

Feedback on the Discussion Paper

Summary in time order of receipt

“This is an excellent document and I commend all associated with this path breaking work. Please emphasize service business models and service value chains more in future work to improve relevance to business managers.”

- Nirmal Pal, formerly at Pennsylvania State University, USA

“I wholeheartedly support this work and look forward to future interactions with this community. ...it is contained within a larger and even more critical domain – the science of viable enterprise systems. Net value production in an enterprise derives from complex interaction among service and non-service oriented processes. The enterprise provides the platform for running the value creating applications. Service science is a key part of enterprise science (theory, architecture, infrastructure, applications, etc.) supporting the production of all goods and services.”

- Jay Bayne, Milwaukee Institute, USA

“Service economies actually consume more goods than ‘goods dominated’ economies. Service dominated economies create an opportunity to reduce their material throughput. See for example ‘Material Concerns’ by Tim Jackson.”

- Jon Cullen, University of Cambridge, UK

“A most useful report - thank you! Also, this work is highly related to the social studies of science, and in particular the notion of trading zone and interactional expertise (see Collins, H., Evans, R., and Gorman, M., 2007)”

- Michael Gorman, University of Virginia, USA

“Suggest further focus on Digitally Connected Service. Digital connection is key to improving scaling of service and service productivity and quality, transparency and regulatory compliance, and sustainable innovation. Cyber-Enabled Design of service on a Cyber-Infrastructure is critical to scaling as well.”

- Cheng Hsu, Rensselaer Polytechnic Institute, USA

“The document aims to provide a broad overview of SSME. The aims are clear and consistent throughout. There is a need for more material on service design, especially case studies as a key focus for practice and theory. Much SSME content is already included in industrial engineering tools and techniques (simulation, project management, data collection methods, demand forecasting, decision analysis, large scale system design, knowledge management, new service design, etc.).”

- Tan Kay Chuan, National University of Singapore

“This paper stimulates stakeholders to make them aware of why service science is important and how we may achieve it. More specifics would help; for example, technology introduction in healthcare requires social-organizational rearrangements. Are service systems too broad to model? Some are capital (infrastructure) intensive, some are labor intensive, and some are knowledge intensive – more categories will help.”

- Sungho Lee, Samsung Economic Research Institute, South Korea

“CMU’s eSCM (eSourcing Capability Model) focuses on the full contract life cycle view, governance, relationship, and value propositions for both provider and customer/client perspectives.”

- **Alan K Yamamoto, IBM USA**

“This document covers all areas, subjects, interests, concerns, problems of service science today. My interests are service business models in manufacturing industry, and improved sector collaborations.”

- **Tadao Sumi, Shoin University, Japan**

“I am not an expert at service science... This represents the best overview/introduction I have read. ...Let’s get to work designing the next innovative service experience!”

- **Keith Instone, IBM, ibm.com user experience design**

“If education and business wish to encourage students to study SSME, they will need to define and communicate typical post-graduation SSME job roles, responsibilities, and salaries. Otherwise students will not have the practical information they need to confidently select this discipline as a course of study over other traditional disciplines with known career paths.”

- **Kelly Lyman, IBM Research, USA**

“I applaud efforts to make ‘service science’ into a field and catalyst for progress. ‘Service’ provides context, meaningful use, and value for the products of agriculture, manufacturing, information systems, and many other endeavors. Society needs to focus on and improve the services individuals, organizations, and coalitions provide each other. It is time to develop ‘service science’ – much as it was time in the 1990s to develop ‘governmental service to the public’ – into a robust topic and focus for appreciated activity.

- **Thomas J. Buckholtz, independent consultant (former co-CIO, USA federal government Executive Branch), Silicon Valley, California, USA**

“Excellent start, but execution needs more pragmatism. Let’s keep it simple – SOA is a good starting point... Again let’s not get lost in the science.”

- **Freddie Moran, IBM UK**

“You omit mathematicians, logician, and semanticians – all of whom will be needed to formalize the integration of these many knowledge domains. Need to address service systems in which the customer is not the payee, but the commissioner – indirect service systems are complex and common. Is service system just a re-labelling of the complexity of the human element? Finally, there is perhaps great need, but little or no demand for polymaths (sadly).”

- **Richard Taylor and Chris Tofts, HP UK**

“If SSME graduates are to be truly inter-disciplinary, they should have firm grounding in human behavior, human psychology, service or system design, systems analysis and exposure to multiple application areas.”

- **Sunderesh S. Heragu, University of Louisville, USA**

“We are very pleased with the initiative... to emphasize the need for a profound knowledge base for service science... At our Institute we are developing a large scale program with industry and academic concerning service science. We fully agree with the authors that service science is an important science for the future that yet has to be further developed. Our contribution focuses on three critical success factors of building a successful scientific body of knowledge on service innovation: demand driven knowledge development, the value of a design orientation, and organization growth models. We think these issues can strengthen the ideas already posed. A Service Innovation Capability Model (SICM) could be one of the instruments developed from an interdisciplinary knowledge base to support organizations on this road.”

- René van Buuren, Timber Haaker, Wil Janssen, Edward Faber, Telematica Institute, The Netherlands

“The comparison with physics, chemistry, and biology is not appropriate, as these three are objective; service science is subjective. There is a lack of understanding about the role of human beings as a source of uncertainty in systems.”

- Rajkumar Roy, Cranfield University, UK

“The rate of breakthrough, university-spearheaded innovation in services management and marketing has been slowing. Universities in general, and business school in particular, have become too entrenched in their disciplines with an increasingly narrow focus, often on niche research topics, to drive true innovation in management thinking. The rapid advance of the service economy with increasingly complex systems might just offer this opportunity to define new frameworks, thinking and even new vocabulary, and break free from the departmental and faculty-centric thinking in our universities. Perhaps, SSME can become a catalyst for a paradigm shift in service research, education and management.”

- Jochen Wirtz, National University of Singapore

“Is a service system more, less, or equal to an economic system, i.e. are service systems a superset, a subset, or the same set as economic systems?”

- Ying Tat Leung, IBM Research

“One of the biggest opportunities for service innovation in the future years will be the intelligent use of data. There is an incredibly huge and constantly increasing amount of gathered digital data of almost every aspect of our business and private life. Using state-of-the-art statistical methods and modeling, this information can be transformed into better service, improved quality and reduced costs.”

- Christoph Heitz, Zurich University of Applied Sciences, Switzerland

“This is a great first step in trying to move the academic environment in the direction of service science and being relevant in the 21st century. It has already stimulated much discussion on campuses worldwide, and has provided direction for implementation of new programs. However, I am concerned that this document has a heavy engineering slant to it. It seems to come from a supply viewpoint, and tends to leave out a focus on the customer. It is the customer that should be the driving force behind all of this.”

- Dwayne Gremler, Bowling Green State University, USA

“This is a very good and important document in order to promote the service science discipline, which may represent a major part of service research. The economics, economic geography and international trade dimensions of services should be reinforced in the document.”

