Aalto University

Making Service Science Mainstream

A white paper based on the 2009 Service Science Summit

For feedback on this paper and further information, please visit:
http://servicefactory.aalto.fi/whitepaper

Foreword

Readers of this document are in good company. Service science is already taken seriously by companies that are leaders in their fields. Academics from leading universities around the world and government policy-makers are also supportive. Moreover, it is a global phenomenon – more than 250 universities in more than fifty nations already offer related educational programmes at undergraduate and graduate levels.

In 2009 Aalto University and IBM convened the 2009 Service Science Summit in Helsinki. Attendees at this summit demonstrated how influential and respected individuals from diverse stakeholder groups support the objective of making service science mainstream. That support is provided both as a means of achieving organisational objectives and for altruistic reasons. While there is commercial advantage to be gained from the development of service science, there is also societal benefit and academic relevance.

In large part, the individuals and organisations currently involved in the promotion of service science are early advocates for the concept. There are issues and challenges to be overcome in order for service science to become a mainstream discipline.

Given the status of service science at this point in its evolution and its reliance on the creation of new knowledge, much of the current workload falls to academia.

The academic community has internal challenges which it must deal with but it also needs continued and enhanced support from other stakeholders, namely government and industry.

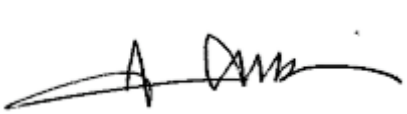
The support to date from business and governments has been considerable but it needs more. This requires more individuals to lend their voice, more companies to embrace its business advantages and more co-ordination among academia, industry and government bodies.

In many ways, Aalto University itself typifies this type of industry-government-academic collaboration. Formed from the merger of the Helsinki School of Economics, the University of Art and Design and the Helsinki University of Technology, Aalto University opens its doors in 2010 benefitting from the 300-year history of its constituent institutions. In common with how the service science community needs to grow, this innovative cooperation requires all its stakeholders to look forward with ambition and creativity in order to expand the horizon of knowledge that has been earned over time.

The promise of service science is to push forward the boundaries of existing knowledge. In so doing it will create the basis for an educated workforce that can effectively use intellectual power to prosper in today's service-led economies.

Now is the time for YOU to take part and to harness the commercial, economic and societal opportunities it will create. We hope that this document will encourage increased participation and collaboration towards making service science mainstream and realising its benefits for all stakeholders and society at large.

We thank all the participants in the 2009 Service Science Summit for their time, constructive engagement and continued cooperation. Special thanks are also due to Ovum for editing this white paper.



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Executive Summary

This white paper distils two days of presentations, discourse and debate that took place in Helsinki in March 2009 at the Service Science Summit. It addresses issues that arose at the Summit including: what is service science, why is it needed, who are its stakeholders, what are its benefits and what steps must be taken to make it mainstream.

US Government legislation, in support of service science, has defined it as:

> "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, and 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."

The need for a structured, systematic and empirical approach to understanding services is no longer in doubt. Developed economies are increasingly service-led but many of these services are internationally portable. This is challenging governments in developed economies to upskill their workforces and promote innovation in their domestic service capability. Academia is helping to understand the shift towards services but also needs to provide new teaching and research required to improve service capabilities and skill levels.

Individuals and organisations that are taking a leading role in the advancement of service science fall into three broad stakeholder groups: industry, government and academia. Each comes to service science with its own interests and concerns. In industry, there is growing realisation that services will play a significant role in commercial success. In government, there is mounting awareness that it has two roles to play in the development of service science: one as an influencer on how it should be pursued in academia, and the other as a large-scale procurer and provider of services. In academia, programmes of study in service science are having to appeal to students, and research in the nascent field needs to balance pushing the boundaries of knowledge with practical application.

The three stakeholder groups generate and receive benefits from their participation in the service science community. These benefits are diverse and range from funding, to IP regulation, to providing a trained workforce, to knowledge transfer, to contributing towards policy formulation. However, at this point in time, there is a potential imbalance in the benefits given and received: more is expected of academia than it gets in return. Academia therefore faces particularly challenging issues while bearing a disproportionate responsibility for making service science mainstream.

The issues and challenges for academia are centred around five topics: curricula, quality, hiring, fellowship and partnership.

From the curriculum perspective, courses tend to develop as extensions of existing faculties and therefore emphasise particular sets of skills from those disciplines rather than the range of skills demanded by service science.

From a quality point of view, there are numerous hurdles that have yet to be overcome including the influence of rankings that encourage universities to focus on mainstream programmes, professional promotion policies that discriminate against scholars who are members of more than one faculty, and a dearth of accreditation options for service science programmes, among others.

From a hiring perspective, service science's current low profile means that some programmes are struggling to attract students and potential employers are failing to properly value service science graduates.

From the fellowship viewpoint, a lack of accepted procedures governing how exchange arrangements are organised between companies and universities (and within and between universities) and organisational structures that favour protecting budgets/resources make service science fellowships difficult to establish.

From the perspective of partnerships between the various stakeholders (industry, government and academia), activity centred around academic institutions show varying levels of maturity.

The recommendations identified in this paper are:

1. Develop a common understanding of service science skills
2. Make service science a recognised, viable career path
3. Establish structures to facilitate collaboration
4. Highlight practical applications of service science
5. Respect the distinction between pure and applied research

These recommendations are intended to further the objective of making service science a mainstream concept and academic discipline. Substantial investments towards this goal have already been made by various leading stakeholders. Enhanced collaboration now will create a richer intellectual capital that new and existing participants in the service science community can both draw from and contribute to.

Scope

Edited by Ovum, this white paper is based on the work of all participants in the 2009 Service Science Summit.

The summit was held on 26 and 27 March 2009 in Helsinki, Finland and was co-hosted by Aalto University and IBM. The summit attracted 104 participants from 68 institutions in 31 countries.

Divided into five working groups, the summit attendees addressed service science issues related to:

- Curricula
- Quality
- Hiring
- Fellowship
- Partnership

The structure of this document begins with an overview that aims to describe the context within which service science currently exists. It identifies academia as the critical participant at this particular point in the evolution of service science. This is followed by a section highlighting issues and challenges identified by the five working groups.

