

Education, competencies and human capital reengineering in Service Science

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Definition

Service Science Management and Engineering - SSME

“...curricula, training, and research programs that are designed to teach individuals to apply scientific, engineering, and management disciplines that integrate elements of computer science, operations research, industrial engineering, business strategy, management sciences, social and legal sciences, in order to encourage innovation in how organizations create value for customers and shareholders that could not be achieved through such disciplines working in isolation.”

America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science
(COMPETES) Act, Public Law 110–69—AUG. 9, 2007



Three important objectives

- Provide methods to scientifically analyze services, efficiently manage services, and maximize the productivity of services through engineering production processes
- Solve problems arising from service intangibility, simultaneity of production and consumption, and heterogeneity of the context services are delivered
- Explore a framework for systematically develop innovation



SSME 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

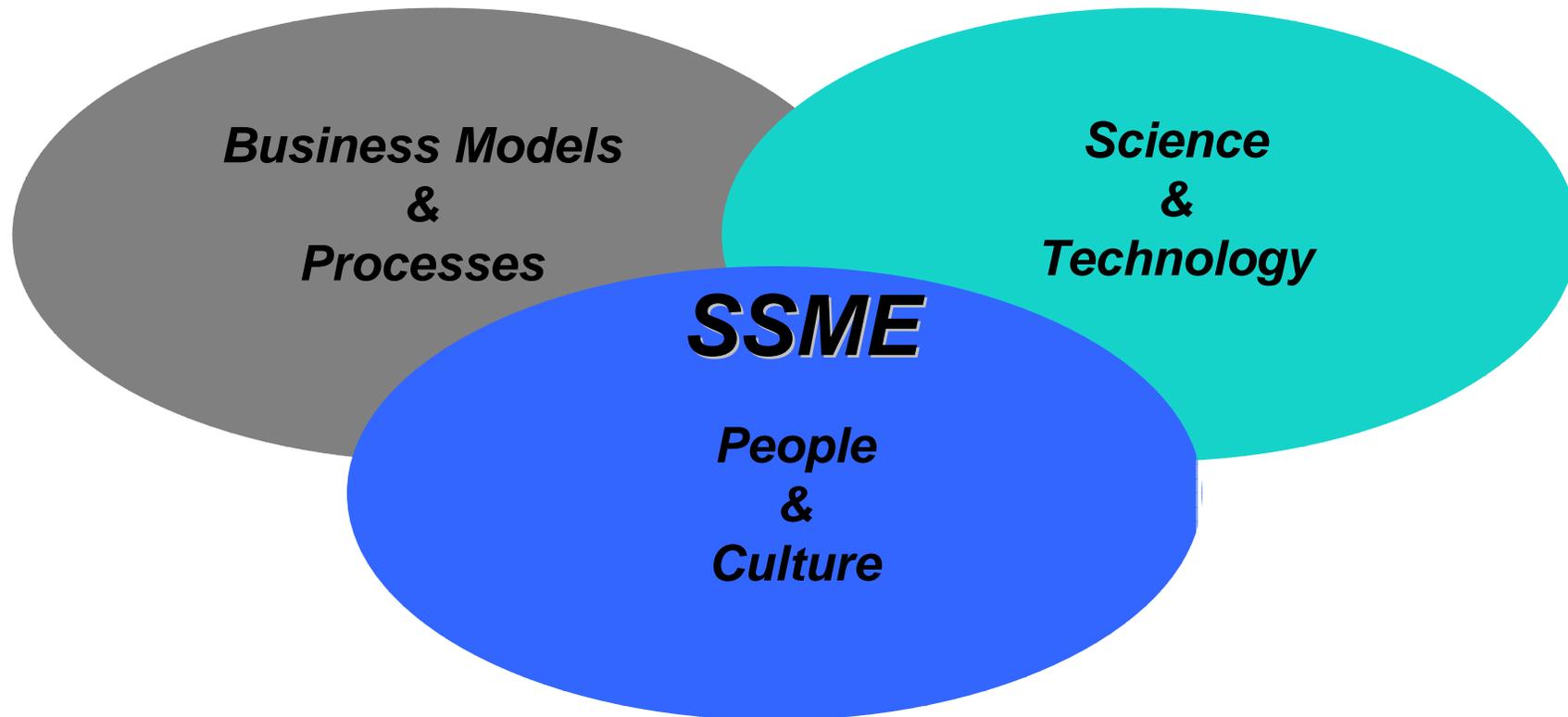


Service Education is Interdisciplinary



Need more T-shaped people – both deep and broad

Need for Academic Curricula Change: Service Science, Management & Engineering (SSME)