- **Luis Rubalcaba, University of Alcala, Spain**

“Overall, the paper is a highly pertinent and progressive. I agree with the need for service science as an interdisciplinary approach that leverages collaboration across stakeholders. Service science is evolving from a business and societal need for understanding and solving increasingly complex problems. The problems are not being solved in the most effective manner as the talent is not equipped with the right set of competencies to address new challenges. Higher education systems, as the producers of talent, need to wake up to this call and work collaboratively with industry and policy makers to develop ‘adaptive innovators’.”

- **Rahul Choudaha, University of Denver, USA**

“Comment 1: There exists already quite a lively debate on bringing together research on product and service innovation (see Gallouj and Weinstein, 1997; DeVries, 2006; Drejer, 2004; Howells and Tether, 2006). Especially some effort has been placed already to develop concepts for studying innovation within a unifying framework rather than applying service or product specific models. A short acknowledgement of these efforts would help recognizing this emerging stream of literature which takes place for instance in journals such as Research Policy.

Comment 2: Concerning the need for interdisciplinary research: during the second annual Product and Service Innovation Conference in Park City, Utah, in February 2005, scholars argued that an urgent need for future research in innovation studies would be to close the gap between the, up to now still separate, research streams within the disciplines of marketing and operations management (cf. Karniouchina et al., 2006).”

- **Henning Droege, ESADE Business School, Barcelona, Spain**

“This document is a move in the right direction. However, after reading the document, it’s still hard to see what we can retain as the key points. Revenue, profit, and market share and productivity are better KPIs, in contrast to other variables mostly considered as CSFs (Critical Success Factors).”

- **Diem Ho, IBM University Relations, EMEA**

“A fantastic document and great reading for those have already known about SSME. It would be helpful to re-work this into a document that could be distributed for policymakers who are not as knowledgeable about service science.”

- **Meredith Singer, IBM Governmental Programs Executive**

“One of the disciplines missing from the text is project management. There seems to be a mindset that a service is delivered by a single person. However in many industries, the service offering delivered may take many people, working for many months to define, develop and deliver. As such these service offerings are managed as projects. “

- **Paul Ferguson, IBM Global Business Services, Australia**

“Need more specific research proposals – too abstract and high level. For example, pricing service is a challenge - many want it for free. Research recommendation: service should make life easier – what are key drivers to do this? Business recommendation: what is business value - how to measure and control? Policy recommendation: policy influence understanding – what is being planned?”

- **Wolfgang Braun, META Mergers & Acquisitions**

“We all live in a world of services. As patients, clients, patrons, students, consumers, etc. we depend on the services of others for our prosperity, well being, and quality of life. Yet we lack a deeper, fundamental understanding of the configurations, relationships, and dynamics of people, technology, and resources that comprise our systems of service. In fact, despite the dramatic shift toward services in many economies of the world, service systems (such as the US health care system) could well benefit from a rigorous scientific, management and engineering approaches to improve their performance, timeliness, and ‘service.’

Further, service innovation would also benefit from a more fundamental understanding of service systems, and sustaining that innovation through education and business practices. Historically, science, engineering and management (SEM) have helped revolutionize the art of MAKING things of value. Industrial revolution(s) have occurred in a wide range of fields due to the contributions of SEM that have taken data and knowledge and transformed them into things of value that we use in our lives. Today, a similar shift has occurred, and science, engineering and management are poised to help revolutionize the art of DOING things of value.

At UC Berkeley, and at the Center for Information Technology Research in the Interest of Society (a four-campus State-funded Institute of Science and Innovation), we have invested heavily in the field of services, both in research and in the curriculum. Success will come from our graduates: We believe that the workforce of tomorrow will need a fundamental understanding of the dynamics of people, technology and resources to allow them to contribute to and thrive in a services world, and we believe that graduates of our program will work to make health care safer and more efficient, improve the flexibility and innovation of large financial houses, effectively marshal resources in times of disaster, help the poor move up the social ladder, or create new service business. Their abilities to effectively work with complexity, engineer robustness and resilience, embed adaptability and flexibility, etc. in to their chosen service systems will be the key marker of our success in their education and training.

We strongly support this effort, and we would urge introspection on the deep impact such a field can have on the fundamental aspects and systems that we all take for granted in our lives.”

- **Ravi Nemena, Director SSME, CITRIS Program, UC Berkeley**

“The document presents the introduction of SSME as it was a completely new development on the service field. Although previous efforts made by service academics and researchers are mentioned, the document requires more clarity and emphasis on the foundations of services management. A full section or chapter to give credit to pioneer efforts and contributions in different parts of the world is strongly suggested. Overall, this part of the document is rather short and shallow, and again, it has a particular focus on service innovation. When developing countries are mentioned, it only refers to China and India. However, I strongly suggest including Latin America as a different region. This is a different region which presents already a higher percentage of service sector contribution to GDP. Privatization, FDI and other factors illustrate the strategic importance of services in this region. Countries like Mexico, Brazil, Panamá, Costa Rica, for instance, deserve special attention.”

- **Javier Reynoso, ITESM, Mexico**

“Service-product is a false dichotomy; the real dichotomy is functional-holistic.”

- Tor W. Andreassen, Norwegian School of Management

“Services’ share of the global economy has grown, rising from 56% of GDP in developed countries in 1971 to 72% in 2006. Services are essential for the efficient operation of an economy, facilitating commercial transactions and enabling the production and delivery of goods and other services. As companies learn to trade products and services in new ways, often through ICT, services have become a pillar of the global economy. The share of workers employed in services is now over 70% in most developed countries and catching up in developing countries. Services have been the source of most job growth over the last decade. The service sector in the US represents the largest portion of employment and economic output – accounting for 93 million jobs and nearly 80 percent of U.S. private sector GDP – approximately \$8.5 trillion.

One player I’m missing here are governments as public sector clients. In some European countries governments have a tremendous influence on the GDP (sometimes up to 40%), so an enormous purchasing power which shouldn't be neglected. Governments are consumers in their own right and should seek ways to become more innovative procurers for services. As such, governments are in a unique position to support service innovation by acting as lead customers with ambitious requirements when procuring services. Governments should be encouraged to develop and share experiences of innovative procurement policies.”

- Corinna Schulze, IBM Governmental Programs EMEA

“There are some additional economic arguments to be made. Also, it is very important to highlight the importance of the resulting job creation in the service sector. For decades, the service sector's share of the global economy has grown steadily. Significant innovation, resulting in increased productivity and efficiencies occurs in the service sector. Services are essential for the efficient operation of an economy, facilitating commercial transactions and enabling the production and delivery of goods and services. In developed countries, the service sector employs far more people and creates many more new jobs than the manufacturing sector. In addition, services are a crucial component of innovation and production in a host of manufacturing industries and agriculture.