The working groups also highlighted a number of conclusions and recommendations. These recommendations are intended to progress the development of service science as not only a mainstream academic discipline but also a mainstream concept for all stakeholders.

Two appendices are also included. The first lists further sources of information that readers can use to complement the content of this document. The second appendix lists the participants in the 2009 Service Science Summit.

Introduction

What is service science?

Service science exists to change the nature of services and service businesses. It seeks to create value by applying scientific rigour to the design, delivery, consumption and exchange of services and to create knowledge through research.

Bringing more structured thinking to service innovations is an easy objective to relate to. Equally important however, is examining received wisdom about existing services upon which people and economies depend:

- Are my company's services well designed such that buyers and sellers readily recognise their value?
- How can public services be delivered more efficiently so that costs are controlled while satisfaction improves?
- Where will the necessary skills come from to deliver my company's services given the changes I foresee in the next five years?
- Is my organisation capable of extracting maximum benefit from the services it buys in from the market?

These are all valid questions for service experts on both the supply and demand side. The service science community asserts that more sustainable and more profitable answers can be arrived at through rigorous investigation that identifies resilient service principles.

Sceptics do exist and are keen to make pejorative comparisons to the natural sciences. They typically state that services can never be a 'hard' science like physics or chemistry. While that can provide the grounds for interesting philosophical debate, it misses the point. The point of service science is to expand our body of knowledge in a structured way so that practical improvements can be identified, implemented and further enhanced over time.

Scientific methods can be and are applied to services: empirical and experimental data can be observed or generated and can be measured and used to create models or hypotheses to predict outcomes that can be verified, validated and repeated. Underlying factors (often human) affecting the service in question may change over time, thus making it difficult to arrive at absolute and unchanging principles. While this may not fit some observers' definitions of 'hard' science, that is no reason to ignore the practical advantages it brings such as improved profitability, efficiency or effectiveness – not to mention knowledge.

Defining service science

It is generally agreed that service science requires a multi-disciplinary approach, combining knowledge from a variety of domain areas. A useful definition, and an encouraging one given its provenance, can be found in the America Creating

Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science (COMPETES) Act, which was signed into US law in August 2007 stating that:

> "…the Federal Government should better understand and respond strategically to the emerging management and learning discipline known as service science.",

which it defines as

> "…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, and 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."

Other interpretations of the concept include Service Science Management and Engineering (SSME) or, SSMED with the inclusion of Design to take into account factors important to the user experience of services. For the purpose of this document, we will refer to all such interpretations under the Service Science label.

The diverse nature of service science is not restricted to its sources of knowledge. It also reflects the needs of a diverse range of stakeholders (academia, government and the business community) and it can be applied to a diverse range of service types regardless of their reliance on automating technology or manual labour.

The need for scientific rigour in services

The common factor linking the interest of all stakeholder groups is the increasingly important role of services in modern economies:

- Most developed economies today are service-led economies, heavily reliant on industries such as financial services, travel, hospitality, retail and professional services. In the US the services sector accounts for over 80% of economic output[1]; in the UK the figure is more than 70%[2].
- Large commercial organisations, many with a manufacturing heritage, see the development of service businesses as an important element in their future success. This leads to concepts such as the servitization of manufacturing. On the other hand, the need for scalability and efficiency leads to the productization of services.
- The international portability of many types of service (e.g. financial transaction processing, IT application development) creates opportunities and challenges

[1] US Bureau of Economic Analysis
[2] Office for National Statistics

for governments in respect of their economic development programmes and social welfare. Generally speaking, government policy in developed economies needs to defend against this portability by upskilling their workforces or promoting innovation in domestic service capability; governments in developing economies seek to promote their advantages as locations from which to deliver such services and to promote innovation to sustain their competitive advantages.

As with other aspects of technological, economic or societal change, academia is motivated to not only understand this shift towards services but also to engage in teaching and research that develops knowledge and tools for this game changer.

Stakeholder groups

Let us now look at service science from a stakeholder point of view.

For convenience, individuals and organisations that are currently taking a leading role in the advancement of service science can be grouped into three stakeholder groups:

- Industry
- Government
- Academia

Industry

Companies in the IT industry are among the early adopters of service science. They recognise the need to be more service-oriented and that this will impact their business strategies.

Since 2005 IBM has made more than half its revenue from services. In the last 18 months, three product-led IT companies – HP, Dell and Xerox – have invested more than $24 billion of shareholder funds in acquiring pure service businesses. By definition, ensuring a sufficient return on those investments will require a different approach to understanding and managing those service businesses.

Outside the IT industry, there are a wide range of companies engaging with the service science community. This includes companies such as law firm Clifford Chance; financial services firms HSBC, Royal Bank of Scotland and JP Morgan; CPG firms Tesco, Unilever and Marks & Spencer; engineering firms Arup and Laing O'Rourke among others[3] - most of these are primarily service-centric businesses.

Turning to non-IT companies typically associated with physical products, the 2008 service revenues of the following companies are revealing:

- Rolls Royce: £4.8 billion or 52% of total revenue, up from 38% in 2001.
- Caterpillar: $17.5 billion or 34% of total revenue.

[3] Most of these companies contributed to a recent paper published by The Royal Society, "Hidden wealth: the contribution of science to service sector innovation"

- ThyssenKrupp: €17.3 billion or 33% of total revenue.
- General Electric: $35.5 billion or 31% of total revenue (this excludes GECS, its financial services business).
- Ericsson: SEK 49 billion or 23% of total revenue.
- Thales: €2.7 billion or 21% of total revenue.

A common factor driving companies' interest in service science is a realisation that services play and will continue to play an important role in their commercial success. It should be noted that the above list only deals with services that are sold as such to clients. It does not take into account services consumed by these companies. Whether delivered using in-house or external resources, corporate success also requires companies to manage effectively the services used to support critical business strategy, infrastructure and processes.

Government

The role of government agencies can be both as a user and a facilitator of service science knowledge.

In a user role, some governments - as large-scale procurers or providers of services in their own right (e.g. procurement of IT services from the market, delivery of health services) - seek to harness service science knowledge to improve the delivery or consumption of such services. Their motivation is rooted in the responsible use of taxpayer money: being more efficient and effective in the use or delivery of services can mitigate tax rises or fund investment in schools and hospitals, for example.