The marketplace requires innovation that combines
people, technology, value and clients

Existing Curricula

- **Study programmes in SSME exist at all levels, from undergraduate to PhD**
- **Three categories of curricula** can be identified
 - distinguished by focus on engineering, business or management.
 - related to the profiles (engineering or business) of the schools that develop them
- All offer some flexibility
 - **Engineering-focused curricula** offer a choice of three training modules (besides core course content):
 - information and communications technology;
 - psychology, sociology and arts; and
 - operations, management and marketing
 - A common **business-focused curriculum** has been developed by ten European universities that offer a joint degree master programme in international business informatics. Main features:
 - internationalisation and interdisciplinary work
 - students must attend three universities in order to graduate



Existing Curricula (2)

- Less defined is the curriculum **focused on management**
 - nevertheless, the SSMEnetUK initiative has produced a blueprint of questions that should be addressed when proposing any such curriculum.
 - *rationale for developing a service science programme;*
 - *the target market for such education;*
 - *resources required by educators;*
 - *already existing service science programmes;*
 - *programme content;*
 - *programme delivery; and*
 - *outcomes*
- **Drawback:** The approach used so far can lead to an emphasis on a particular set of skills that does not reflect the breadth of skills that SSME demands.

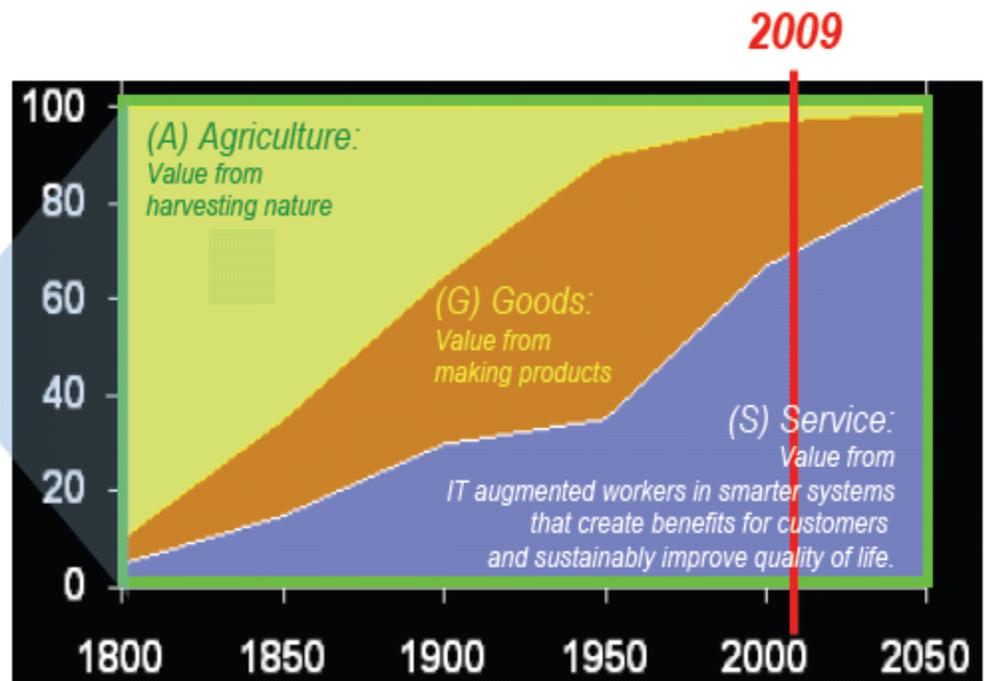


SSME Proofpoints

World's Large Labor Forces

A = Agriculture, G = Goods, S = Service

Nation	Labor % WW	A %	G %	S %	40yr Service Growth
China	25.7	49	22	29	142%
India	14.4	60	17	23	35%
U.S.	5.1	1	23	76	23%
Indonesia	3.5	45	16	39	34%
Brazil	3.0	20	14	66	61%
Russia	2.4	10	21	69	64%
Japan	2.2	5	28	67	45%
Nigeria	1.6	70	10	20	19%
Bangladesh	2.1	63	11	26	37%
Germany	1.4	3	33	64	42%