Many policy makers still have a traditional view of the economy that focuses on agriculture and manufacturing. The growing and strategic contribution of services to the health and growth of economies worldwide is not generally recognized. Research has shown that economies with more efficient service sectors enjoy higher productivity and growth (Catherine Mann, The US Current Account, New Economy Services, and Implications for Productivity, Review of International Economics, forthcoming). More research needs to be done to develop new, more robust indicators that can better capture how and when service innovation is taking place.

Innovation in services is increasingly critical to ‘global competitiveness.’ To compete in an increasingly challenging global marketplace, service innovation is critical. China has highlighted the development and growth of its services industry as one of the key objectives of its 11th 5 Year Plan (China's policy vehicle), in part, because of a desire to emulate India's success.”

- Susan C. Tuttle, IBM Governmental Programs

“Four concepts (adaptive innovator, SSME, service systems, and value proposition) need to be tied in better to address the sustainability of service innovation. Add service concept design in order to involve broader disciplines (e.g., art and design) into SSME.”

- Soe-Tsy Yuan, National Chengchi University, Taiwan

“I enjoyed reading the paper, particularly the policy implications on education and its usage in business. Needs more region specific data and roadmaps.”

- Mark Goh, National University of Singapore

“I do believe that many important business problems can be solved through an integrated cross disciplinary view of service systems. One example which comes to mind is healthcare claims adjudication. Manual healthcare claims adjudication has been an issue for many years. Contracts, which specify the entitlements of members of a health plan, have become significantly more complex since the introduction of managed care. Healthcare computer applications have difficulty adjusting to changing contract structures. So claims which the applications cannot support are handled manually resulting in accuracy issues and adding cost to the healthcare system. In the United States alone, hundreds of millions of healthcare claims are processed annually. Computer applications can be developed which automatically adjudicate most healthcare claims and respond to changing requirements.

In order to do this, the contracts would have to be represented in an extensible language which can be interpreted by the applications. Computer Science practitioners have been trained to build computer programs which are driven by structures specified in recursively defined extensible languages. But these practitioners are not normally trained in the analysis of business requirements. Information Systems practitioners have been trained in analysis methodologies, but are not normally trained in the required linguistic structures. Expertise from both of these disciplines is needed to solve the problem. It is not hard to think of other examples where the implementation of the ideas in the discussion paper, in particular crossing traditional silos, would make substantial improvements in the delivery of services.”

- Paul Weinberg, Temple University, USA

“The discussion is well written but remains too generic. For example, the definition of service systems is excellent but it includes all organized, purposeful activity; same with service systems being complex systems; absolutely right and how do we take it from there? There is a lot of work on complex systems.

I would go for a different approach and focus on some key evolving phenomena making service systems different e.g. productization and servitization; service versus product dominant logic in value creating systems; co-producing and co-creating; the revival of socio-technical systems as differentiators in service systems. This approach is more manageable and makes more sense than being all inclusive which I am afraid leads nowhere.”

- Uzi de Haan, Technion Institute of Technology, Israel

“I’ve attached a 2x2 taxonomy of service (degree of co-creation high/low and physical/informational services) that I hope can be helpful. The definition of service is too broad (includes manufacturing) and somewhat vague. I observe that ‘service’ and ‘knowledge’ are used interchangeably in the document. The growing sophistication of customer requirements is important. Everyone knows service is multidisciplinary – how can you go beyond the obvious?”

- Takashi Kikuchi, Tokyo Institute of Technology

“The paper states that a service system can be defined as a dynamic value-co creating configuration, which I view as a crucial contribution towards defining service research domain. I agree with the concept in general, though I believe that there is a need for a two-tier definition of service system: service system in the broad sense, that encompasses economy as a whole (which would correspond to the current definition) versus the service system definition in a more narrow sense, which would be focusing specifically on the service driven industries (as opposed to product driven ones). A comparison of service systems to product systems would give some further clarity to the boundaries of the domain.”

- Ivanka Visujie, Katholieke Universiteit Leuven, Belgium

“This paper quickly and cogently describes the need for and lays some of the foundation for a new field aimed at the study and improvement of service called service science. I expect it will wind up being an important and influential paper. The target audience includes educators, business-people, and policy-makers -- and it has something for each of them. For education, it describes the need to create a new kind of cross-disciplinary education aimed students who will work in service jobs and who will be particularly adapted to innovate in service. For business, it describes the clear and present need focus on service innovation in terms of R&D and workforce. For policy, it describes how governments must take notice of the need to cultivate service innovation or risk irrelevance. For all, it contains concrete advice for how to succeed by creating a culture that values service innovation.

It is a great paper. My detailed comments follow in the sections below. Mainly I quibble with some terminology, suggest that real citations or references are needed throughout (somehow), and discuss how service science is like a perspective that has us consider the world in terms of service systems but that there is little necessity to the commitments we're making here -- these are empirical questions that the paper sometimes takes as fact. The long list of service disciplines may also be confusing and annoying to some.”

- Paul Maglio, IBM Research

“The major points in the body of the document as well as the recommendations match well those coming from other similar meetings. There were two NSF symposia past summer - one in Portland and the other at Penn State. The report seems to match the major recommendations in terms of the requirement of ‘T-shaped professional’, new education programs and funding opportunities.

I think a major component that is missing in this document which is the management of technology. One of the meetings in Portland was focused on this topic as technologies start merging. Management of technological innovation has been very critical in the manufacturing industry. The experts agree that it is even more important in the service sector due to the increased human interaction.

For example, my personal interest is the health care service organizations. If one looks at this industry closely, it is seen that the innovation diffusion coefficient has been really low. The complexity of the system is one of the factors that influence this. Another factor or factors are the doctors themselves. The complexity and the risk of their job prevent them from adopting technologies faster. It is an area that needs a lot of attention so that we can solve the mysteries of those factors hindering innovation in this complex service system. It is getting even more complex as technologies such as nano, bio and information are converging towards smart drugs, or remote diagnosis.”

- Tugrul U Daim, Portland State University, USA

“The main missing idea here is that you neglected the Media industry with its all new coming innovative services, such as ‘Convergence between ICMT and Media’. All my recommendation will concentrate on that vision plus other issues related to service life cycle (requirements engineering). This paper could include Media whenever ICT is mentioned as audiovisual content for broadcasters, filmed entertainment, interactive entertainment and music should consolidate with ICT (especially, IPTV, iTV, mobile phone, PMPs, VOD and Webcasting). For example, the phrase ‘provider-customer’ everywhere in the document could just as well read ‘provider-customer/consumer’. The word customer all over the paper may be replaced by customer/consumer. How do customer/consumers access service in an easy and friendly manner? Reachability is an important characteristic of service system design. If you cannot reach or access the service system, it cannot benefit you when you need it. The discipline of Requirement Engineering (RE) is not listed.”

- Abdelrahman Saad, Egypt-Mediasoft, Egypt

“Very good initiative aimed at better and far more comprehensive understanding of service systems and in particular service innovation. Main observations: I believe that even more radical focus should be given to developing human resources with knowledge and skills that would enable them to understand better service systems and assume service mindset. As clearly pointed out in the document the stakeholders in service science have problems in understanding each other and I believe that some of the opinions/comments on the document will fully reflect this dichotomy. My comments are no exception to that, still I hope they can contribute to improving the document.

