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Succeeding through Service Innovation

Developing a Service Perspective on Economic Growth and Prosperity

A Discussion Paper with Recommendations for Education, Business and Policy

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Succeeding through Service Innovation: A Discussion Paper

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Executive Summary

Service systems form a growing proportion of the world economy and are changing the way businesses, governments, families and individuals work. This document seeks to identify some of the issues facing *stakeholders* as they attempt to design, build, operate, sustain and dispose of service systems over the lifecycle. It focuses on the development of people with the skills and *service mindset* to make service systems more efficient, effective and sustainable, and addresses the types of expertise and knowledge required for *service innovation*.

Developments in technologies, economic institutions, demographics and globalisation drive the scale, complexity and interdependence of today's service systems. Ideas of service are not, of course, new but the rapidly increasing economic significance and the greatly accelerated rates of change mean that understanding and improving service systems in a sustainable way has become a major challenge for both practitioners and academics.

Many individual elements of the knowledge and expertise relating to service systems already exist in different areas of professional practice and in various academic disciplines. However, they often lie in unconnected silos. This no longer reflects the reality of interconnected economic activities, which, for example, now sees manufacturers of complex engineering products increasingly adopting service-oriented business models and health care service providers learning lessons from modern manufacturing operations. The priority now is for a common language and frameworks to underpin and encourage an integrated view of service systems. *Service Science, Management and Engineering (SSME)* is emerging as a distinct field of study, often referred to in short as *Service Science*.

Shared language and frameworks are an essential pre-requisite for progress and this document seeks to provide a step in this direction. It reflects the knowledge and expertise of an experienced group of academics and practitioners, identifies gaps in knowledge, priorities for research and offers a basis for an inclusive and international movement. Succeeding through service innovation presents three key challenges: developing people with the skills and service mindset to become *adaptive innovators*; developing integrative service systems research; and raising awareness among policy makers and key stakeholders. As a basis for formulating a plan of action, this document makes specific recommendations:

For education: Promote the recognition of SSME programmes and qualifications and the exploration of innovative delivery mechanisms so that graduates are equipped with practical integrative skills and a service mindset as adaptive innovators in business and society.

For business: Encourage the development of exemplar service systems through rigorous application of service science; define clearly the challenges of service innovation; build appropriate organisational and technological infrastructures; and support and fund the development of a large and inclusive service system research community.

For policy: Promote the importance of service systems and the implications of service innovation for other parts of the economy; support and fund inter-disciplinary research to drive service innovation; require leading-edge practices in government agencies to develop infrastructures, methods and data-sets for service innovation; and make public service systems more comprehensive and citizen-responsive.

The discussion or 'green' paper is intended to stimulate further dialogues among the stakeholders. Following the launch, this document and feedback form will be available on the symposium website. Anyone with an interest in service innovation and its implications for education, business and policy is invited to comment on the document by 30 November 2007. The document will be revised based on suggestions and comments received and then published as a 'white paper'.

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1. Introduction

1.1 The demand for service innovation

The growth of service activity across industries is now widely recognised. However, is it really anything new? Service is as old as the division of labour and has been provided in various forms since record keeping began. Indeed writing records was a form of service! But the scale and complexity of globally-dispersed *service systems* is growing rapidly, and the importance of using resources efficiently, effectively and sustainably is rising, as service activities become an ever greater part of value creation in modern economies. Proportionally, we are paying more for experience, advice, information, assurances, use of infrastructures and leasing, and less on growing, building and owning physical goods.

Thanks to the application of science, management and engineering to the improvement of agriculture and manufacturing, remarkable products from automobiles to personal computers can now be produced flexibly and efficiently and have become widely available. Searching for, obtaining, installing, maintaining, upgrading and disposing of products often consumes far more time and resource than production and purchase themselves – offering great opportunities for efficient and sustainable *service innovation*.

Similarly government programmes have become increasingly complex, requiring service innovation to cope with the scale of the demand. For families and individuals, service innovation helps to achieve healthy and productive lives in modern urban and rural environments as each generation aspires to a richer, more fulfilling life than its predecessors. Last, but far from least, access to information sources and on-line spaces have enabled the creation of new service businesses such as Amazon and Google, not to mention the fast emerging opportunities generically described under the heading of 'Web 2.0'.

In such a rapidly changing and increasingly complex world, service innovation requires new skills and associated underpinning knowledge. People are needed who can understand and marshal diverse global resources to create value. Frequently these resources are accessed using advanced information and communication technologies (ICT) and new globe-spanning business models. The people with new skills for service innovation are sometimes known as *adaptive innovators* for the continuous stream of improvement they identify and realise.

The need for science, management and engineering in agricultural and manufactured products has not gone away. Indeed, cutting-edge technologies such as nanotechnology and biotechnology can be applied to enhance consumer experience. However, products now become part of service innovation and future scientists, managers, engineers and entrepreneurs will be involved to a greater extent in various kinds of service innovation.

Service innovation can impact customer-provider interactions and improve the experience of finding, obtaining, installing, maintaining, upgrading and disposing of products. Service innovation can enhance the capability of organisations to create value with key stakeholders. Service innovation can improve the quality of life of the individuals and help society deal with issues such as aging populations. Service innovation can enable self-service that eliminates waiting and allows 24/7 access via modern devices for example mobile phones, web browsers and kiosks.

1.2 Service Science: an emerging field

The emergence of *Service Science* or *Service Science, Management and Engineering (SSME)* is a story of gradual identification of numerous areas of study: *service economics, service marketing, service operations, service management, service engineering, service computing, service sourcing*, *service human resources management, service design,* and more (see Appendix I: History and future outlook of service research). Despite important developments in the service field over recent decades, there has been a growing perception that a more integrated approach is needed if real progress is to be made. With the increasing demand for service innovation, it is time to take stock and to explore the possibility of bringing coherence into the emerging strands of knowledge and experience. Without a clear understanding of the domain and how it relates to existing theories, knowledge will continue to be fragmented.

1.3 Drawing the threads together

Since 2004, as an active user of knowledge and skills required for service innovation, IBM has been working with many other pioneers to call for a systematic approach to service research and education. This has resulted in dozens of SSME-related meetings being held in various countries.

In July 2007, IBM and Cambridge University's Institute for Manufacturing orchestrated an international symposium to help distil the key issues surrounding the nature of service and to identify guidelines for future development. The two-day meeting was attended by a group of leading academics and senior business leaders with a wide and deep knowledge of service research and practice – some 200 years experience in all. The symposium was also informed by 'correspondents' who, though unable to attend the meeting, made contributions through completed questionnaires and position papers. In spite of the diverse, multi-disciplinary group, the event produced a remarkable commonality of view (see Appendix II: Contributor list).

1.4 The discussion paper and four key concepts

As a key outcome of the Cambridge symposium, this document is aimed at all those who have a responsibility to understand service innovation and improve the capacity of their organisations to respond to future demands. It describes the changing structures and growing significance of service in the modern world, examines the nature of service systems and their characteristics, identifies knowledge and skill gaps, and proposes ways to improve the understanding and performance of service systems. Labelled as a discussion paper, the document invites an inclusive global discussion about service innovation and new ways that service systems can sustainably improve our economic and social well-being.

To establish a basis for discussion, this document tries to create shared view on four key concepts: service system, value proposition, adaptive innovator and Service Science, Management and Engineering (SSME) graduates. These four concepts are likely to be as important in the future as the traditional concepts: factory, trade, problem solver and Science-Technology-Engineering-and-Mathematics (STEM) graduates.

