprise Management</td>
<td>Creativity</td>
<td>Accounting and Financial Management</td>
</tr>
<tr>
<td>Decision Support Systems</td>
<td>Human Resources Management</td>
<td>Multimedia and New Services</td>
</tr>
<tr>
<td>Information Systems Architecture</td>
<td>New Service Development and Design</td>
<td>Customer Relationship Management</td>
</tr>
<tr>
<td>Requirements Engineering for Services</td>
<td>Introduction to Research Project</td>
<td>Capital Budgeting</td>
</tr>
</tbody>
</table>

*Courses with strong business orientation*
Compact Modules

- Health Services with IT Support
- **Service Oriented Architectures and Cloud Systems**
- **Supply Chain Management**
- Service Oriented Architectures (SOA) in Manufacturing:
  - **SOA for Business Management of Manufacturing Enterprise**
  - Service Orientation of Shop Floor Control in Manufacturing Enterprise
- **Strategies for Business Analysis and Optimization**
- e-Business
- e-Commerce
- Products and Services in Electrical Engineering
- Advanced Electrical Systems for Renewable Energies
- Integrated Maintenance Services
- Thermo Energy Audit
- Intelligent Electrical Networks
- Technical Expertise of Electronic and Telecommunication Equipment
- Management of Public Services
Continuous Training Programs

1. Specialist in Information Systems for Healthcare
2. Marketing, Communication and Management in Healthcare Services
3. Management and Administration of Public Services in the European Union
4. Integrator for e-Government Services
5. Architect of Integrated Services for Manufacturing
6. Integrator of Services for Supply Chains
7. Entrepreneurial Culture
8. Advanced Analysis and Optimization of Business Processes
9. Trader of Electric Energy
10. Auditor for Thermo Power Systems
12. Expert in Electrical Engineering Services
13. Expertise of Electrical Equipment and Metrology Assurance
14. Consultant in Services for the Electronics Industry
15. Expert in Cloud Services
16. Developer of Interfaces for Mobile Terminals
IBM Cloudburst – Logical Diagram

- **Internet access**
- **Remote Connection**
- **User access**

**Provisioning and administration interface**

**Repository**

Client-created VMWare images

**Cloud resources**
IBM Cloudburst 2.1 features

- Automatically extensible and scalable modular Design
- Self Service Portal with autonomous provisioning and no management effort
- Predefined automation templates and workflows of the most common resources (e.g. virtual images VMWare)
- Professional services for installation and configuration
- Technical support for hardware, software and applications
- Unique price for prepackaged and preconfigured hardware, software and networking

Software System

TSAM – Tivoli Service Automation Manager
TSA – Tivoli System Automation
ITM – IBM Tivoli Monitoring
ITUAM – IBM Tivoli Usage and Accounting Manager
Virtual Machines Applications in INSER@SPACE

- Service Science Knowledge Environment
  Based on MediaWiki
  Semantic
  http://sske.cloud.upb.ro

- E-learning
  Courses
  Presentations
  Applications (access to specific VM’s)
  http://elearning.cloud.upb.ro

- Virtual Labs
  VM Template ->Customization -> Final Template

- Future Developments
  Research
  Industry

http://sske.cloud.upb.ro/
SSKE: an ontology-based Kplatform

- An *educational knowledge path on Service Science* fostering service innovation in different service sectors, using fundamental concepts related to Service Science
  - business oriented,
  - IT oriented (SOC, SOEA, Cloud, SaaS),
  - service orientation of processes (integration, servitization, productization)

- *Growth of the service companies’ visibility*
  - companies to publish case studies
  - data base on service innovation in different sectors

- *Report on new methods*, tools and software applications to develop IT services and to accomplish service automation and to foster service and service system innovation.
  - PoTs, PoCs, demos, etc.

- *Service innovation*: approaches, R&D, metrics, KPIs

- *Activities for services*: core, secondary, service performance measurement (value, perception): metrics, KPIs
ISSIP Membership

http://www.issip.org/

promotes the professional development, education, research, practice, and policy work of its member individuals and institutions working to improve diverse, interconnected, complex service systems

**membership** - who can join:

* people involved in the services research, service innovation, and/or the service science field of interest either through your career and/or education

**Education & Research SIG**

http://www.issip.org/community/special-interest-groups/sig-education-research/

* **mission** - to increase quantity and quality of service science related educational materials, courses and degree programs as well as open data sets for service systems research, to increase the number of T-shaped service innovators globally
Joining the international Service community

IESS1.3 Participation & Proceedings

Exploring Services Science

4th International Conference, IESS 2013
Porto, Portugal, February 2013
Proceedings

IESS1.3 Participation & Proceedings

Three papers presented
SOEA – the internationalization context

Dissemination of Results: SOHOMA Editions & Literature [ISI recognized]

SOHOMA'11 Proceedings Volume

SOHOMA'12 Proceedings Volume

SOHOMA'13 Preprints Volume
Main topics:

- Medical Information
- Health Services
- Medical Robots
- Translational Medicine
Thank You