The most general comment I can make concerns inclusiveness of the service science concept that is put forward time and again in the document. However, reading the whole document does not give me confidence that this is the case as there is a focus on marketing & management (MM) issues. Other disciplines such as economics are mentioned several times, but do not seem to be on equal footing with MM. I guess that this reflects to a certain extent the structure of symposium attendees and other specialists involved so far by discipline and by country of origin (UK, USA, Canada, with the exception of German participant). Since the document invites ‘an inclusive global discussion’ this could be achieved in the future by attracting participants from different disciplinary and geographical constituencies.

There is also a need to balance the role of different stakeholders as the document focuses on business stakeholders, while public sector organisations are put aside, except for universities and research institutions. Even the business stakeholders are mostly associated with big, complex service systems. What about SMEs that dominate the company landscape? In order to contribute to understanding of service system a box could be added in the document exemplifying a case of a simplified service system that includes different stakeholders participation in efficient functioning of the system. On the other hand the involvement of people with different discipline and skills could also be added to the case. Besides national funding institutions for research also international funding institutions, such as for example EC; OECD; ECB; WB, EBRD could be added as potential stakeholders in supporting interdisciplinary research of service systems. On the EU wide level there exist a set of documents, programmes and projects concerning service innovation, which also include methodological and measurement issues (<http://www.proinno-europe.eu>). There is a need to explore how Community Innovation Surveys could be complemented with SSME concepts. Appendix I needs some refining and supplementation. Basically, history and future of service research are biased in favour of marketing, organisation.”

- Metka Stare, University of Ljubljana, Slovenia

“Whereas the need for more business-to-business service research is mentioned in the Appendix, the main text appears to emphasize business-to-consumer services (and is persuasive, given that limitation). The report thus runs a risk of conserving present orientations in services research and education rather than exploiting and supporting the great change in how industry operates. If major themes in B2B services had been more prominent in the text, it would have been easier to recognize the importance of innovation in relation to economic growth and sustainability; in effect, the report does not highlight innovation to the extent that its title promises. The rising level of education around the world (which contributes to specialization) needs to be mentioned more. A stronger text could have been based on an analysis of government policies in countries that do support services research actively. Nevertheless, this is a stimulating initiative!”

- Jan Bröchner, Chalmers University of Technology, Sweden

“We need to be explicit about and distinguish two different views (A: Vargo & Lusch, service = activity) (B: IHIP; services = not product)... We should also establish the link to SOA and BPM when talking about service systems.... With regard to our Karlsruhe Service Research Institute KSRI (www.ksri.uni-karlsruhe.de), it may be worthwhile to mention the idea of an ‘industry-on-campus’ center to underpin the effort to collaborate across boundaries. Germany and many other countries already did work towards creating T-shaped professionals, though not service-specific ... The European Service Directive can serve as an example of governments' efforts to promote services (ec.europa.eu/internal_market/services/services-dir/index_en.htm).”

- Gerhard Satzger, IBM / Karlsruhe Service Research Institute, Germany

“The statement that a service system is a complex system that interacts in non-linear ways is true but should be described in more detail for the full impact to be adequately understood and appreciated. Again, examples would help. One example would be a hospital or other type of health care provider: multiple service providers (doctors, nurses, administrators, insurance, food, waste management) converge in a hierarchical manner on a single point to provide service to customers (health care). The quantity and quality of service vary dramatically based on the vast number of permutations and combinations of linear and non-linear interactions of the large number of service providers, the technologies they use, different business models they employ, and the changing demands of the customer over time (e.g., critical care to outpatient care). The challenges of innovating healthcare services, managing the service delivery, and ensuring service quality become apparent when the quantity and potential range of each of the input variables are made clear. Some of the special challenges of service innovation -- as opposed to product innovation -- become apparent when a map is made of the providers and the range of technologies and business models available to them over the course of the changing consumer demand.”

- Robert D. Shelton, PRTM Management Consultants, USA

“From my perspective, this report serves as a very good foundational document. Generally speaking, it might be appropriate to add more examples to illustrate the breadth of services considered for this discussion. What are appropriate measurement frameworks for services? It would be helpful to consider adding a breakout of new style services offerings vs. the traditional service industries, for example, Amazon (new) vs. financial services (traditional). Doing so will highlight the acceleration and recent proliferation of service concepts vs. the longstanding ones. Consider adding a breakout of service revenue within the business sector as a percent of total revenue. (SSPA has the breakout for s/w and computer electronic industries; it illustrates the significant and unrecognized revenue contribution from services in traditional product companies.) It's unclear why software metrics and product & software architecture are included. Calling out software development -- and not product development -- does not seem logical. One suggestion is to expand service management to include actual "service delivery" - not just supply capacity management and demand management. Service delivery is the actual provisioning or delivery of a service to the end customer; it seems to be omitted in the discussion.”

- Rachel Berg, PRTM Management Consultants, USA

“China has set service innovation as one of major goals of 11th Five-Year Plan. The mega-project Research and Development of Service Integration Framework is a key project of 11th Five-Year Scientific and Technical Supporting Programs, conducted by Beijing University of Posts and Telecommunications in close collaboration with industry and government. The project aims to integrate replicable e-service resources among various domains in service industry and moreover the collaboration of academy, government and industry also seeks for an insightful solution to maximize value exchanging in service systems in an inter-disciplinary context. Our future goal involves service-related higher education in undergraduate and graduate level in China.”

- Pei Li, Beijing University of Posts and Telecommunications

“It's not easy to comment because of the abstractness of the content. More examples would help. Quality needs to continually go up just to keep up with inflation of expectations. The idea of making the students have the skill of service science is good. But specialists or professors don't have enough time to gather and discuss, so before gathering students, organizers who think we should be able to do something interesting have to have the case of success of service science. Addressing the knowledge gap and the skill gap are important, but at the same time I think addressing generation gap and difference of the environment of childhood are also important. Thus thinking of service, the important thing is not only the integration of the specialties, but issues of fairness or access equality.”

- Asako Murakami, University of Tokyo

“A very good paper. Glossary and appendices are necessary and clarify. Extensions such as SSMED or SSMEA are too long; service science should be the target, and enough. Also a simple/simplified service system definition will be necessary in addition to the right and long one for illustration purposes to make it clear. Governments should put more effort on deregulation activities, deregulation not protectionism. As it is known services are embedded in national social processes, roles, rules and conventions. Public sector produces a lot of services in Europe. Also standards play key role. In my opinion, today's citizens, the younger generation, are more willing to accept, buy and pay for services than their parents. So the time is favorable. Service science is required, service development is in many cases continuous improvement, and without real knowledge (science) and skills is difficult or even impossible.”