The changing global landscape of business and society can be described, for the purpose of increasing service innovation, as a very large global service system. This is made up of many smaller *service systems* (individuals, businesses and government agencies) interacting via *value propositions* to exchange service for service and to co-create value during the process. In this context, *adaptive innovators* will need to have knowledge of an emerging field known as *Service Science, Management and Engineering (SSME)* or *Service Science* for short. Considering the integral role of design and the arts, SSME could logically be extended to SSMED or SSMEA (Service Science, Management, Engineering and Design/Arts).

2. Clarifying the Rationale and Defining the Domain

2.1 Why are we interested in service systems?

The shift to service as the driver of economic growth is clear. Statistics indicate that employment in developed economies is dominated by people working in service industries and the public sector (see Appendix III: Service sector in global economy). For instance, over 70% of people working in the US are employed in service activities and the sector accounts for over 80% of US GDP. Meanwhile, developing countries, such as China and India, are starting to assess their role in the service economy. If we take into account service activities in the manufacturing sector, even these current figures are an understatement. Indeed, organisations increasingly find themselves in a world of service systems and face common problems – how to design, build, operate, use, sustain and dispose of service systems for the benefit of multiple stakeholders, including customers, shareholders, employees, partners, and the society at large.

Businesses know what service issues and challenges need to be addressed. Service has a 'front stage' that is about provider-customer interactions: how can quality and customer satisfaction be improved when there are multiple customer touch points and channels of interaction? Service also has a 'back stage' that is about operational efficiency and beating the competition with better value chain relationships, smarter employees and technology-enabled processes: how can operations and productivity be improved using the latest ICT advances and lean methods? Service performance needs both front stage and back stage components: how can the 'voice of the customer' and the 'voice of the process' be matched for the best overall performance?

Service excellence increasingly implies the use of global resources: how can global sourcing and regulatory compliance be enhanced? Service leadership means never standing still: how can service innovation be stimulated and realised? Service growth means the ability to create definable, repeatable, scalable and unique market success rapidly and effectively: how can the promising new service offerings be scaled up, simultaneously improving revenue and profit margins?

And more than anything else, businesses know they want it all – working seamlessly integrated, aligned and in a manner difficult for the competition to copy. Not only do service businesses seek answers to these questions; manufacturers on a servitization journey are eager to answer the same questions (see Appendix IV: Business challenges for service research).

Perhaps somewhat less intuitively, non-business organisations are under the same pressure to improve service systems. Government agencies feel the pressure to provide services to the public. Commercial competition is replaced by pressure from the public for transparency, quality and efficiency. Non-profit organisations are under pressure to improve quality, productivity, regulatory compliance and innovation. Households recognise the need to balance healthcare and education, retirement and financial planning, and insurances and on-going expenses.

A service system can be defined as a dynamic value co-creating configuration of resources, including people, technology, organisations and shared information (language, laws, measures and methods), all connected internally and externally by value propositions, with the aim to consistently and profitably meet the customer's needs better than competing alternatives.

In many cases, a service system is a complex system in that the configuration of resources interacts in non-linear ways. Interactions take place at the interface between the provider and the customer and, with the advent of ICT, customer-to-customer and supplier-to-supplier interactions become prevalent. As such, a service system is more than the sum of its parts and, through complex interactions, the parts create a system whose behaviour is difficult to predict.

The largest service system is the global economy, which connects to an external natural system. The smallest service system is a single person, connecting to an internal cognitive/biological system. Businesses, government agencies, and households are types of service systems of special interest, since they may be sustained over many generations who fill roles within them.

2.2 What is the vision for service science?

The vision is to discover the underlying logic of seemingly complex service systems (and the value propositions that interconnect and sustain them). This can then be developed into a coherent, integrated body of knowledge to support ongoing innovation in service systems design, operation and improvement - for the benefit of individuals, organisations and society.

In the real world, however, service systems frequently fail to meet expectations. The disappointments reflect a lack of sound understanding of the science underlying the design and operation of service systems. New knowledge is required to systematically describe the nature and the behaviour of service systems.

While acknowledging that service systems are very different from each other, and hence may need to be studied separately to understand nuances, it is crucial to accept this variability and get on with the important task of discovering the fundamentals. We still need specialists to deal with the increasing complexity but, to extract the full potential of service systems, we must seek to understand (1) how to optimally invest in service systems to sustainably improve key performance indicators (customer satisfaction, productivity, regulatory compliance, innovation capabilities) and (2) how to create new service offerings based on improved value propositions or new types of service systems.

Unlike the information technology industry during the last fifty years, there is no Moore's Law roadmap within the service domain that can guide organisations on what investments to make, and help knowledge workers decide what problems to tackle, in order to see predictable, year on year, performance improvements. Accordingly, the aim of service science is to discover an underlying simplicity or order within a world of service systems. It provides the structure and rigour for building a widely accepted and coherent body of knowledge to support ongoing innovation in service systems.

Key questions include:

- What are the architectures of service systems?
- How can service systems be understood in terms of a small number of building blocks that get combined to reflect the observed variety?
- How might architectures and building blocks help us understand the origins, lifecycles and sustainability of service systems?
- How can service systems be optimised to interact and co-create value?
- Why do interactions within and between service systems lead to particular outcomes?

Service science is about integration, optimisation and sustainability. This includes discovery, innovation and application of best practices. In complex business, technological and societal systems, we currently lack understanding of the full value potential of resources over their lifecycles.

Service science aims to provide a clear and common understanding of service system complexity. We have pieces today, but existing knowledge is not integrated into a unified whole. Service science provides motivation, methods and skills for integration.

Service science has the potential to benefit individuals, businesses and society, drawing upon the integrated talents of a diverse community of academics, industry, governments, entrepreneurs, as well as non-profits. Service science will enable adaptive innovators to identify the seeds around which service innovation can take root and grow.

2.3 Who are the stakeholders of service science?

Individuals and institutions dependent on complex, interconnected service systems are all stakeholders in understanding and improving their performance and sustainability. Businesses that want to improve their service revenues and profit margins are clearly stakeholders, including both incumbent firms and small and medium enterprises (SME). Their counterparts in the non-profit sector are also stakeholders who share similar concerns and aspirations. Governments, be they national, state, county or local, wishing to improve their competitiveness in the service economy are important stakeholders. A key question for governments is – how can they help create a high-skilled workforce, as well as provide legislative, social, technological and environmental infrastructures to support service innovation?

Meanwhile, knowledge workers across a wide range of disciplines are stakeholders. Over the past twenty years, disciplines such as service marketing, service operations, service management, service engineering, service design, service computing, and many others, have been established. Since service systems integrate a spectrum of resources (people, organisations, shared information and technology), the different strands of specialised knowledge would contribute more value to the practice if they can be brought together towards an integrated theory of service systems, rather than remaining isolated. Service science provides a useful platform to critically examine the relevance, assumptions, strengths and shortcomings of individual disciplines.

2.4 Why now?

Global trends, such as demographic shifts, off shoring, adoption of self service technologies and web-based service, and the reorganisation of knowledge-intensive work, are changing the nature of, and increasing the demand for, service innovation (see Appendix IV: Global trends and service innovation). As a consequence, the growing complexity of products, businesses and government agencies, households in urban and rural environments, and shared on-line information spaces requires a solid scientific foundation for the study of service systems. Service science has the potential to be as important as the foundation provided by physics, chemistry, biology, cognitive science and computer science for the modern world. Service scientists could well be just the type of adaptive innovators needed to create the next generation of service innovations.