In a facilitator role, some governments have a direct influence on how service science should be pursued by universities in their jurisdiction; others see service science as a means to develop particular aspects of their economies (e.g. market valued skills, innovation).

In Europe, academia tends to expect a stronger input from government than in the US, although the America COMPETES Act referred to above does give the US Federal Government a basis to engage with the service science community.

The European Union's Lisbon Strategy with its emphasis on the information society and the knowledge economy forms a structure to promote the advancement of service science and its contribution towards making the EU the most competitive economy in the world.

At a country level across the EU there has been a mixed interpretation of how service science should be treated by government. In Germany there are examples of dedicated service science research departments receiving matching funds from government. In the UK the emphasis is more on establishing a direct link with academia on existing policies around skills development or innovation.

Examples of governmental involvement in Asia include the Thai Ministry of Education collaborating with development and industry agencies[4]; China's Ministry of Education was represented at the 2008 International Conference on Service Science held in Beijing[5]; and Infocomm Development Authority of Singapore (IDA) sponsoring service science scholarships[6].

Academia

The interest among academia in service science is perhaps the most broad-based of the three groups. Interested parties tend to represent IT, engineering and management disciplines. This stakeholder group's interest is also arguably the most complex.

From a teaching point of view, universities are interested to ensure that they offer academic programmes that will appeal to prospective students. The prospect of service science becoming mainstream is therefore a development that academic leaders need to prepare for in order to attract new students.

From a research point of view there is both a desire to be at the forefront of creating new knowledge as well as ensuring they are capable of responding to requirements for practical application of pure research. This contributes both to institutional reputation for research excellence as well as addressing the need to attract funding in the form of commissioned research.

These two academic perspectives on service science are further bolstered by the requirement to adopt a thorough academically rigorous approach to research and teaching. Recognising the rise of service science is an acknowledgement of the thoroughness with which individual academics, faculties and universities are evaluating their teaching and research programmes.

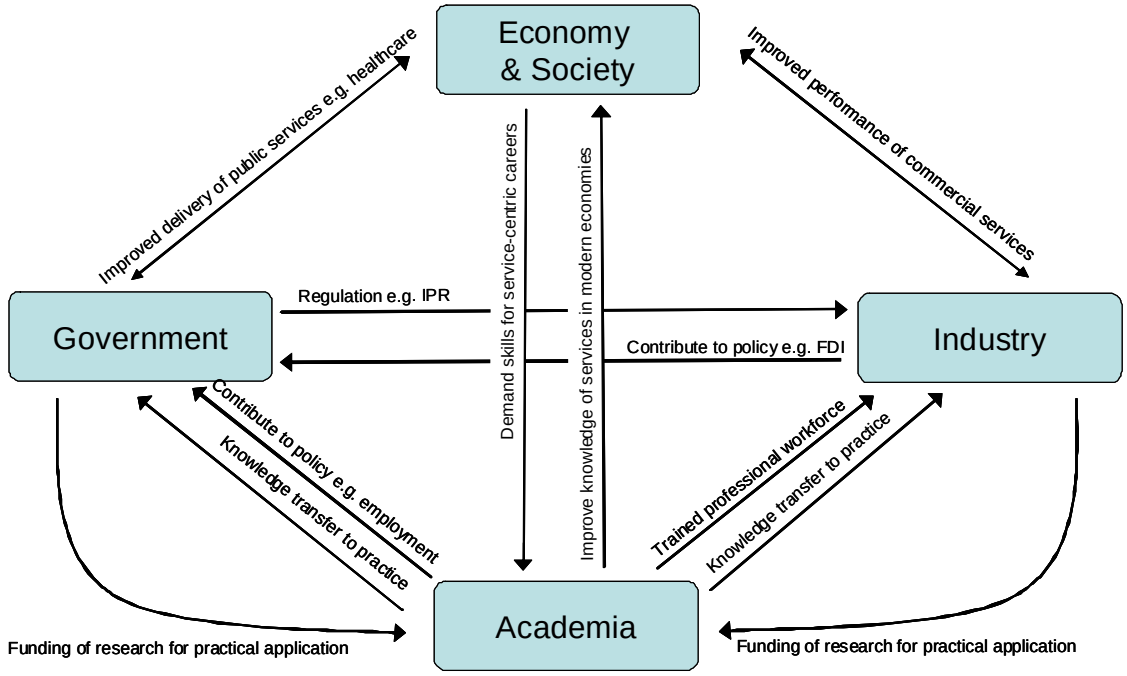
The complexity associated with academia's interest in service science becomes apparent when one considers the practical aspects of co-ordinating multi-disciplinary research and teaching. The lack of established accreditation systems and the nascent nature of the other stakeholder groups' involvement further add to the challenges faced by academia (more on this below).

Service science in practice

Figure 1 illustrates how the interests of the three stakeholders identified above can be aligned for mutual benefit. The figure also portrays the macro-level impact of this collaboration on the wider economy and society.

[4] http://pld.nectec.or.th/ssme/index.html
[5] http://www.icss2008.org/program.html
[6] http://www.sis.smu.edu.sg/programme/SSME/

Figure 1 **Dependencies between service science stakeholders**



Source: Ovum

Notes: FDI: Foreign Direct Investment; IPR: Intellectual Property Rights

In this simplified illustration, academia is funded by industry and government entities with a particular interest in services. This funding enables academia to engage in training, education, research and the application of knowledge specific to services. The return on the original funding comes in two forms: a workforce trained in relevant skills; and the identification of new knowledge that can be applied for practical advantage in commercial and public contexts.

Direct collaboration between industry and government is not unique in kind but does require detail that is specific to services. For instance, legal protections for intellectual property must provide for intangible service innovations. Attracting inward investment for services (as opposed to manufacturing) is likely to be more dependent on the quality of human rather than physical resources.

With this collaboration in place, mutual benefits should also be realised at the macro-level. Both government and industrial entities should experience improvements in their roles as service providers while academia will be expected to deliver the skills required by a society that understands the role of services in modern economies.

The following section, relying on material prepared by the various working groups of the 2009 Service Science Summit, deals with the issues and challenges facing academia in making service science mainstream. Some of these issues and challenges are internal to academia; some are shared with other stakeholders. In all cases however, a collaborative effort by the stakeholder groups can more easily overcome the issues and challenges faced by academia than if they are left to deal with these alone.