CIA Handbook, International Labor Organization

Note: Pakistan, Vietnam, and Mexico now larger LF than Germany

SSME Proofpoints

- In the U.K. services comprise more than **80 percent** of the economy, according to the Chartered Institute of Purchasing & Supply.
- In Portugal, services make up about **60 percent** of the economy.
- In Australia, services make up about **69 percent** of the economy.
- In Italy services make up **72 percent** of the economy.
- In Germany, services account for **67 percent** of the economy.
- The service sector accounts for **72 percent** of the gross domestic product (GDP) in Taiwan (according to Taiwan Economic Development and Research Center)
- In India, the IT Services industry grown rapidly for so long: the annual growth rates was nearly 30% in the past ten years, with revenues now nearing \$50 billion, about 5.4% of India's GDP (The Economist, 12/13/07)



SSME Proofpoints

- The share of the service sector in global employment reached **40 percent** (last year overtook agriculture as the leading economic sector (reports by the United Nations))
- Services now accounts for:
 - more than **75 percent** of the labor force in industrial countries such as Japan and UK;
 - more than **50 percent** of the labor force in developing countries such as Brazil, Russia and India.
- The shift to services represents the single largest labor force migration in **human history**.
- The shift towards services is not simply a US phenomenon, or a developed nations phenomenon.
 - China (21% of the world's labor force) has seen its service sector grow by 191% in the last 25 years and aims to shift 420M workers from farms to services in the next five years.
 - Germany (1.4% of the world's labor force). has seen its service sector grow by 44% in the last 25 years.



Global Outreach

University Outreach

- **150 Universities** Worldwide are Teaching SSME in 40 Countries
- **46 Universities** worldwide have an SSME-related degree or certification program
- In addition, **88 Universities** worldwide have launched an SSME-related course or courses
- Between 2005-2007, the number of SSME courses, certificate and degree programs more than **doubled each year**
- The number of institutions teaching SSME - from end of 06 to end 07 - is up **over 60%**
- Number of countries represented - up **over 30%**
- Degrees/Programs/concentrations - up **over 50%**



Some schools with SSME programs

- Mestrado em Engenharia de Serviços e Gestão (MESG) - Faculdade de Engenharia da Universidade do Porto (Portugal)
- MBA - Services Sciences, Management And Engineering, Lusofona University - Information Systems School (Portugal)
- Singapore Management University
- Center for Services Leadership at the ASU W.P Carey School of Business
- UC Berkeley
- MIT
- U Maryland
- Information School, Renmin Univ. of China
- UC Santa Cruz
- North Carolina State University
- University of St. Gallen, MCM Institute
- Karlsruhe Institute of Technology, Germany
- Technion, Israel
- U Sydney Australia
- San Jose State University
- Northern Illinois University
- Business Services Science at RMIT University (Melbourne, Australia)
- Service Science, Management, and Engineering at Masaryk University (Brno, Czech Republic)
- Service Engineering and Management Summer School 2008, Department of Industrial Engineering and Management, Helsinki University of Technology
- Service Science Research Center (SSRC) in National Chengchi University
- SRII - Service Research and Innovation Institute



A common understanding of service science skills

Short-term recommendations of the 2009 Service Science Summit:

- **Industry** should be more explicit when describing desired skills and academic qualifications in job descriptions that are relevant to service science.
 - Ideally, consistency between the curriculum industry has been involved in designing and/or delivering and the roles for which they recruit service science graduates
- **Government bodies** should seek to identify which service science skills can best contribute towards their objectives and work with universities to influence curricula accordingly
- **Companies** can influence university policies on new programme introduction by creating formal alliances of service science employers to establish commonly accepted job profile requirements.
- Further influence on **university policies** can be achieved through the pooling of research funding across companies with the intention to create universities that will act as service science promoters.