3. Recognising the Foundations and Identifying the Gaps

3.1 What foundations have been laid by existing theories?

Service science covers all types of value-creating resources, and the disciplines or competencies that study and apply them. There are many strands that study resources or approaches to integrating resources of service systems.

They can be clustered in four areas:
(1) Business and organisations as a resource: Schools of Management (operations management, marketing, industrial marketing, human resource management, strategy, innovation, financial engineering, value engineering)
(2) Technology as a resource: Schools of Science and Engineering (systems design, engineering, software metrics, software development, product and software architecture, design)
(3) People as a resource: Schools of Social Science and Humanities (psychology, economics, sociology, behavioural sciences, theatre, arts, design, innovation)
(4) Information as a resource: Schools of Information (ICT, simulations)

As an integrative force, the scope of service science could include contributions from many areas that might map into the four fundamental resource categories as follows:

- Behavioural sciences (3)
- Economics and law (1,3,4)
- Engineering (2)
- Human resource management (1,3)
- Industrial marketing (1,2,3,4)
- Information and communication technology (2,4)
- Innovation and design (1,2,3,4)
- Marketing (1,2,3,4)
- Operations management (1,2,3,4)
- Organisation theory (1,2,3,4)
- Product and software architecture (2)
- Psychology and cognitive science (3,4)
- Simulation and AI (1,2,3,4)
- Sociology and anthropology (1,2,3,4)
- Software metrics and development (2)
- Strategy (1,2,3,4)
- Systems theory and design (1,2,3,4)
- Theatre and arts (3)
- Value engineering (1,2,3,4)

Discovering fundamental building blocks of service systems, and how they can be combined to create the variety of service systems, service interactions and outcomes observed in the world, is already underway. Resource classification schemes are also being developed, along with associated access rights, service level agreements, standards and protocols, safeguarding designs and failure recovery methods. Furthermore, multiple perspectives on service systems (such as provider, customer, partner, employee, governance authority, competitor, entrepreneur, or criminal views) allow the formalisation of systematic approaches to service strategy, business model design, and pricing of new services. Encouragingly, though with varying degrees of success, pioneering attempts are being made to develop a normative view on how service systems can be described and their behaviours explained, such as the GAPS model, Service-Dominant Logic, Unified Theory of Service, and Service as Leasing.

In general, attempts to create an integrated theory of service activities and service systems have been primarily of academic interest, with only passing practitioner interest. Nevertheless, practitioner driven tools, methods and data sets are emerging. They provide relevant starting points for practitioners to establish an overarching framework and outline the problem space at multiple levels. Some of these tools have been used to model government agencies and public sector, as well as businesses. There are tools and methods that have been developed for modelling industries as a system of business components with associated key performance indicators (KPIs). Historical economists and organisation theorists interested in industrial evolution have started to align their efforts with some of these emerging tools and data bases. The development of service-oriented architectures (SOA) for describing information technology 'services' that support work and business practices is on the rise.

3.2 Where is the knowledge gap?

Despite significant progress, there are wide gaps in the understanding of service systems. Challenges still exist at the level of individual specialised disciplines. For example, while operations research and industrial engineering often model people waiting in queues, more realistic understanding of people as emotional and psychological beings that can learn and adapt over time, is lacking. Computer science and information science often model information systems (composed of hardware and

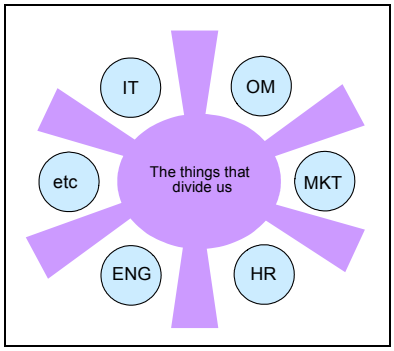
software) as architectures optimised to respond to well understood environmental demand variations. Nevertheless, the design of governance mechanisms that allow information systems to proactively respond to strategy changes and predictable technological advances is less understood. The disciplines of economics and business strategy need to accommodate predictable innovations. Service management and operations need to create better knowledge of service system scaling and lifecycles. Law and political economy need a better comprehension of social innovation, and the way that legislation can improve service system productivity. The emerging discipline of complex systems engineering should provide more specific insights into the robustness and fragility of service systems.

Apart from individual disciplines, there are more fundamental challenges in integrating various strands of knowledge. While knowledge specialisation remains important, one shortcoming is that each individual discipline tends to concentrate on particular resources (people, technology, organisations, or information) or particular configurations of resources. Academics have well defined research agendas within their communities to deal with discipline-specific issues, but the complexity of service systems requires an integrated approach. The key to understanding service systems is not just to examine one aspect of service but rather to consider service as a system of interacting parts. Many types of resources need to be bridged, including service marketing (customer as key resource), service operations (process as key resource), service computing (information and IT as key resource), service human resource management (employees as key resource), service sourcing (whole organisations and value chains as key resource), and so on. As service systems become more complex our ability to understand them is hampered by the isolation of different disciplines. The hard work of creating an integrated theory that spans many disciplines, however, has not been done.

This situation stems from the tradition that academic institutions are structured along discipline and sub-discipline lines and academic silos are created to encourage deeper understanding of a specialised subject (see Figure 1). There is expectation, from institutions and funding bodies, that academics conduct research and provide courses within their disciplines. Although often addressing similar matters, each discipline or function usually has an implicitly agreed (presumed) set of interests, paradigms and methodologies. Over time, academics see cross disciplinary research as being highly risky and potentially career-damaging.

As a result, there is an imbalance in service research; studies tend to focus too much on either customer (marketing) or provider (operations). This is reflected, and indeed reinforced, by top journals, which tend to be highly specialised. In operations management journals, for example, less than 20 per cent of the papers focus on service topics although the majority of the economy is service-based. In addition, some of the disciplines tend to focus on specific sectors; marketing tends to be concerned with business-to-consumer and operations with business-to-business. Gradually, a mismatch emerges between academic focus and practical interest on the topic of service innovation.

Figure 1 The gaps between academic disciplines



3.3 Where is the skill gap?

In addition to the knowledge gap, the supply of people with the right skills is inadequate as the service economy continues to grow. The role of education in the 20th century was in part to prepare students for jobs. Universities have been conventionally rewarded for creating people with specialised knowledge. Service innovation, however, requires an extended role of education in the 21st century. Universities must prepare people to be adaptive innovators, who are as deeply skilled in their home discipline as before, but with additional entrepreneurial skills and the ability to think across disciplines in the many project roles they may fill during their professional lives.