Issues and Challenges

Working groups that contributed to the 2009 Service Science Summit were organised around five topics:

- Curricula
- Quality
- Hiring
- Fellowship
- Partnership

Each group worked to understand the issues and challenges related to the establishment of service science as a mainstream concept related to their respective topics. The findings of each working group are outlined below. The subsequent section lists recommendations for all stakeholders groups as to how these can be actively and constructively addressed with a view to establishing service science as a mainstream concept.

Curricula

Study programmes in service science currently exist from undergraduate to PhD levels. They have typically emerged from engineering or business schools and three categories of curricula can be identified, distinguished by a focus on engineering, business or management. In order to account for the required multi-disciplinary nature of service science education, all such courses offer an element of flexibility:

- Engineering-focused curricula offer a choice of three training modules alongside 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, for example, that offer a joint degree master programme in international business informatics[7]. Internationalisation and interdisciplinary work are main features of the programme and students must attend three universities in order to graduate
- Less defined is the curriculum focused on management although the SSMEnetUK initiative has produced a blueprint of questions that should be addressed when proposing any such curriculum. These seven questions are typically asked by university approval committees for new academic programmes and address: rationale for developing a service science programme; the target market for such education; resources required by

[7] http://www.dke.univie.ac.at/binnet/Consortium/project_partner.htm

educators; already existing service science programmes; programme content; programme delivery; and outcomes

The list of potential skills that any service science course should address is broad, covering areas such as strategy, leadership, analysis, design, modelling, management and communication.

Service science courses tend to develop as extensions from an existing faculty or school. This can lead to an emphasis on a particular set of skills that does not reflect the breadth of skills that service science demands.

Quality

International accreditation of service science programmes can act as a spearhead for the overall development of the service science field by:

- contributing to a more widely accepted definition of target markets, job and career profiles, and relevant intended learning outcomes
- helping to overcome the problem of fragmentation which currently exists in research, degree education, as well as with respect to the institutional integration within university organizations
- encouraging employers and universities to develop a common perception of industry needs, accomplishments and capabilities of academia, as well as quality in service science training
- helping to properly map industry dynamics into university activities (e.g. the rising importance of technological knowledge and skills)
- contributing to a common understanding of what represents the “common core” of service science education
- providing quality assurance and harmonization at international level.

From a quality perspective, the academic community faces a range of issues in its efforts to establish service science as a distinct field of academic study. Four problems areas have been identified as giving rise to these issues:

- **Lack of strategic fit with institutional portfolio strategy:** the linking of study programmes to institution-wide characteristics and the requirement to generate scale benefits through common core courses encourage universities to increasingly adopt a comprehensive portfolio strategy approach to their degree programmes. Additionally, the influence of rankings, at both institutional and programme levels, encourages universities to focus on mainstream programmes. As these factors determine how resources are allocated it becomes all the more difficult to achieve a critical mass of collaborating service science academics within a university
- **Mismatch between multi-disciplinary requirement and functionally-focused university structures:** university-level approval procedures act against the creation of interdisciplinary programme offerings resulting, for instance, from difficulties in defining and dealing with shared program ownership. Along similar lines, professorial promotion policies have a tendency

of discriminating against academics holding joint membership in several school faculties. Perceived risks associated with shared investment complicate senior management's ability to negotiate mutually beneficial revenue and cost-sharing arrangements across faculties

- **Mismatch between focus of service science programmes and national accreditation requirements:** regulatory approaches differ widely from country to country. These range from centralised oversight agencies deciding on professorial appointments and course content to highly decentralised models under which universities have far more discretion over such decisions. While establishing service science programmes is probably easier under more decentralised models, complete decentralisation provides insufficient support for programme standardization which, in turn, is a prerequisite for using degree programmes as a spearhead for the establishment of service science as a distinct discipline in academia
- **Lack of international accreditation options for service science programmes:** Achieving an appropriate international student mix is an important quality indicator, which is directly related to the institution's ability to build up international brand recognition for the programme. While international program accreditation and rankings are obvious means of establishing cross-border reach, both suffer from a structural lack of availability at this point. The unclear definition of service science as well as the diversity of programme curricula has prevented the emergence of widely accepted rankings. International accreditation systems tend to be functionally specialized and therefore do not provide comprehensive coverage of service science.

Hiring

A feature of service science, prior to it becoming a mainstream academic discipline, is its low profile and a general lack of awareness. This can be problematic when it comes to hiring, both in the sense of attracting potential students and employing graduate students.

Universities trying to attract students to enrol in service science programmes are challenged by a lack of clarity among prospective students and among senior faculty members as to what service science entails. This absence of a clear identity for such programmes leads to a lack of awareness, which in some cases, has resulted in proposed study programmes being postponed due to insufficient numbers of students enrolling.

Similarly, a lack of established identity leads to potential employers neglecting to properly value graduating service science students as having a distinct and distinctly valuable education. It was noted that particularly in current economic circumstances, a student's decision to specialise in service science can be viewed as risky in comparison to more established fields of study where there is a clear appreciation of such programmes' value in the recruitment procedures of industry and government.

One way to familiarise students and employers with service science is through the use of internships. The EU's expansion of its Erasmus[8] education and training programme, such that it will allow for industry involvement in placements and teaching, was welcomed as a progressive development.

Experience gained of service science internships to date has been limited given the relatively low number of service science students. The working group however, believes that the concept of internships will apply similarly to service science as to students on other study programmes. The group envisages internships being popular with both students and recruiters. Students appreciate the international experience and the opportunity to impress a prospective employer while industry benefits through the injection of new thinking and the ability to cherry-pick talented interns. Standard inhibitors to internships - by no means limited to service science - include language proficiency for international placements, visa requirements and funding.

Fellowship

This working group looked at both fellowship and experience exchange within academia as well as between academia and industry. Examples of fellowships under consideration were:

- Executives in residence at universities
- Professors in residence at companies
- Sabbaticals for academics and practitioners
- Living laboratories – experimental settings similar to the natural environment

These forms of fellowship seek to exchange experience in various modes including knowledge co-creation, knowledge exchange and technology and knowledge transfer.