- Pentti Vähä, VTT Technical Research Centre of Finland

“There is also the need to define 'service science' better. Service management and service engineering are clear, but calling the service domain a science needs a better explanation. Service is an applied science, but calling it an applied science confusing it with service engineering. Computing has a similar problem, but there is a clear delineation between computer science and computer engineering. Computer engineering is concerned with the implementation of computer science and computer science is fairly well defined. This document does not sufficiently define the science of services to do the same for this domain.

Some of key questions about services include ways of reconstructing the dynamics of service systems from data and ways of characterizing the emergent properties that arise from the combination of the various building blocks. We agree with the foundations for the development of service sciences listed in the document. In developing the Service Systems Engineering program at Michigan Tech, a key challenge was to define and implement courses that represent the common core of the field.”

- Leonard J. Bohmann, Michigan Tech University, USA

“Need ‘adaptive and proactive innovators.’ Seems to be the intersection of project management, complexity theory, and open innovation. Project management website (<http://www.pmi.org>) has information about a shared body of knowledge. Reading the document, a sentence came up to my mind: ‘Service innovation: where science meets art!’ This is because the creativity that is found mostly in art seems to be increasingly important to ‘technological’ services (i.e. services using some kind of technology, now mainly ICT technologies). My research is now about the transformation of the traditional telecommunications operators, with special focus on BT. And this transformation is fundamentally about service innovation: how to innovate faster in order to (co-)create better and cheaper (or more affordable) services? BT is now deploying its BT 21st Century Network, which is a platform that will allow BT to develop new services faster and more effectively, and co-create services with third parties (in a more systematic way). BT Operate and BT Design are the new divisions of BT focusing on service innovation. And other major telecommunications operators like Deutsche Telekom, France Telecom and NTT are moving somehow to this concept of having an all-IP (Internet Protocol) network/infrastructure to foster service innovation.”

- Carlos Sato, University of Sussex, UK

“Services undoubtedly account for a significant proportion of GDP and employment in the worldwide economy. Consequently, as the paper cogently argues, there is a pressing need to build specific knowledge about the management of services. Nevertheless, in light of the business diversity within the service sector, it is not clear what the specificity of the field of ‘Service Science’ itself might be. Such heterogeneity is to be expected from any sector that represents such a large part of the world’s economy. Yet, it poses great challenges to the academic and managerial communities in the process of identifying and sustaining the discussion about ‘Service Science.’

The paper pertinently highlights the many advances made by academics in the field of management, which for the most part address specific elements of service-related economic activity such as customer psychology, technology management or issues related to human resources. Underlying this discussion is the critical need to agree over the precise scope of areas of knowledge such as ‘service systems,’ ‘service science’ and ‘service innovation. The lack of such definitions combined with the heterogeneity of the service sector makes it difficult to specify the common elements of service activities which make them a coherent unit of analysis. Thus, there is much room for improvement in defining, organizing and grouping the various domains of knowledge related to the management of services. Such clarity in the definition of basic concepts would not only make the present document more accessible to readers unfamiliar with the service-dominant logic, but would also be an important first step in strengthening the argument about the increasing importance and presence of service activities in the whole span of businesses in general.

While the burden of clarifying definitions and developing general concepts falls mostly on the academic community, the input of practitioners should play a critical role in the discussion at hand by providing insight into the specificity of particular service activities. For example, the field would benefit immensely from better illustrated and more detailed definitions of service skills. The ‘adaptive innovator’ described in the paper will, by definition, be involved in situations and decisions which are multidisciplinary by nature. Thus, before we can effectively bridge the existing ‘skill gap’ we need to address questions about power structures, decision-making hierarchies, employee empowerment and employees’ scope of action.

The field of ‘Service Science’ is craving for increased interaction among various domains of work. Collaboration and coordination within the academic community and between academics and practitioners will be critical as we move forward.”

- Philip Moscoso, Alejandro Lago, Paulo Rocha e Oliveira, and Marlene Amorim, IESE Business School, Spain

“The term "service system" needs a clear definition to delineate it from "economic entity". Innovation is not a simple process, but involves risk-taking and failure - thereby clashing with typical measurement systems in organizations. With regard to service innovation I would suggest references to previous work, and some examples (e.g. end-user auctions and peer-to-peer VoIP as service innovations).”

- **Andreas Neus, IBM Global Services, Germany**

“I really like the paper and think that it helps move this new initiative forward. Thank you. I would like to network with people that are trying to move forward with Service Innovation especially in governments. I'm happy to share what I have been trying to do with the U.S. Federal CIO Council and networking Communities of Practice. The document should emphasize enterprise architecture and communities of practice.”

- **Brand Niemann, U.S. Environmental Protection Agency**

“The success of SSME is a key to improve service performance as well as service qualities and values (include "quality management (1,2,3,4)" at p8 list). It is important to recognize that service systems are not consisted from only technologies, but methods to enable technologies, management, and social knowledge. We need to include these aspects, and integrate them to service systems. Technologies can be created by technical community, but it always needs customers who utilize them to create and realize their values.

Things around technologies are created together with various members, such as customers, technical and business professionals, and researchers. Roles of service researchers include not only create new technologies, but abstract created values in service activities and formalize them. Since SSME researchers extend and transform their research areas, so that its supporting environment, such as its academic and business organization and management system, also needs to explore.”

- **Yuriko Sawatani, IBM Service Research, Japan**

“Service science should consider standards associations as stakeholders. The rights of the individual need to be considered in service system design.”

- **Syamant Sandhir, Futurescape, India**

“Industrial service (e.g. preventive maintenance based availability service) of manufacturing companies is creating added value for the customer by focusing on selected process segment and by performing even better than the customer. This requires continuous improvement and excellence through new service innovations. This is not possible without thorough understanding and continuous monitoring of the life cycle requirements of customer's process and values. Understanding all aspects of psychology of customer's service experience, values and full revenue model is prerequisite for successful life cycle industrial service business. Emotional factors are strongly emphasized. The value of services has to be made so simple to understand that they are easy to buy. Visualization and high touch are important.

Manufacturing companies, which are expanding their product offering into the field of life cycle services in the customers' facilities, are facing increasing complexity when executing continuous business transition. Service production is decentralized: process control, design and information management are more challenging in the network of customer, partners and subcontractors. In order to achieve fluent life cycle business transition and maintain competitiveness, it is necessary to mould the service innovation process into the customer's process.”

- **Vesa Salminen, Lappeenranta University of Technology, Finland**

“I provide as a separate open PowerPoint file the BÉSAME architecture that we have designed and are using for developing the specific contents and learning instruments and strategies for our new master on SSME. This work is being undertaken jointly between UOC and IBM-Spain. Many people are already prepared, at least partially, as service adaptive innovators. Rather than a completely new paradigm which needs a big effort to be learned, the service mindset and service education can be presented as an important and strategic add-on or complement to prior education and competence. Congratulations for the report integrators. It must be very difficult to come out with such a quality document, from a two-day meeting where many people gave their contributions. I wished I could have attended the Cambridge meeting, but I am glad that I could comment on the report.”