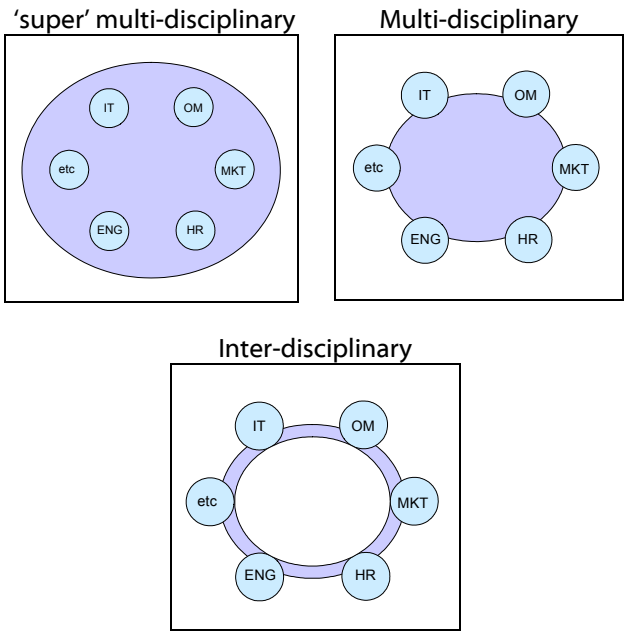
Adaptive innovators have the ability to build consensus across inter-organisational boundaries and cultures, across intra-organisational functional silos, and across disciplinary silos of specialists who do not speak the same language, but whose skills are all needed to adapt to and innovate in a dynamic landscape. They have a service mindset, supported by intellectual, psychological and social capital components, and can think and act in a way driven by an integrative 'service logic' rather than one of the often competing logics associated with organisational functions and units. To the degree that service science makes clear and measurable progress, adaptive innovators will be in high demand.

4. Working together to Bridge the Gaps

4.1 What are the alternative approaches to addressing the gaps?

The shortage of available knowledge and skills to deal with service systems requires a more systematic approach to both research and education. As shown in Figure 2, there are three ways to address the integration gap. To some, service science is seen as a 'super' ***multi***-discipline embracing all appropriate, but as yet not agreed, disciplines and functions. To others, service science is seen as a ***multi***-discipline, embracing elements of the major disciplines and functions. Alternatively, service science can be seen as an ***inter***-disciplinary activity which attempts to unite various areas based on ***trans***-disciplinary (or ***cross***-disciplinary) collaboration.

Figure 2 Three perspectives of service science



In this document, we advocate the inter-disciplinary approach. It is understood that many barriers to integration are well established, and trying to remove them would require considerable effort and may deflect attention from more purposeful integration activities. Thus, one way to overcome the barriers is to accept their existence rather than try to remove them. Such an approach to developing service science will lead to

> "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 organisations create value for customers and stakeholders that could not be achieved through such disciplines working in isolation" (US Congress HR 2272, 2007).

The inter-disciplinary approach brings benefits to both academia and practice. From a practical perspective, the approach would lead to a rigorous methodology to invest in the improvement of service systems and the design of high-value service offerings. From an academic perspective, the approach would provide a rigorous foundation for many interrelated disciplines so that research and education could be more rapidly advanced.

4.2 What are the opportunities to address the knowledge gap?

Inter-disciplinary activities are not new to research and practice. They are in evidence in many universities and industries. Indeed there is an established body of knowledge about how to undertake inter-disciplinary work, which can be adapted to service research. There are opportunities at every level to address the barriers between disciplines and the study of service systems.

Individual: Leaders in both practice and academia are well placed to highlight the excitement of inter-disciplinary work and to reduce the risks sometimes associated with moving outside a specialism or discipline. The potential of service systems to improve society as well as business will attract sophisticated and broadly capable people to the field. Leaders can help to develop, articulate and enable aspirational service activities.

Structural: Inter-disciplinary or cross-functional work happens at a project or activity level. Cross-functional teamwork on specific projects with common goals encourages mutual awareness and respect for other disciplines. Exemplary individuals, teams, projects and outputs, such as case studies, provide a vehicle for encouraging more co-operative behaviours, common purpose and non-

discipline/functional-based language and mindsets. However, the need for rigour and relevance in inter-disciplinary service research remains particularly important in order that new knowledge and practices are seen to be robust and reliable. A shared belief in the need to focus on customers can provide an important starting point.

Business: Business challenges are often inter-disciplinary and cross-functional. Business problems commonly require participants with different disciplinary backgrounds to learn enough about each other's perspective (conceptually, methodologically and substantively) in order to achieve effective and productive work. Challenges clearly expressed in the language of business can cross academic boundaries and demonstrate that no single academic community has exclusive 'ownership' of the problem. Businesses can also provide hard data for academic research to support the pursuit of robust and practical outcomes. Industrial structures focused on services are already emerging and businesses can encourage the development of service professionals, service fellows in academia and the well articulated cultivation of a service ethos. Hiring policy might usefully recognise the importance of psychological capital and customer empathy.

Academia: Leading journals in the field of service research are extremely influential in setting the agenda and tone of academic research. They are uniquely placed to encourage inter-disciplinary studies. In addition to leading journals of inter-disciplinary/cross-functional research, major specialised journals are encouraged to initiate special issues in inter-disciplinary areas. This is not straightforward and more work is needed to define and document more precisely what constitutes 'good' inter-disciplinary research.

Funding bodies should be part of the process towards more inter-disciplinary research so that they can assess research proposals more consistently. Close partnerships with industry can help academics to develop relevant research agenda leading, in due course to the development of inter-disciplinary tools, models and frameworks that reflect interactions between a firm's different departments and its external partners.

Modern web-based communication tools may enable the required multi-disciplinary social networks to form and work together as needed to move from silos of knowledge to connected and integrated webs of knowledge.

Funding and Incentive: Except in certain areas of physics and mathematics, the incentive and the methods of creating integrated theories that span multiple areas are not well known. In addition to discipline-specific studies, funding should also be provided to support inter-disciplinary service research, through mechanisms such as dual appointments and shared rewards. More fundamentally, funding should not be biased towards narrowly defined disciplines; it should be granted on the basis of the research's potential to advance knowledge and practice.

4.3 What are the opportunities to address the skill gap?

The education of discipline-based specialists remains a vital role of universities. In response to the skill gap, however, universities should offer students the opportunity to gain qualifications in SSME. Such qualifications would equip graduates with the concepts and vocabulary to discuss the design and potential redesign of service systems from inter-disciplinary perspectives. Industry often refers to "T-shaped professionals", who are deep problem solvers in their home discipline, but have the competence to interact with and understand specialists from a wide range of disciplines and functional areas. T-shaped professionals are more likely to become adaptive innovators as identified earlier.

Widely recognised SSME programmes would help ensure the availability of a large population of T-shaped professionals with the ability to collaborate to create service innovations. SSME education and qualifications would indicate that these graduates could communicate with scientists, engineers, managers, designers, and many others involved in service innovation. In many areas of the economy, competition will be greatest for new service experiences that delight customers with unique aesthetics and artistic design (expression and personalization), not just low costs and productivity (functionality and standardization). Graduates with SSME qualifications would be prepared with concepts and vocabulary to 'hit the ground running' when joining a service innovation project, immediately productive for the employer, and paying significant dividends to the project.

Establishing SSME qualifications is by no means an easy task. Cross-disciplinary course development requires significant effort to develop because it is not easy for busy faculty to work together sustainably over time. Educational innovations are often reliant on the efforts of one or two people and vulnerable if they leave or take other duties. Cross-disciplinary programmes can also be harder to organise and more expensive to initiate and maintain. Clearly, rapid progress in the design and delivery of these programmes would require active support and resources from business and government.

5. Recommendations

Despite the opportunities for bridging the knowledge and skill gaps, service science is still in its infancy, not unlike the science, management and engineering of agricultural and manufactured products two hundred years ago. Today, far better tools and information systems exist to develop service science than those available two hundred years ago. Nevertheless, the problem is far more complex than innovating tangible agriculture or manufacturing products or processes. The goods-dominant logic of the last two hundred years may actually interfere with adopting a service mindset conducive to successful service innovation.