A lack of accepted procedures governing how fellowship arrangements are organised means that it requires significant work to establish fellowships, either within one university, between different universities or between universities and companies. The quality of personal contacts also plays a strong role in establishing such relationships. These factors combine to make fellowship opportunities unpredictable making it difficult to justify investing time to establish contacts.

Existing structures in both universities and companies are often barriers to establishing fellowships or exchanging experience. In each case, organisational structures can create an insular approach more concerned with protecting budgets and resources than looking externally for opportunities to cooperate.

[8] http://ec.europa.eu/education/lifelong-learning-programme/doc80_en.htm

The UK Advanced Institute of Management Research (AIM) Service Fellowships are a clear example of government sponsored fellowships that allow academics to spend time in the area of service. The 6 AIM Service Fellows appointed in 2008 had 60% of their time bought out from their universities to focus on service research. The AIM Service Fellows are also tasked to build capacity in service research in the UK and to improve engagement with industry and policy makers in the domain of service.

Helsinki School of Economics (HSE) was also cited as an example of a progressive approach to experience exchange. The main aspects of the various approaches used by HSE that were highlighted include:

- Establishment of three-year partnerships with 10-15 established local companies. Partner benefits include taking part in teaching opportunities, promotion of company name and access to master's theses
- Placement of "research interested" employees in research projects. Companies are expected to contribute towards the costs but funding is also received from official bodies including Tekes, the national agency of innovation and R&D. Companies can use these as windows into ongoing research undertaken by the university
- Establishment of 50:50 joint venture companies to conduct research for individual companies or groups of companies. Some companies provide employees to the joint venture on a part- or full-time basis; they also see the joint venture as a good source from which to recruit future employees

There is a distinction between the drivers for universities and industry to engage in fellowship and experience programmes. Whereas universities are primarily motivated by scientific rigour, companies seek to gain practical relevance of academic knowledge. This can lead to tension when it comes to funding as scientifically rigorous research is typically a long-term endeavour while practical applications generally look for short-term returns.

Partnership

The working group on partnership dealt with how various stakeholders from government, academia and industry can act in collaboration to contribute effectively to the development of service science as a mainstream concept. This working group was also active in understanding how partnership can be best supported by appropriate funding of service science research.

Current partnership activities centred around academic institutions demonstrate varying degrees of maturity. They range from involvement in undergraduate and graduate education programmes to short courses, research initiatives and research institutions funded by public-private partnerships (PPPs).

Examples cited of such partnerships include a Seminar Series at the University of Dublin, Trinity College; the Service Factory at Aalto University; and the Service Engineering Laboratory at Politecnico di Milano. The Customer and Service Science

laboratory at Bocconi University was established in 2007 as a public private partnership with Italian financial advisory company Gruppo Mediolanum as the main corporate sponsor.

The Karlsruhe Service Research Institute (KSRI) was also identified as a positive example of partnership in action. This institute is located at the Karlsruhe Institute of Technology in Germany and current research partners include IBM, SAP and Forschungszentrum Informatik. An active programme of external events was indentified as helping KSRI secure required funding from industry partners.

SSMEnetUK is a strong example of partnership involving all three stakeholder groups. SSMEnetUK is funded by the UK government's Engineering and Physical Sciences Research Council (EPSRC) and supported by British Telecom, Hewlett Packard and IBM. Its goal is 'to ensure that the UK is at the forefront of research in SSME, by developing and promoting UK capabilities while forging strong links with international communities in the field'. It also lobbies the UK government to provide funding into service science research and development. It is supported by numerous UK universities.

The working group also observed the increased investment in research and development (R&D) in the services sector of the economy (12% annual growth across OECD member countries as opposed to 3% for the manufacturing sector[9]). This increase was attributed to three factors: improved measurements for service sector R&D, growth in R&D intensity in the services sector and increased use of outsourced R&D by industry and government.

[9] Howells, Jeremy, New Directions in R&D: Current and Prospective Challenges. R&D Management, Vol. 38, Issue 3, pp. 241-252, June 2008

Recommendations

The collective contributions of the five workings groups can be summarised in a series of recommendations and associated actions. These recommendations are intended to contribute towards the establishment of service science as both a mainstream academic discipline and a concept understood by, and for the benefit of, all stakeholders.

The recommendations are:

1. Develop a common understanding of service science skills
2. Make service science a recognised, viable career path
3. Establish structures to facilitate collaboration
4. Highlight practical applications of service science
5. Respect the distinction between pure and applied research

Develop a common understanding of service science skills

Given the international reach of the service science community, the range of services that such education can be applied to and the sources of existing knowledge that can be drawn on, it is unfeasible and likely undesirable to attempt a global standardisation of service science curricula.

However, it is desirable that there should be a strong sense of identity across, and a basis of comparison between, service science qualifications awarded by different institutions in different locations and specialising in different aspects of services.

Actions:

Industry must be more explicit when describing desired skills and academic qualifications in job descriptions that are relevant to service science. Ideally, industry should ensure there is a strong element of consistency between the curriculum they have been involved in designing and/or delivering and the roles for which they recruit service science graduates.

Companies must influence university policies on new programme introduction by creating formal alliances of service science employers to support a common definition of service science programmes and 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 of creating universities that will act as service science champions. It would be incumbent on such champions to offer undergraduate and post-graduate multi-disciplinary programmes in service science.

Government bodies, in particular those bodies concerned with trade development and attracting inward investment, must seek to identify which service science skills can best contribute towards their objectives and work with universities to influence curricula accordingly.

Academia needs to develop a curriculum framework for service science, which should include key and core topics for service science education on different educational levels as well as optional topics, depending on the specific university mission and context, including faculty skills, relationship with external stakeholders, research focus and excellence. Such a framework would provide models for:

- either establishing innovative service science educational programmes or for the 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

Make service science a recognised, viable career path

For researchers, practitioners and educators, but perhaps most of all for prospective students, the establishment of accepted employment prospects and career paths based on service science qualifications is a prominent concern.

Attracting students to choose a particular course of study is a competitive undertaking. As such, stakeholders need to substantiate their arguments in favour of service science education with hard evidence of the potential returns. Stakeholders need to work together to explain why the risk associated with investing in service science education is more perceived than real.