A common understanding of service science skills (2)

Longer-term recommendations:

- **Develop a curriculum framework for service science**, which should include
 - key and core topics for service science education on different educational levels
 - optional topics, dependent on the specific university mission and context,
 - faculty skills,
 - relationship with external stakeholders,
 - research focus and excellence.
- Such a framework would provide models for:
 - establishing innovative service science educational programmes
 - enlargement of existing studies with service science related topics, modules or courses
 - education in service science on a professional level (e.g. certificates, postgraduate, MBA) and on an academic level (e.g. bachelor, master, PhD.)
 - establishing cooperation programmes on an individual level and on programme level e.g. double and/or joint honours



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*** (i.e. the ability to design, understand and evaluate innovative technologies and processes)
 - ***New interaction modes or services*** (i.e. understand user and consumer needs and be able to meet requirements and quality expectations)
 - ***New business models*** (i.e. 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)**



1st SEM Program Structure

1st Year – 1st Semester

C11. Mathematical Modelling of Economic Processes (4 ECTS)

C12. Business Process Modelling, Strategies and Communication (3 ECTS)

C13. Information Management and Data Warehousing (3 ECTS)

C14. Information Systems Architecture (3 ECTS)

C15. Marketing and Financial Performance of Business (3 ECTS)

C16. Network and Systems Security (3 ECTS)

Scientific Research/Development (10 ECTS)

Total Sem. 1 / Year 1 = 30 ECTS



2nd SEM Program Structure

1st Year – 2nd Semester

C21. Service Operations Management and Logistics (4 ECTS)

C22. Business Process Management (3 ECTS)

C23. Multimedia and New Services (4 ECTS)

C24. Knowledge Engineering and Management for Services (3 ECTS)

C25. Communication Management and Cognitive Psychology (3 ECTS)

C26. Accounting and Financial Management (4 ECTS)

Scientific Research/Development (10 ECTS)

Total Sem. 2 / Year 1 = 30 ECTS



3rd SEM Program Structure

2nd Year – 1st Semester

C31. Supply Chain Management (4 ECTS)

C32. Data Workflow and Computer Networks (3 ECTS)

C33. Enterprise Management Architectures (3 ECTS)

C34. E-Business Technologies (3 ECTS)

Scientific Research/Development (17 ECTS)

TOTAL Sem 3 / Year 2 = 30 ECTS



4th SEM Program Structure

2nd Year – 2nd Semester

C41. Project Management (3 ECTS)

C42. Capital Budgeting (3 ECTS)

C43. Organizational Behaviour and Customer Relationship Management (3 ECTS)

C44. Intellectual Property and Entrepreneurship (3 ECTS)

Scientific Research/Development (6 ECTS)

Master Project (12 ECTS)

Total Sem 4 / Year 2 = 30ECTS



Service science - as a viable career path

- Service science programmes with a minimum of 50% management content should seek **EPAS accreditation** from the European Foundation for Management Development (EFMD).
 - Introduced in 2006, EPAS is available to service science programmes offered by non-business schools, by several schools of a university and for programmes embedded in a cross-institutional joint or dual degree structure.
- Universities should encourage **alumni networks of service science graduates** to explain their current work in industry to prospective students.
 - In other cases, business and informatics alumni working in service engineering and management could perform a similar role.
- Representatives from industry, government and academia should participate in promotional activities to improve awareness among prospective students of **job profiles and employment prospects** available to service science graduates.
- Information about SSME should be presented to ongoing projects consortia working on qualifications, competencies, knowledge and skills of graduates of bachelor and MSc degree programs.



Service science - as a viable career path (2)

- Universities should use leading edge research and industry collaboration **to promote the concept of service science** among existing students.
 - This will serve to improve the awareness of service science among faculty members and students and will promote service science as a field in which students can specialise after their undergraduate studies by pursuing relevant graduate programmes.
- Human resource departments in larger companies should ensure that **qualifications in service science become a pre-requisite** for relevant roles within their companies.
 - This is standard practice in more established areas of study and should be applied to service science in order that the company accesses the particular advantages of this academic qualification.
- University liaison personnel from industry should ensure there is a **clear line of sight from academic curricula to job opportunities**.
 - This is to be achieved by taking an active role in promoting service science as a career path, contributing to the definition of university curricula and ensuring that recruitment programmes at universities explicitly seek out service science graduates for relevant roles in their companies.



Thank you!

Questions ?