While it is hard to precisely predict the ultimate form of service science, there is great confidence that better inter-disciplinary collaboration should lead to a more complete understanding of service systems within and across disciplines. Accordingly, the recommendations below are offered as a point of departure for a more inclusive conversation. The overall aim is to ensure that human energy and expertise can be marshalled to best effect for business and society.

5.1 Recommendations for education

1. ***Enable graduates from various disciplines to become "T-shaped professionals", who can make early contributions as adaptive innovators with a "service mindset" in service-driven globally integrated enterprises.***

   All students and employees, who wish to, should have the opportunity to learn about service science and develop a service mindset. A service mindset is realised by adding SSME qualifications to an existing deep home discipline of study. A service mindset will help students of service to become T-shaped professionals, who can work effectively in project teams across discipline and functional silos, as adaptive innovators with a good background in the fundamentals of service innovation. As research creates a truly integrated theory of service systems and value propositions, the students of service will also become better system thinkers prepared to succeed in a 21st century service-driven globally integrated economy.

2. ***Promote the recognition of integrative SSME education programmes and qualifications, as a way of developing a "service mindset", in conjunction with industry recognition and recruitment of SSME qualified graduates.***

   SSME qualifications, which we see as critical to developing adaptive innovators with a service mindset and service innovation skills, should include interactional skills across the main disciplines of service science. Interactional skills enable proficiency in the concepts and vocabulary for framing problems and discussing potential solutions across disciplines. The main disciplines of service science include, among others, service economics, service marketing, service operations, service management, service quality (esp. customer satisfaction), service strategy, service engineering, service human resource management (esp. in managing a professional service firm), service computing, service supply chains (esp. eSourcing), service design, service productivity, service measurement, and service innovation.

   Within the disciplinary areas, the customer can be seen as both a service consumer and a service provider. More specifically, additional topics might include service process analysis, SERVQUAL and TQM (including when to use and when not to use these methods), Lean and Six Sigma, servitization, self service, integrating competing logics of different disciplines, managing the service experience over time, managing service failure and recovery, knowledge of organisational change, and service provisioning (including interpersonal competences such as cross-functional teamwork and conflict resolution).

3. ***Rapidly develop a modular template-based SSME curriculum, and add new material and refinements over time, as research creates a truly integrated theory of service systems.***

   SSME qualifications should employ a template-driven curriculum model and specify modules that can be switched in and out across different faculty and courses. Developing a service mindset requires participation in one or more practical projects. Working on industry projects would be essential for students to acquire the above competencies, particularly

those involving the ability to solve problems, cross-functionally in real-time, and an open mind. It also allows students to see service systems in action. The design and provisioning should ideally involve student teams with members from different schools, including business, engineering, social sciences and information science, and sometimes from different universities. The design of service science laboratory space should enable small multi-disciplinary project teams to work together with collaborators in remote location. Tele-presence meetings and the design of remote collaborations with industry and government should be supported. Service science labs should focus on entrepreneurial projects. Capstone project could help prepare students to become adaptive innovators with a balance of practical and theoretical knowledge of service systems.

4. ***Explore alternative and innovative provisioning routes for SSME related education.***

   SSME qualifications should be accessible through many different channels including on-line eLearning. Channels should offer exposure to cases, simulations, and lab activities across major sectors of the modern service economy. They include public sector (government & security, healthcare & education, environment & recreation), commercial sector (retail & franchise, hospitality & entertainment), information sector (financial & banking, consulting & professional, media & internet), infrastructure sector (transportation & communications, utilities & construction, manufacturing & extractive). Understanding the unique value propositions and key performance indicators (KPIs) across major economic areas should include a historical perspective on the co-evolution of technology, work practices, and business models.

5.2 Recommendations for business

1. ***Review existing approaches to building repeatable service systems and expand project-based collaborations with multi-disciplinary teams from academia.***

   Understanding, modelling and measuring service activities that take place in business today is well underway, from activity-based costing of work practices to service-oriented architecture support technological change at the speed of strategy change. ITIL (IT Infrastructure Library) and other standards efforts around IT service management should begin with a catalogue of service offerings. Despite good progress, surprisingly little is known about optimal investment strategies for continuous improvement of service systems, scaling margins as service revenues increase, systematically reducing complexity of service systems, and devising measurement systems that can be used internally as well as shared externally in an appropriate manner to protect privacy and preserve competitive advantage.

2. ***Build large and inclusive inter-disciplinary service science communities involving recent graduates with SSME qualifications.***

   Businesses should include SSME qualifications preferred in relevant recruitment efforts to help create demand and encourage academic programmes to form and rapidly improve.

3. ***Provide specific challenges and funding for service systems research.***

   Business should provide specific challenges and funding for service systems research via organisations such as the Service Research and Innovation Initiative, and many other regional industry-academic-government collaboration forums.

4. ***Develop appropriate organisational arrangements and practices in the area of business partnerships to enhance industry-academic collaboration around service systems projects.***

   Businesses can also support practitioner participation in SSME relevant conferences to help academics improve their SSME programmes with the latest collaborative business-academic projects and case studies. New tools, methods, and data sets related to SSME should be the focus of business-academic collaborations to stimulate rapid progress.

5. ***Work with stakeholders to include sustainability measures and create actionable roadmaps.***

   As sustainability becomes an increasingly urgent global concern, businesses can use this opportunity to expand the definition of stakeholder value to include other service system measures beyond traditional revenue growth, margin and market share improvements. Balanced efficiency, effectiveness, and sustainability improvements driven by optimal investment strategies can be a major area for focus in the coming years.

5.3 Recommendations for policy

1. ***Explain the importance of service innovation for all parts of the economy and fund the development of an integrated theory of service systems.***

   Service innovation is still poorly understood relative to its importance to the economy. Nevertheless, history has proven the effectiveness of focused basic R&D efforts to advance science and build a body of knowledge that can provide practical benefits over many years. The separate discipline areas of service research have developed to a point that an integrated theory is within reach, if adequate funding is available.

2. ***Demonstrate the value of service science to government agencies, and thereby create methods, data sets, and tools to inform and challenge education and research.***

   As government service systems, which employ over 20% of the populations of some nations, are improved the ripple effect through the rest of the economy can be a significant enhancement to the national production functions and spur economic growth.

3. ***Develop reliable economic data on knowledge-intensive service activities across sectors to underpin leading practice for service innovation.***

   Measuring service activities across sectors of the economy to better understand service quality, productivity, regulatory compliance, and innovation is an important starting point.

4. ***Make government service systems more comprehensive and citizen-responsive.***

   Government service systems are especially in need of comprehensive review and improvement by engaging citizens concerned. Improvements are achievable through the shift from provider-centric to citizen-centric design of government service systems.

6. Having Your Say: Feedback Arrangements

Individuals and organisations with an interest in service innovation are central to this document. This document will be widely distributed to universities, research institutions, business organisations, non-profit organisations, government departments and agencies.

We want to hear views on every aspect of this document. In particular we would like views on the questions set out in Appendix VI. The feedback form can be found online at

www.ifm.eng.cam.ac.uk/ssme

The feedback form is designed for individuals and organisations to:

- determine the degree to which they support the document
- comment on and improve this document, for example, by adding specific recommendations
- contribute to the follow-on 'white paper'

The feedback period lasts 8 weeks from the date of publication, finishing on 30 November 2007.

All responses will be analysed and, based on the feedback, a white paper representing a broad set of contributions will be published.