- Joan A. Pastor Collado, Open University of Catalonia, Spain

“Your definition of service management in the Glossary of the Cambridge paper begins to capture the interdisciplinary essence of service management. I attempted to illustrate this joint view in my Figure 2.8 Open-Systems View of Service Operations. I rather liked your Figure 2 better because it included in addition HR and IT, functions that must also be managed. I liked your focus on service innovation and need for interdisciplinary research.”

- James Fitzsimmons, University of Texas at Austin, USA

“Mention qualitative approaches (given subjective nature of value). Drivers: With increased prosperity, people have increased availability of time, money and other resources for pursuits beyond material satisfaction and higher education levels. We would say something like "Aim of service science is better understanding of the inherent dynamics of services systems, to allow for more informed strategic choices (instead of the "simplicity" mentioned in current version) and more effective tactical implementations (instead of "complexity" mentioned in current version)." Why now: (1) Environmental crisis (need more emphasis on low-material-and-energy intangibles), (2) Growing worldview gaps (integrate BOP 1 billion with rest of world; and here-and-now-materialism versus material-denial-and-spiritual-afterlife societies; can service science mediate?). Value-creating resources - be careful given customer-created value (only value in pairs, not in things). Soft skills needed might include EQ training, meditation and other forms of self reflection and self awareness. Be clear about what is meant by "entrepreneurial" – is this starting new companies or rather new ideas within large companies, or both?”

- Yoshinori Fujikawa and Carl Kay, Hitotsubashi University, Japan

“I believe the paper forms an essential basis for an explicit expansion from the present resource-focused viewpoint to a system-oriented, interdisciplinary mindset within education, business, and policy. As a consequence, on top of current activities within specific domains, models, methods, tools, and of course people will be developed in order to design, build, operate, use, sustain, and dispose integrative service systems. Insights across several disciplines are brought together methodically with the primary aim to systematically improve value propositions. Thus, I think, with this document, there is a chance of initiating essential work with high impact on future economies. Because of its character of “meta-ness” and comprehensiveness, the paper and the idea of service science tends to be hard to confine and thereby will evoke a number of critics. But due to a reasonable guess for an exponential growth of the variety of worldwide available service system parts as well as an exponential growth of their interconnections, the need for an explicit service science will be increasingly obvious.”

- Axel Hochstein, St. Gallen University, Switzerland

“I think the document is full of interesting concepts and I fully support the aim of this paper. It is very interesting and comprehensive. Congratulations. According to my understanding, there are several issues:

a) Services Systems may be considered as activity systems towards an objective or a function which is co-produced between service provider and customer. According to systems theory, service Systems may deal with its dynamics to create and absorb value taking into account: a) processes involved; b) the interaction between "components"; c) the "boundary" definition; and d) control and management role. I think Services and Innovation are broad concepts. It's relationship with Service Systems, too. I think that we need to clarify what kind of services and why Innovation in Service Systems is necessary? Maybe (1) to design and create new ones; or (2) make the existing ones more efficient to ensure economic sustainability; or (3) more customer oriented.

b) The document emphasizes the idea of “service design” as an engineering activity. The design of services may require the idea of how to design an activity. Therefore, maybe it's useful to think in the systemic “components” such as “interactivity design” and “co-production design” creating and exploiting relationships. If the intention is to focus on IT Services, recent taxonomies in Services (see Link and Siegel, 2007) show: supply-dominated; production intensive, science based and engineering services. All services may fit into this mindset? All services can be designed with these principles?

c) At an operational level, and according to my research, service managers are concern about how to fill the gap between ex-ante expectation and ex-post customer satisfaction based on value for money which implies the appropriate dynamic design of resource allocation and mobilization in order to keep services a profitable business.

d) I think also that literature recognizes the Services are defined by its intangibility, simultaneity, specificity, interactiveness, level of standardization vs. heterogeneity (or variability) and perishability. In consequence, I see Service Systems as Information Systems where one key resource is information but also the knowledge and criteria to act according to information involved and exchanged. I would like to see more stress in Information Systems for that reason.

e) Service Innovation is a much more abstract outcome than in manufacturing and difficult to measure according to literature reviewed. This I think should be present in the research agenda. Service Innovation may imply operational and strategic issues. The way that innovation may affect to previous ideas I think is a major (and exciting) challenge which I have suggested b). I think the approach for Innovation may be interdisciplinary taking into account: 1) emotional aspects; 2) expectations; 3) relationships and interdependence which may suggest institutionalization but also the idea of complexity. Therefore, I think innovation may deal with (1) social and political context; (2) culture; (3) system control (at operational and strategic levels of analysis) and (4) management skills. I would emphasize, as suggested, “service levers” such as relationships, knowledge and customer interactions.

f) I think also that there is the need to include the myriad of potential workers in service systems both “white” and “blue” collar. In addition to that, I think the document should take into consideration the problems related with people mobility and off-shoring, like the Service Directive issued by European Union this year and how affect how service employees may work across countries.”

- Javier Busquets, ESADE Business School, Spain

“T-shaped professionals need to be capable of creating strategic differentiation and operational excellence for their service employers. Strategic differentiation emphasizes the creation of novel service packages that lead to increased sales revenues. It involves strategy formulation, marketing, design, innovation and supply chains management. Operational excellence, on the other hand, focuses on achieving short-term improvements in processes that leads to lowered cost of services sold. It emphasizes productivity, measurements, quality, operations, human resource management, engineering and computing. T-shape professionals are thus required to become familiar with the principles and methodologies of visioning the future and leading cross-functional teams to bring about breakthrough innovations needed in the marketplace as well as of applying proven engineering technologies and other tools to achieve gains in productivity, efficiency, quality and cost.”

- Carl Chang, State University of New York at Buffalo, USA

“The Service Science Laboratory should be an integral part of a SSME academic program. I see it as the bridge between the students’ academic learning and the invaluable experience they can gain from working collaboratively with a multi-disciplinary team engaged in problem-based learning. The Laboratory is the platform to provide support to the students to experiment with and evaluate realistic service system scenarios within the extent of physical (or real), virtual and simulated worlds. Seeking sponsors of these projects is great way to establish and enhance partnerships with stake-holders in the business community.”

- Stephen K. Kwan, San José State University, USA

“The document is very well designed and presents the case clearly and concisely. I appreciated the effort to clarify what the document was trying to say to each of the constituent groups: industry, academia, and government policy-makers. Service systems are defined well, together with the challenges that they face in improving operations and quality. The recommendations are succinct and well thought through. My overall view, however, is that the word ‘innovation’ is somewhat misused in the title and then throughout the document. While the demand for service improvement is clearly recognized, it is ‘innovation’ that is proposed to address these challenges. To me, innovation is more directly tied to the development and initiation of NEW services. What this document is actually talking about, in my view, is addressing the need of the service sector for operations and quality improvement, in addition to continuing innovation in the sense of developing new services.”