Actions:

Universities must achieve recognised accreditation for service science programmes:

- Service science programmes with management-focused content should seek EPAS accreditation from the European Foundation for Management Development (EFMD), for example.
- Service science programmes with engineering-focused content should explore EUR-ACE (EUropean ACcreditation of Engineering) accreditation from the European Network for Accreditation of Engineering Education (ENAEE) or IEEE certification, for example.

Universities must encourage alumni networks of service science graduates to explain their current work in industry to prospective students. Where there are insufficient graduates of service science from a given university, business-informatics alumni can fulfil a similar role until there is an established network of service science graduates.

Representatives from industry, government and academia must participate in promotional activities to improve awareness among prospective students of job profiles and employment opportunities available to service science graduates. These awareness-building campaigns should use multiple formats (e.g. online, student organisations, conferences) and stakeholders should collaborate to identify relevant role models who personify the career aspirations of students considering service science as a programme of study.

Universities can also use leading edge research and industry collaboration to promote 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 must 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 training.

University liaison personnel from industry must 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.

Internships must be offered to service science students by business and government employers. Appropriate funding will be required, particularly in the case of international internships.

Establish structures to facilitate collaboration

A recurring theme in the discussion of making service science mainstream is collaboration. Whether between different stakeholder groups or within stakeholder groups, the consistent call for enhanced co-operation suggests that there is recognition of the fact that service science aims to use new approaches to deal with problems that existing approaches are not capable of.

This is a positive recognition that no one stakeholder or no one stakeholder group has a sufficiently broad and deep perspective to make real progress in extending the boundaries of knowledge in services. Ensuring that appropriate structures - be they formal and legal or informal and behavioural – are in place will allow this collaboration to occur with greater frequency, consistency and sustainability.

Actions:

Personnel in universities and companies who can act as negotiating partners must be identified and their roles actively promoted. Sufficiently supported by their respective organisations, these contact personnel will be able to negotiate the

terms of fellowship opportunities, thereby removing some of the hurdles that have been identified including an over-reliance on personal contacts.

Universities must be flexible in enabling faculty members to take up external jobs that contribute to their standing within the service science community.

Government agencies can facilitate exchange and internship opportunities for faculty members, professionals and students. Stakeholders must support and make use of programmes such as Erasmus in the EU while also evaluating the creation of similar programmes at a national level.

Companies must ensure that universities they wish to partner with understand the strategic relevance of public-private partnerships. Purely internal orientations of some university administrators suggest that public universities still struggle with this. Ensuring that this understanding is in place could help to overcome regulatory limits that restrict such universities' ability to take on entrepreneurial risks (e.g. long-term funding commitments may not be allowable if they are only based on short-term and contract-based collaborations with industry).

Clear expectations for how intellectual property rights (IPR) will be managed are required. Universities and companies must establish their individual expectations for IPR as a standard starting point for negotiating the terms of fellowship opportunities. These expectations should be sufficiently pre-determined that they form a basis for negotiation but should allow for flexibility according to the circumstances of a given fellowship opportunity (e.g. long-term co-creation vs. short-term knowledge transfer).

Highlight practical applications of service science

In its current stage of evolution, it can be challenging to convince a general audience of the practical value of service science. Specific instances can be cited where service science has delivered real and tangible practical value but for a general audience, these are not always sufficiently compelling to provoke action in support of service science.

Making service science mainstream implies an obligation to make it intelligible and accessible to non-specialists. In so doing, service scientists can explain the value of their research in terms that facilitate the justification of the investments they require to undertake research programmes and to provide teaching facilities.

Actions:

Researchers must demonstrate their ability to contribute to their partners' innovation agendas. They must also show how the application of thorough research can enhance the success rates of initiatives designed to introduce innovation that is critical to economic or business success.

Be they governmental or industrial, organisations that fund research must specify service science as a targeted area for investment with specified objectives. This recommendation aims to overcome the difficulty inherent in seeking funding for

multi-disciplinary research from funding agencies that are organised to fund research within already established disciplines.

In the expectation of defined outcomes, the business community and government agencies must provide part-time jobs, sabbaticals, consulting or professional training opportunities to faculty members. Such engagements and their outcomes must be used and promoted as examples of how service science research can be valued in practice.

Respect the distinction between pure and applied research

The recommendation to highlight the practical implementations of service science research should not devalue the role of pure research in the field of service science. That it has a solid foundation based on long-term pure research is critical to its longevity as a field of study and this must be respected.

At the same time it cannot be overlooked that securing the confidence of stakeholders to engage in joint action requires the demonstration of where, how and when the return on financial and other investments will come.

Actions:

Funding bodies must specify service science as an area of research in which they are willing to invest. To this end, other stakeholders must exercise their influence in the framing of funding proposals so that service science research is an explicitly recognised candidate for such funds.

Stakeholders must adopt realistic expectations for when their investments will generate returns and in what form. Some research will have direct, practical applications; other research will be more indirect and longer-term. Both types of research must be recognised as worthy of funding.

While short-term (up to four years) research projects are recognised for their contribution to specific research themes, long-term collaboration between networks of interested parties must also be funded to engage in research that contributes to the sustainable growth of the services sector in national and international economies.

Conclusion

The knowledge and observations captured in this paper originate from the more than 100 participants in the 2009 Service Science Summit. By distributing this paper to stakeholders around the world, we make this information available to the service science community at large.

During the summit, we endeavoured to focus discussion on making service science mainstream. As is evident from this paper and its recommendations, this requires meaningful and sustained collaboration between stakeholders. Indeed, many of the recommended actions cannot be allocated to one particular stakeholder group – they require constructive co-operation in pursuit of a common goal: to create new knowledge in the field of services that can be applied for the benefit of all stakeholders.

Given that we have identified collaboration and co-operation as central to the development of service science, a logical question to ask is with whom you should work. In anticipation of such a question, two appendices have been included in this paper, which detail further sources of information and summit attendees. The people and institutions listed, as well as others mentioned in this paper, are obvious candidates with whom you can participate as an active member of the service science community.