In the spirit of continuous improvement, we see this document and the white paper as just a first step in an on-going dialogue that will engage many more stakeholders who seek to develop successful adaptive innovators, SSME qualified, in a service-driven global integrated economy.

We will continue to challenge academics and practitioners to perform the needed inter-disciplinary work that might someday lead to a breakthrough in service science and hasten the positive impact on business and society from service innovations.

Glossary

Adaptive innovators: People who are entrepreneurial and capable of integrated systems thinking in the many project roles they may fill during their professional life time. In contrast to the specialised problem solvers of the 20th century who are sometimes called 'I-shaped' professionals for their depth, 21st century adaptive innovators are deep in some area but with broad communication skills across areas of business, technology, and social sciences and hence they are sometimes called "T-shaped professionals".

Service or service activity: A short definition is provider-customer interactions that co-create value. A longer definition is the application of competences (knowledge, skills, and resources) for the benefit of another entity in a mutually agreed and mutually beneficial manner.

Service computing: The use of information technology (IT) to support customer-provider interactions, including topics such as: web services, e-commerce, service-oriented architectures (SOA), self-service technologies (SST), and software as a service (SaaS).

Service design: The application of design methods and tools to the creation of new service systems and service activities with special emphasis on perception of quality, satisfaction, and customer-employee experience.

Service-dominant logic: The product-dominant logic is the traditional economic worldview of services (plural) and products as two distinct value-creating mechanisms in an economy. The service-dominant logic worldview, upon which service science is based, advocates that service (singular) is value co-creation interactions undertaken when service systems create, propose, and realise value propositions, which may include things, actions, information, and other resources. Value propositions are built on the notion of asset sharing, information sharing, work sharing (actions), risk sharing, as well as other types of sharing and exchange that can co-create value in customer-provider interactions.

Service economics: The definition and measurement of service activities in an economy, including the measurement of productivity, quality, regulatory compliance, and innovation.

Service engineering: The application of technologies, methodologies and tools to the development of new service offerings and the improvement of service systems.

Service human resources management: The application of human resource management to service businesses and activities. This management term is rejected by many social scientists and those who do not believe it is appropriate to talk about humans/people as resources. The term human relations management is sometimes used as a more appropriate alternative. Many service firms have the motto to treat employees like they treat valued customers.

Service innovation: The combination of technology innovation, business model innovation, social-organisational innovation, and demand innovation to improve existing or create new service value propositions (offerings or experiences) and service systems.

Service management: The application and extension of management methods and tools to service systems and service activities, including capacity-and-demand management that integrates insights from service operations (supply capacity management) and service marketing (demand management).

Service marketing: The study of value-creating customer-provider interactions, outcomes, and relationships, that extends the tools and methods of marketing. Gradually replacing "services marketing" by stressing that the outcome of all economic activity should be service (or value) whether the service/value emanates from things ("goods") or activities ("services"). This discipline places special emphasis on quality and customer satisfaction, demand forecasting, market segmentation and pricing, customer life-time value, and sustainable value propositions design for long-term value co-creation relationships. Relationship marketing and CRM (customer relationship management), both primarily focused on the two-party relationship between customer and provider, and the new concept of many-to-many marketing (a network and stakeholder approach) are highly supportive to the new notion of service marketing.

Service mindset: A focus on innovating customer-provider value co-creation interactions (service systems and value propositions, SSME qualified) that is combined with the interactional expertise capabilities of an adaptive innovator to enable teamwork across academic disciplines and business functional silos.

Service operations: The study of value-creating (work) processes that include customer-input as a key component of the process, using and extending the tools and methods of operations research, industrial engineering, management science, operations management, human resource management, lean methods, six sigma quality methods, and supply chain or logistics management.

Service networks: Also known as service system networks. More often than not, service systems connect to other service systems via networks of relationships. Such relationships may have one or more associated value propositions. Social network analysis (people as service systems) and value network analysis (businesses as service systems) are tools that can be used to analyze service system networks for robustness, sustainability, and other properties.

Service science: Deliberately chosen as a symbol of rigour in pursuing the truth, it is the umbrella term for the emerging discipline of Service Science, Management and Engineering (see SSME below). Service science is the integration of many service research areas and service disciplines, such as service systems and value propositions, service economics, service marketing, service operations, service management, service engineering, service computing, service design, service measurement, service sourcing (esp. eSourcing), service governance, and service innovation.

Service sourcing: The make-versus-buy decision for service activities, including the study of outsourcing, contracts, service level agreements (SLAs), and B2B on-line markets.

Service system: A service system is a dynamic value co-creating configuration of resources (people, technology, organisations, and shared information). Service systems are complex systems, and they are also a type of 'system of systems,' often both containing internal smaller service systems as well as being contained within a broader service system. Service systems typically interact via value propositions, which may create stable relationships between service systems in extended value chains or networks. See also, service networks.

Stakeholders: Also known as roleholders in service systems. Roleholders are people, or other service systems, that fill named roles in service systems. The two main roles in any service system are provider and customer. For example, executives, employees, and customers are roleholders in businesses, politicians and citizens in nations, teachers and students in schools, doctor and patient in hospitals, and parents and children in families.

SSME: Service Science, Management and Engineering (SSME) is an emerging field. Curricula, training, and research programs that are designed to teach individuals to apply scientific, engineering, management, and design disciplines that integrate elements of computer science, operations research, industrial engineering, business strategy, management sciences, social and legal sciences, and others in order to encourage innovation in how organisations create value for customers and stakeholders that could not be achieved through such disciplines working in isolation. It is also known as simply 'service science'.

STEM: The Science, Technology, Engineering, and Mathematics (STEM) fields are widely considered to be the key to an advanced society. The STEM workforce is viewed by many governments, academic and business organisations as the key to a nation's innovation capacity and long-term competitiveness.

Value proposition: The offer that one service system makes to another in order to initiate and then realise (actualize) value co-creation. For example, division of labour is at the root of many value propositions: "You do this for me, and I'll do that for you." By traditional economic definitions and conventional marketing definitions, value propositions may include both product (thing) and service (action). However, the modern meaning of service is value co-creation, where service involves both things and actions from both customer and provider consistent with a value proposition. Value propositions may be rejected because a potential customer does not trust the provider's (proposers) capabilities or reputation, believes the proposal violates a law or policy, or it may be rejected in favour of self service, a competitor's proposal, or in favour of other options. Designing, proposing, and realising (actualising) value propositions contribute to the formation and improvement of service systems.

Appendix

I: History and future outlook of service research

To assist the many new students of service in quickly gaining a broad brush overview, the history and emergence of service research has been characterized in six periods:

- ***Pre 1980:*** *Crawling Out* period is when service marketing and service operations become distinct from product marketing and operations, in part as conventional service economics reports categorize more of the economy as value derived from service activities.

- ***1980-1985:*** *Scurrying About* period with more services research published moving beyond goods and products but literature was still mostly conceptual. A core group of academics and business practitioners develops.

- ***1985–1992:*** *Walking Erect* period with increasing number of scholars of service, and explosive growth in the literature including service research journals, dissertations and textbooks. Academic events, centres and pioneers in Europe as well as US emerged.

- ***1993-2000:*** *Making Tools* period with more quantitative research - measurement, statistics, and decision support modelling; broadening, deepening and sharpening of the research; continued globalisation and multi-disciplinary research and expanding topic areas including; service design and delivery, service experiences, service quality and customer satisfaction, service recovery and technology infusion, service computing, service supply chains and eSourcing (sometimes called service value chain).