- Louis E. Freund, San José State University, USA

“An issue that must be explored in a service-based economy is the impact on intellectual property (IP) rights. One might argue that IP as it relates to services is more about execution (people, process and culture, etc.) than has been the case in a product-based economy, where protecting design features and functionality is critical. To some degree the traditional thinking about IP may be slowing necessary value creation and progress in a service-based economy where the “ability to execute” becomes more of the differentiator than the idea of what to execute on. For business, the need to create a services R&D function has become as critical as it has traditionally been for the product side of the technology industry and will require us to develop business models to quantify the economic impact of service quality. For example, the impact of quality investments on service economics and, as applicable the economics of the products that the services are meant to address.

The absence of these models is a major inhibitor and unless generated will no doubt restrict the funding of service research and operational improvement/innovation. Such models are made more difficult by current financial reporting practices which place product and services P&L in different silos disconnecting the cost of the investment from its benefit. Once complete, these models must be shared with the financial and shareholder communities to create the needed ‘air cover’ which permit executives to justify the optimal investments in service.”

- JB Wood, and Tom Pridham, Service Research Innovation Initiative

“This is a fabulous beginning to standardizing the language and nomenclature of service. As a provider of software components, we always struggle with a common set of designations, labels, and identifiers when conversing and communicating with our customers who are also software developers. Because they are in specific applications and industry segments, they have their own way to describe like concepts. Establishing an agreement on the standard services language is highly important. In addition to our commercial business, we are also growing our own resources through relationships with Universities and hiring Interns/Coop students. This is one area in which I will experiment with developing adaptive innovations for the rest of our corporation. Students of today are savvier when it comes to service systems than I was in the 1980’s. Also, to communicate the “services innovation” message, we will need more facts and stories. Graphs with data help tremendously - quick summary bullets help fast paced business professionals to get the point critical in this quest.”

- Marshall Lee, Spatial Corporation, USA

“This paper places significant emphasis on service systems, rather than on the service itself, which is the driver of the system. Consider: service concept -> service process -> service system. How one defines the service delivery process determines how the supporting service system is defined. Technology, especially IT, has enabled businesses/ organizations to more broadly define or expand the scope of the service delivery process (for example, service business processes), which now not only cross the traditional functional areas within an organization, but also often cross organizational boundaries. As a result, the boundaries that define a given service system are determined by the scope of the service delivery process that the system supports. It is the transdisciplinary nature of the service delivery process that requires complex, transdisciplinary service systems to properly support them. (At the Frontiers in Services meeting, Bo Edvardsson stated that the first step in developing/ innovating a new service is to define the service concept. This is followed by designing the service process that ‘operationalizes’ the concept, which in turn is followed by developing the service system that is needed to support the process. Thus: service concept -> service process -> service system.

I find some confusion throughout the paper in the use of the words ‘sustain’ and ‘sustainability.’ I think you need to make a stronger, clearer case for service innovation. The combination of the globalization of business, which has shifted the power in the market place from the producers to the consumers and consequently driven down profit margins, coupled with the growth in services in all corners of the world, has created a demand for service innovation with the goal of increasing the customer value proposition.

Profit is discussed here several times as one of the goals. However there are a large number of non-profit services including governments, healthcare, education, NGOs, etc. that do not have a profit motive, but nevertheless will benefit from service innovation.

The paper suggests that the world is actually one interconnected mega-service system. Although this may be true, it does not necessarily provide the manager at the individual organizational level with specific guidelines for managing his/her organization (not unlike the study of macro economics provides minimal insights to managers today). Thus service managers and service designers need to define the scope of the service they want to provide as a service (delivery) process (or business process). Once the service process has been defined, the next step is to define/ identify all of the different elements of the service system that are needed to support the process.”

- Mark M Davis, Bentley College, USA

“Generally, the paper gives a good motivation why service science is an important research discipline. In this context, the paper does a good job in arguing why service science becomes particularly relevant nowadays. We think this is quite important since services are of course not a new concept and have been a key business activity for centuries. In order to improve the readability of the paper for an audience that is not familiar with the topic, we think it is indispensable to make statements clearer using more concrete definitions of terms and some examples. Currently the paper is written on a very abstract level and many statements are rather hard to grasp. It should become clear for the readers that they are already part of many service systems. In addition, we think the audience would appreciate more discussion about how a service-led economy may look like in future. One example could be a discussion about how services may change the way companies work.

The paper does a really good job in motivating why we need to increase investment in the service science field. It gives clear recommendations what companies, universities and public bodies should do to face the future challenges. Perhaps the point would be even clearer if consequences of not addressing the issue were discussed in more detail.

1) Markets and particularly financial exchanges are good examples for service systems and show how different kinds of services can be composed to provide complex services. In this context, engineering each individual service requires knowledge about several different disciplines. For example, when designing allocation services for an exchange - for trading floors as well as for electronic platforms - one has to consider economic properties such as incentive compatibility, technical aspects such as computational tractability, legal regulations, social as well as psychological factors, etc.

2) More and more complex software systems are built using service-oriented architectures. To develop middleware services for such architectures an interdisciplinary mindset is required. While the software developer of course requires appropriate software engineering skills, she/he also requires in depth knowledge about the legal requirements underlying the contracting of services, about the economic properties of service sourcing mechanisms, etc.

Examples of interdisciplinary research: The Thesus project (<http://theseus-programm.de/about-theseus>) is a research program initiated by the Federal Ministry of Economy and Technology, with the goal of developing a new Internet-based service in order to better use and utilize the knowledge available on the Internet. The courses on ‘Industrial Engineering and Management’ and ‘Computer Science’ integrate traditional engineering methodologies with economics, management and informatics in order to realize the idea of T-shaped skills. Complementary to this, the ‘Information Engineering and Management’ program focuses on an interdisciplinary view on computer science, economics, strategic and operational management, and law. The goal of this program is to organize the usage of information as an economic good and competition success factor.

To expand the existing programs towards a more holistic view on eOrganisation and service engineering, there will be two new industry sponsored professorships "Service Innovation & Management" and "Economics and Technology of eOrganisation". We plan to use the document as a basic reading in courses such as service innovation and management. One of the fundamental questions that we think is not perfectly answered by the document: Is there really a need for an integrated theory? Why is it not sufficient to have several (not necessarily coherent) theories available that give answer to concrete problems? It would be nice to mention problems that cannot be solved without a single integrated service science theory.”

- Rudi Studer, Christof Weinhardt , Steffen Lamparter, Benjamin Blau, Universität Karlsruhe, Germany

“A key thrust of service science is to raise awareness for research and development collaboration for services, in particular between service businesses and academic institution. This collaboration, however, faces specific challenges that are currently not addressed in the paper. Research and development on services that are co-produced with customers is difficult to conduct separated from the field or customer using the service. Research activities may thus need to become embedded into the delivery of services to customer. Such a deep integration is likely to require social capital between an academic institution and the service firm. Given the short history of service research, these strong links may not yet exist.