For feedback on this paper and further information, please visit:

http://servicefactory.aalto.fi/whitepaper

Appendix A

Further reading

When evaluating the eventual sustainability of service science as an academic discipline and as a concept readily recognised by industry and government, it is important to appreciate that there already exists a range of learning resources available to parties interested in the advancement of service science. Such resources can currently be found in the form of articles, textbooks, academic journals and websites. In themselves these are manifestations of the intellectual and monetary investment in service science to date. A selection of these resources is listed below as a starting point for readers wishing to explore the topic in more detail.

Articles of note

Hidden wealth: the contribution of science to service sector innovation (2009) The Royal Society

Succeeding through service innovation: A service perspective for education, research, business and government (2008), IfM and IBM, Cambridge, UK, University of Cambridge Institute for Manufacturing

Designing a service science discipline with discipline (2008) IBM Systems Journal, Volume 47, Number 1, 2008

Refereed journals dedicated to service science

The *Journal of Service Research* is sponsored by the Center for Excellence in Service at the University of Maryland's Robert H. Smith School of Business: http://jsr.sagepub.com/

Service Science publishes innovative and original papers, survey papers, technical correspondence, case studies, conference reports, management reports, and book reviews: http://www.sersci.com/ServiceScience/journal.php

The *International Journal of Services Sciences* publishes original and review papers, technical reports, case studies, conference reports, management reports, book reviews, and notes commentaries and news: http://www.inderscience.com/browse/index.php?journalID=238

Textbooks

Service is Front Stage: Positioning Services for Value Advantage, James Teboul, INSEAD Business Press, 2006

Service Science, Management and Engineering: Education for the 21st Century (2008), Hefley, Bill; Murphy, Wendy (Eds.), Springer Press

Knowledge Services Management: Organizing Around Internal Markets (2010), Mills, Peter K., Snyder, Kevin M., Springer Press

Managing Complex Service Systems (2009) Taylor, Richard, Tofts, Christopher, Springer Press

Services Science, Fundamentals,Challenges and Future Developments (2007), B. Stauss, K.Engelmann, A.Kremer, A.Luhn (eds), Springer Press 2007

Services Marketing: People Technology and Strategy, 6th Ed., Lovelock, Christopher H. and Jochen Wirtz (2007), Pearson/Prentice Hall, New Jersey

Services Marketing: Integrating Customer Focus Across the Firm, Zeithaml, Valarie, Mary Jo Bitner & Dwayne Gremlery, 4th edition, New York: McGraw-Hill 2006

The Service-Dominant Logic of Marketing: Dialog, Debate and Directions (2006), Lusch, R., Vargo, S.I., (eds.), M.E.Sharpe 2006

Advances in Services Innovation (2006), Spath, D & Fahnrich, K-P,(eds.), Springer Press 2006

Websites

Karlsruhe Service Research Institute: http://www.ksri.uni-karlsruhe.de/

SSMEnetUK, a UK network of researchers in Service Science Management and Engineering: http://www.ssmenetuk.org/

The Service Research and Innovation Institute (SRII), seeks to advance service science research and innovations required to drive improved productivity and quality for the technology industry, organizations and society at large: http://www.thesrii.org/

IBM's Service Science, Management and Engineering website: http://www.ibm.com/developerworks/spaces/ssme

Appendix B

Participants in the 2009 Service Science Summit

	Title	Organisation	Country
Esko Aho	Executive Vice President and a Member of the Group Executive Board of Nokia	Nokia Oyj	Finland
Reijo Aholainen	Senior Expert, EIT	European Commission	Belgium
Jesus Alcoba	Management and Technology Dean	La Salle Campus Madrid	Spain
Mikko Alkio	State Secretary	Ministry of Employment and the Economy	Finland
Tevhide Altekin	Curriculum Manager for ITM program	Sabanci University	Turkey
Tomas Aluja-Banet	Vice Dean for Corporate Relations	Universidad Politecnica de Catalunya	Spain
Francesca Amisano	CEEMEA University & Delivery Centers Recruitment Leader	IBM	Austria
Roman Beck	Assistant Professor as the Institute of Information Systems	University of Frankfurt	Germany
Sergey Belov	University Relations Coordinator, IBM Central & Eastern Europe, Middle East, Africa (CEEMEA)	IBM	Russia
Martin Benkenstein	Director of Marketing	University of Rostock	Germany
Amine Bensaid	Vice President, Academic Affairs	University Al Akhawayn	Morocco
Bernd Bienzeisler	Academic Assistant Department of Human Resource Management	Fraunhofer Institute for Industrial Engineering and Organisation	Germany
Kate Blackmon	AIM Fellow	Said Business School	UK
Tilo Boehmann	Head of Service Management Research	International Business School of Service Management	Germany
Daniel Bretones*	Professor IS Management	ESCEM	France
Patrick Brezillon	Professor	Universite Pierre et Marie Curie	France
Martine Broekaert	Academic Relations Executive	IBM	Belgium
Georgi Chobanov	Dean, Faculty of Economics and Business Administration at Sofia University	Sofia University "St. Kliment Ohridski"	Bulgaria

Paul Coughlan	Associate Professor of Operations Management	Trinity College Dublin	Ireland
Valentin Cristea*	Head of Computer Science Department	University Politehnica of Bucharest	Romania
Adrian Curaj*	General Director	Executive Agency for Higher Education and Research Funding	Romania
Jacques Delplancq	Directeur Delegue du President	IBM	France
Eric Dubois	Managing Director - Centre for IT Innovation (CITI)	Public Research Centre Henri Tudor	Luxembourg
João Falcão e Cunha*	Lecturer and Researcher, Faculty of Engineering	Faculdade de Engenharia da Universidade do Porto	Portugal
Dianne Fodell	Program Director, SSME (Service Science, Management and Engineering)	IBM	USA
Paul Gemmel	Professor Healthcare and Services Management	Ghent University	Belgium
Pedro Gimeno	Lenovo Alliance Executive - University Relations	IBM	Spain
Matthias Gouthier	Head of Institute for Services Marketing	European Business School - International University Schloss Reichartshausen	Germany
Adam Grzech	Deputy Dean	Wroclaw University of Technology	Poland
Matti Hamalainen	Professor	Helsinki University of Technology	Finland
Terry Hansen	Manager of Public Partnerships	IBM	USA
Elad Harison	Assistant Professor in Business and ICT	Sami Shamoon College of Engineering - SCE	Israel
Anders Henten	Lecturer	University og Aalborg	Denmark
Larry Hirst	Chairman, IBM Europe, Middle East and Africa (EMEA)	IBM	UK
Diem Ho	Manager of University Relations, IBM EMEA	IBM	France
Petra Hocová	Faculty of Informatics	University of Masaryk	Czech Republic
Ulrich Hommel*	Associate Director of Quality Services	European Foundation for Management Development (EFMD)	Belgium
Patrice Houdayer*	Dean	EMLYON Business School	France
Juha Hulkkonen	Business Development Leader, Public Sector, GBS Nordic	IBM	Finland