- ***2000-Now:*** *Creating Language* period with nearly a dozen models of service emerging, and the concept of a service system beginning to take hold to unite the many perspectives. The field is expanding rapidly with an expansion of literature worldwide and increasing numbers of conferences and centres worldwide with IBM and industries' Service Science, Management and Engineering (SSME) Initiative seeking to strengthen the industry, academic, government ties. The service-dominant logic view is gradually replacing the traditional view of service versus product, with a view of service as value co-creation that involves both things and actions, as well as information and other resources.

- ***The Future:*** *Building Communities* will require an inclusive multi-disciplinary approach to service performance, with science, management, engineering and design being supporting academic disciplines and T-Shaped (deep and broad) professionals being adaptive innovators to link and unite these disciplines, and create measurable impact from service innovations for business and society.

Appendix

II: Contributor list

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Appendix

III: Service sector in global economies[1]

In recent years service industries have become a fast growing sector in world economies as measured by traditional economic measurement methods (see Service-Dominant Logic in the Glossary, for an alternative view). Services now account for more than 50 percent of the labour force in Brazil, Russia, Japan and Germany, as well as 75 percent of the labour force in the United States and the United Kingdom. Figure 3 shows the value of services to economies compared to that of industry, construction and agriculture.

Figure 3 Share of total gross value added by sector, 2002

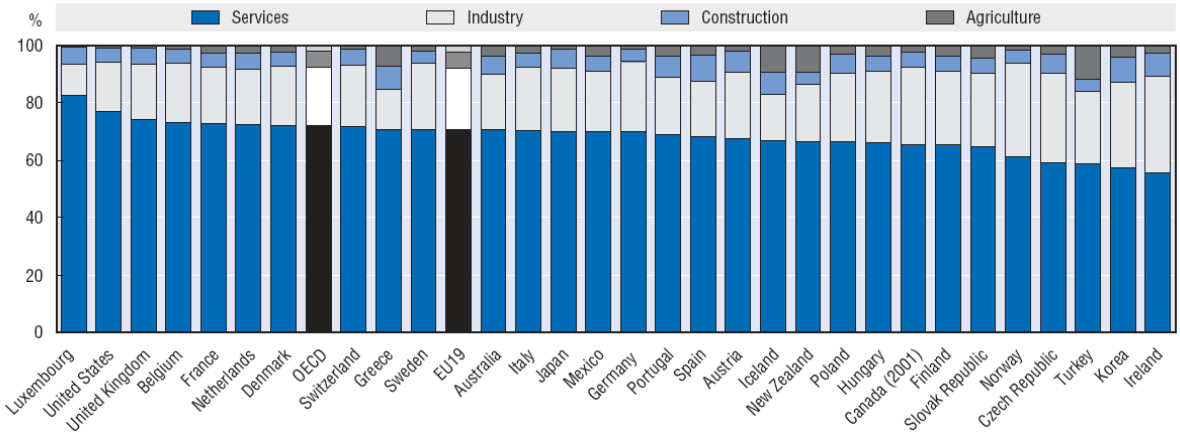
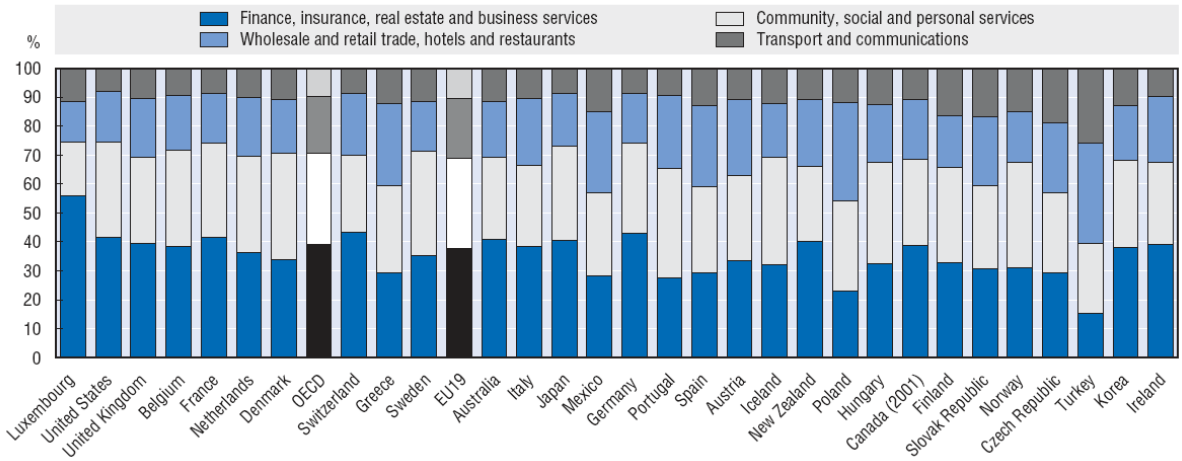


Figure 4 indicates the gross added value of service sector industries within OECD countries, by 2002 services accounted for about 72% of value added and manufacturing for about 17%. OECD reports show that the gap has widened steadily in recent years as demand for services has risen. Belgium, France, Switzerland, the United Kingdom and the United States mainly reflect a high share of value added in finance, insurance, real estate and business services, and a large community, social and personal services sector. The construction sector is also relatively small in most OECD countries, accounting for about 5.5% of OECD value added. Wholesale and retail trade, restaurants and hotels is a more important economic sector and is often large in countries with a strong tourism industry (e.g. Greece, Portugal and Spain).

Figure 4 Distribution of gross value added of the services sector, 2002



[1] Source: *OECD Science, Technology and Industry Scoreboard 2005 - Towards a knowledge-based economy, p.168-9.*

Appendix

IV: Business challenges for service research

The business section of the symposium identified five specific challenges for service research:

1. Understanding service systems

- Establishing a language/taxonomy for service systems and value propositions;
- Developing and using systems architectures;
- Understanding the role, sources and use of data in service provision.

Business-academic collaboration is required in service research, but lack of a shared language that is both relevant to businesses and rigorous to academics slows progress and makes collaboration difficult. Measurement of productivity and quality is more difficult in service businesses. The measurement challenge leads to difficulty in establishing appropriate service level agreements and aligned incentive in a service supply chain and in eSourcing relationships.

2. Business issues

- Determining the nature, the function and structure of service contracts;
- Establishing new legal requirements; Establishing IP models;
- The business case for service systems and value propositions.

Understanding business models and how margins evolve over the course of a service life cycle and a product life cycle needs to be better understood. Understanding and developing appropriate service business models is difficult, so creating business cases for services, justifying investment in service and decision making may be more difficult.

3. Developing new and better types of service

- Innovation – speeding the new service introduction (NSI) process;
- Service design, including new types of service systems and value propositions;
- Defining and developing tools to improve service.

Most businesses emphasize cost cutting more than revenue growth, so service research has a bias to productivity, rather than customer satisfaction (quality) or new market segments (growth). Traditional businesses are concerned with standardization, which may lead to a commodity trap. Often customization and personalization can be high margin, but hard to scale up. The challenge of consistent service delivery when scaling a service business needs to be addressed.

4. Organisation and people issues

- Service organisation structure and behaviour;
- Migrating to a service culture, with better methods to create deep customer insights;
- Recruiting people, getting the right skills.

Businesses describe hiring new science, engineering, management, and design graduates with limited service thinking and service mindset. Service-oriented people seem to be difficult to find, and because they have many job offers, even more difficult to keep.

5. The service environment

- Managing the transition to a service organisation;
- Developing services based on products;
- Reducing the complexity of services and their delivery;
- Providing service in a changing environment.

Businesses report difficulty in transforming from a product to a service business model (servitization and service-mind set). Part of the transitional challenge is being able to articulate what a service business looks like and what its constituent elements are. Creating a language that can be used to define and describe service businesses, their component elements and how they fit together is seen as a significant challenge.

Appendix

V: Global trends and service innovation

An understanding of global trends that entail service innovation, and the areas that challenge sustainable improvement efforts, should be a key element guiding industry and government investment policies. They should be taken into account by service system practitioners as they develop action plans for services development and innovation.

1. ***Demographic trends and sustainability concerns will drive increased demand for public sector service activities and service research related to quality of life and environmental problems.***

   Demographic trends toward a more aged population in many developed countries, a younger population in many developing countries and more immigration between countries will continue to drive demand for healthcare and investment management, education and employment experience, as well as government and local community service activities. Human impact and sustainability concerns will increase energy-related (such as transportation and construction) and environmental service activities.

   Society is changing; in developed countries, there are growing market segments with rising expectations of service quality, along with aging populations. Different demographic segments will demand different levels of service, be they low-cost service or premium high-cost high-value service. Service design and experience will depend on individual and cultural differences. Research needs to address the balance of social, technical and economic requirements of customer segments.

   Sustainability concerns, such as the need for CO_2 reduction, increasingly affect the design and provisioning of service. Service innovation increasingly must achieve high-productivity and high-quality service within sustainability targets. Regulatory compliance issues will drive both legal and new sensor-based monitoring service activities.

2. ***Trends in business and technology (globalisation, automation, self-service technologies, 'service industrialization,' the 'servitization' of manufacturing, and the continued rise of the type of service system known as the globally integrated enterprise) will further drive demand for business transformation service activities, and service research to improve productivity and revenue growth consistent with a triple bottom line of people, planet and profit.***

   The rise of the globally integrated enterprise, including franchises as well as other global service providers, will continue to drive demand for ICT infrastructure improvements that allow value to migrate to the more knowledge-intensive business and professional service activities built upon the infrastructure service providers. The need for more business-to-business (B2B) service research, including global logistics and lean operations is growing. The trend toward self-service technologies and kiosks that provision service locally, but are often deployed and maintained by globally integrated enterprises will drive demand for in-the-field maintenance and security service capabilities.

   There is an increase in globalisation of service activities through off-shoring and regional specialization and competition is growing across highly diverse cultures. Economic linkages across the globe are not new but they have intensified and accelerated over the past decade. Countries are experiencing growth in the contribution of service activities to their national economies, hence research needs to have global application, be cross cultural, transcend traditional economic barriers and keep pace with the speed of change. Because of sustainability concerns, globally integrated enterprises will increasingly be held to a triple bottom line (people, planet, profit, which may all be summarized in a fourth "P" predictability of sustainable value co-creation).

   Technology is becoming more pervasive and ubiquitous, IT-enabled service has risen rapidly and the worldwide IT service industry is expected to increase in value from US$ 635

billion in 2005 to US$ 780 billion by 2008. More small businesses depend on technology and web service infrastructure as markets increase in complexity. The time to global markets can be instantaneous as can be on demand service enabled by smart sensors without human intervention. Research must help harness the power of ICT to design and provision new types of self-service technologies, as well as mobile phone service offerings.

Recent decades have witnessed the rise of 'service industrialization', and the growing value of service innovation. However there remains a great deal of craft-like organisation in some service industries that lack the rigour of traditional manufacturing and engineering disciplines. The growth in service activities is creating a skills gap which requires adaptive workers who change with the business; who can lead market innovation, technology innovation, and who can exploit the accelerating pace of technological and societal change. Researchers and educators must address the need for people with both breadth of understanding and depth in service industry specific skills.

3. ***Trends in internet collaboration and web-based service, such as open source software and software as a service (SaaS), continue to mature and are driving service research around business model innovation and regulatory compliance issues.***

Peer-to-peer collaboration is increasing through use of internet mediated communication and social computing tools (web 2.0, YouTube, MySpace, Wikipedia) and virtual worlds (multi-user games, Second Life). In turn this is leading to service exchanges between individuals and growth in ad-hoc service network formation. Research must recognise the extension of service provision beyond the traditional boundaries of business.

Napster serves as a reminder of the regulatory compliance issues can arise in peer-to-peer collaboration and web-based service systems. New types of service systems will explore new types of business models, and as a consequence regulatory compliance issues may arise.

4. ***Trends in organisational innovation are particularly important to service activity growth, and more service research is needed to understand the co-evolution of customer demand, technology, business models, governance, and organisational innovation.***

Analyses of European Innobarometer data indicate that a substantial share (almost one third) of service firms consider their major innovations to be solely organisational. It has long been commonplace that a large share of the benefits (value) that derive from application of IT in firms flows from the reorganisation of activities that should accompany the new technology. This has particular relevance to service sectors because many types of service until recently have scored low on technology-intensity. New IT has constituted a technological and industrial revolution in service provisioning that challenges many to consider redesigning their work practices and corporate structures in unprecedented ways.

Appendix

VI: Feedback questions

Please do not feel obliged to answer every question and feel free to make other comments that you consider relevant.

General

1. Are the aims clear and consistent throughout the document?

2. Is the structure appropriate?

3. Is the content accurate, representative and with appropriate attributions?

4. Would you like to provide any examples that can illustrate the concepts and ideas in this document?

5. Could you suggest ways to enhance the dissemination and impact of the document?

Section 1.1

6. To what extent do you agree on the driving forces behind service innovation? What other important drivers should be included and why?

Section 2.1

7. To what extent do you agree on the reasons for individuals and organisations to be interested in service systems? What other important reasons should be included and why?

Section 2.2

8. To what extent do you agree on the vision for service science? How well is the vision supported by the key questions? What other questions should be included and why?

Section 2.3

9. To what extent do you agree on the list of stakeholders of service science? Who other key stakeholders should be included and why?

Section 2.4

10. To what extent do you agree on the urgency of the call for service science? What other factors and trends would you like to add and why?

Section 3.1

11. To what extent do you agree on the foundations for the development of service science? What other key fields should be included and why?

Section 3.2

12. To what extent do you agree on the description of the knowledge gap? What other reasons do you think have caused the knowledge gap?

Section 3.3

13. To what extent do you agree on the description of the skill gap? What other reasons do you think have caused the skill gap?

Section 4.1

14. To what extent do you agree on the inter-disciplinary approach to addressing the gaps?

Section 4.2

15. To what extent do you agree on the opportunities to address the knowledge gap? What other opportunities do you think should be included and why?

Section 4.3

16. To what extent do you agree on the opportunities to address the skill gap? What other opportunities would you like to add and why?

Section 5.1

17. To what extent do you agree on the recommendations for education? What other recommendations should be included and why?

Section 5.2

18. To what extent do you agree on the recommendations for business? What other recommendations should be included and why?

Section 5.3

19. To what extent do you agree on the recommendations for policy? What other recommendations should be included and why?

Glossary

20. To what extent do you agree on the definitions and how can they be improved? What other important terms should be included and why?

Other issues

21. Any other comments or suggestions

Please find the feedback form at
www.ifm.eng.cam.ac.uk/ssme

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