John Impagliazzo	Professor of Computer Science and Engineering	Qatar University	Qatar
Laszlo Jereb	Dean of faculty	University of Western Hungary, Faculty of Wood Sciences	Hungary
.Erwin Jung	Manager University Relations Leader of the Invtute for Knowledge and Business	IBM	Germany
Dimitris Karagiannis*	Professor, Head of Institute of Knowledge and Business Engineering	University of Vienna	Austria
Eamonn Kennedy	IT Services Practice Leader	Ovum	Ireland
Finn Kensing	Professor and Director	University of Copenhagen	Denmark
IIpo Koskinen	Professor	Taideteollinen korkeakoulu	Finland
Jyrki Koskinen	University Relations in Nordics, Governmental Programs and Community Relations, Finland	IBM	Finland
Helmut Krcmar*	Head of Institute for Information Systems / Business and Information Systems Engineering	Technical University of Munich	Germany
Jari Kuusisto	Professor	Lappeenranta University of Technology	Finland
Nadia Lamboray	Centre d'Innovation par les Technologies de l'Information	Public Research Institute Henri Tudor	Luxembourg
Rikke Lauth	Chief Advisor	University of Copenhagen	Denmark
Anita Lehikoinen	Director, Division for Higher Education and Science	Opetusrninisterio	Finland
Lea Lehtinen	Assistant Vice President, Service Innovations	KONE Corporation	Finland
Michel Leonard	Professor	University of Geneva	Switzerland
Paul Lillrank	Professor	Helsinki University of Technology	Finland
Charles Loving	UK University Relations Manager	IBM	UK
Kresimir Lugaric	Academic Initiative Representative	IBM	Croatia
Linda Macaulay	Professor of System Design	Manchester Business School	UK
Shlomo Mark	Software Engineering Department	Shamoon College of Engineering - SCE	Israel
Irene Martinsson	Senior Program Manager	Vinnova	Sweden
Louis Masi	Director, Global University Programs	IBM	USA

John McCreery	Associate Professor, Department of Business Management	North Carolina State University	USA
Carla Milani	University Relations Manager	IBM	Italy
Elena-Teodora Miron	Project Responsible	University of Vienna	Austria
Kathrin M. Moeslein	Director	HHL - Leipzig Graduate School of Management	Germany
Kristian Moller	Research Professor and Director of the Service Factory	Helsinki School of Economics	Finland
Katalin Molnar	Director	Center for Service Science Methodology and Research	Hungary
Nerey Mvungi	Principal: College of Informatics and Virtual Education	The University of Dodoma	Tanzania
Andy Neely	Director, Services Performance Research	Institute for Manufacturing	UK
Irene Ng	AIM Service Fellow	Institute for Manufacturing	UK
Viktor Nikitin	Dean and Vice Re tor	Higher School of Economics	Russia
Henriqueta Novoa	FEUP	Universidade do Porto	Portugal
Mislav Ante Omazic	Assistant Professor	Faculty of Economics & Business Zagreb	Croatia
Andrea Ordanini	Associate Professor	Bocconi University	Italy
Erkki Ormala	Member of Board in Helsinki University of Technology, Vice President, Technology and Trade Policy, Nokia Group	Nokia Oyj	Finland
Kasper 0sterbye	Head of Studies	IT University	Denmark
A. Bulent Ozguler	Director, Graduate School of Engineering and Science	Bahcesehir Universitesi	Turkey
Joan A. Pastor-Collado	Research Professor	Universitat Oberta de Catalunya	Spain
Robert Paton	Director, Complex Services Innovation Research Network	Department of Management	UK
Barbara Pernici*	Full Professor	Politecnico di Milano	Italy
Marc Prunier	Professor	Grenoble Ecole de Management	France
Aurelio Ravarini	Head of IS Research Department and Assistant Professor	Universita Carlo Cattaneo LlUC	Italy
Andre Richier	Principal Administrator	European Commission	Belgium

Jorma Saarikorpi	Forest and Paper Innovation Center, Director	IBM	Finland
Timo Saarinen*	Professor	Helsinki School of Economics	Finland
Tarek Saleh	Deputy to the Secretary General of the Supreme Council of Universities	Supreme Council of Universities	Egypt
Johan Sandell	General Manager, IBM Finland	IBM	Finland
Gerhard Satzger	Director	Karlsruhe Service Research Institute	Germany
Corinna Schulze	Governmental Programs Executive, EMEA Innovation Policy	IBM	Belgium
Petra Snellman	Media Relations Manager	IBM	Finland
Jim Spohrer	Director, Almaden Services Research	IBM	USA
Zdenko Stanicek	Assistant Professor	Faculty of Informatics, Masaryk University	Czech Republic
Jørgen Staunstrup	Provost	IT University	Denmark
Benjamin Suarez Arroyo	Infrastructure Engineer	ETS Ingenieros de Caminos, Canales y Puertos	Spain
Attila Suhajda	Government Programs Senior Professional	IBM	Hungary
Tiina Tanninen-Ahonen	Director	Tekes	Finland
Mikko Tarkiainen	Researcher	VTT Technical Research Centre of Finland	Finland
Tuula Teeri	President	Aalto University	Finland
Markku Tinnilä*	Professor	Helsinki School of Economics	Finland
Wietze van der Aa	Director	AMSI - Amsterdam Centre for Service Innovation	Netherlands
Jiri Vorisek	Head of Faculty Department	Department of Information Technologies, Prague University of Economics	Czech Republic

** denotes workgroup leaders for the 2009 Service Science Summit*

Making service science mainstream: A white paper based on the 2009 Service Science Summit

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