Simultaneously, the integration of research into service delivery may require greater flexibility on the part of the participating researchers. Ideally, researcher can be seconded to service projects in order to facilitate the transfer of knowledge between service professionals and researchers. This underscores the need to develop innovative forms of research collaboration for service research that seek to maintain long-term relationships and provide greater flexibility in terms of job assignments.

I agree the drive towards an integrative qualification though I doubt that this can be achieved without prior integrative research that identifies the relevant intersection of concepts from related-disciplines or that can even build on true interdisciplinary research results on a theory of service systems. Just connecting teaching from relevant disciplines is certainly insufficient as the integration then is left to the individual student.

I would like to see a Master of Service Engineering and Management that is as well-respected as today MBA programmes are as a professional qualification for leadership roles in organizations.

Moreover, many service organizations in traditional industries still lack the acceptance of academic qualifications. More advocacies for academic SSME qualifications is thus necessary outside knowledge-intensive service businesses such as ICT, financial services, and consulting. Service research and innovation may need new forms of collaboration between business and research to ensure mutual transfer of knowledge and dissemination. In particular, secondments from business into service research projects and from service science researchers into business projects needs to be facilitated (cf. Böhmman, T., Jahner, S., Krcmar, H. (2008): The perspective of informatics. In: Stauss, B. et al.: Service Science: Fundamentals, Challenges, and Future Developments. Springer: Heidelberg, New York, pp. 149-154).”
- **Tilo Böhmman, ISS International Business School of Service Management, Germany**

“One area that I have an intense passion - you covered - but would like to advocate is governance (organizational structures) that best supports service systems. Also, at my university we are moving the operations course to a service focus - driving from the quantitative side will be a most effective approach.”

- **Tom Griffin, Nova Southeastern University, USA**

“The aim of the paper can be made clearer by giving more information about the role of service innovation in organisations.”

- **Lorna Uden, Staffordshire University, UK**

“This well written and well structured document with clear goals (more adaptive innovators, more integrated service systems research and creating awareness about this in policy circles and among other key-stakeholders) comes timely. Managers, entrepreneurs, policy-makers and academic researchers are ‘discovering’ one by one the service innovation theme and increasingly seem to understand that service innovation will drive strategic renewal, competitiveness and economic growth (as much as even more widely affecting welfare and well being of individuals). The paper explains especially the shift that is needed in and between the various (silo-ed) disciplines to ultimately contribute to the understanding of service systems and the development of an interdisciplinary Service Science.

Nevertheless, some areas need to be the basis for further discussion and debate:

(1) The paper suggests that it is feasible to create a grand unified theory of service innovation and service. We do agree with the need for more integration and interdisciplinary collaboration. However, defining such a high level of achievement will easily lead to disappointment and less fruitful debates.

(2) The development research and education in service management shows a focus on certain management functions: marketing, operations and (some) HRM. What seems to be underdeveloped is ‘strategic management and business policy for services’.

(3) The paper focuses mostly on the need for service research and service education and how to develop these further and less so on the need to provide industry with perspectives, models, tools and tricks to work on service innovation. What firms - again in our view - want is a logic for managing service innovation in value chains and networks.

(4) The paper is poor on policy suggestions other than the need for financing service science and service education, develop fine service statistics and move towards citizen-centric design of government service systems. In our view governments in many countries are currently discussing appropriate responses to the service innovation challenge.

(5) The paper does point at the servitization of manufacturing firms. In our view this could be emphasized much more, not least as this is one of the most persuasive arguments in discussions with policy-makers on the rationale for service innovation policies.

(6) The paper summarizes five business challenges for service research. All five seem to be relevant and interesting for research. From our perspective one issue could be added. This is the issue of growth and growth strategies in relation to innovation.

(7) Finally we observe that reference is made to service systems as providing challenges to mostly education, business and policy-makers. We think that it would be helpful to also point at the opportunities service innovations are offering for individuals (as students, as citizens, as consumers, as patients etc.) and the need to involve them more actively in the way (new) services are shaped and delivered.”

- **Pim den Hertog, Director Dialogic Innovation & Interaction, Utrecht, The Netherlands**

- **Mark W. de Jong, Amsterdam Business School, University of Amsterdam & Director Technologisch TopInstituut Telematica, Enschede, The Netherlands, and**

- **Wietze van der Aa, Director Wageningen Business School, Wageningen University & Research Centre, The Netherlands**

“The Cambridge/IBM Service Innovation report seemed to have two simultaneous goals:

- Explaining and promoting the SSME initiative
- Defining a view of service systems and service innovation that might support future research.

Although worthwhile, these two goals are somewhat inconsistent. Promoting the SSME initiative is about encouraging broad participation across business and academia. Defining terms to guide future research bears the risk of expressing ideas in ways that many practitioners and academics may not fully appreciate.

Three general comments summarize my views about what I believe are important shortcomings of the draft that was distributed in October 2007:

(1) Many of the definitions and generalizations about service are unnecessarily complex. For example, page 5 of the draft says: “A service system is a dynamic value co-creating configuration of resources, including people, technology, organizations, 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.” One might wonder how that statement applies to an internally directed service system such as hiring employees, reimbursing travel expenses, or designing a new offering to the market.

(2) There is confusion between inherent characteristics of all services versus service dimensions that call for design decisions. For example, the definition of service system in the comment above says that service systems “aim to consistently and profitably meet the customer’s needs.” It is more accurate to say that consistency is a design dimension. Consistency is very important for some service systems and unimportant for others. The designer of a service system should decide the extent to which consistency is important and should be encouraged or enforced. A similar observation about inherent characteristics of service versus dimensions of service applies to other characteristics such as dynamic, complex, connected internally and externally, and concerned with profitability.

(3) Based on the way the Cambridge/IBM Service Innovation report is written, readers may conclude that service science is an abstract academic exercise rather than a pragmatic attempt to influence the world. For example, the report seems to view the entire global landscape of business and society as a giant service system. This view is not useful because there is no way for service science to analyze, design, or influence a system that has billions of participants and customers with billions of different personal concerns and interests. In another example, a reference to optimal investment seems questionable; if we barely understand how service systems operate, mathematical optimality is more like a dream than a realistic goal for almost all service systems.

Listed next are four major points based on using a work system approach for thinking about services and service systems. I believe that these points frame the discussion of service systems and service innovation in a way that is more pragmatic and more useful than the view expressed in the Cambridge draft. These comments are based on a stream of research related to what might be called “work system theory.” Recent publications related to work system theory include a 2008 IBM Systems Journal article, “Service System Fundamentals: Work System, Value Chain, and Life Cycle” (<http://www.research.ibm.com/journal/sj/471/alter.html>), and a 2006 book, “The Work System Method: Connecting People, Processes, and IT for Business Results.”

Point 1: An integrated view of service systems should apply to the complete spectrum of services: services for external customers and for internal customers; automated, IT-reliant, and non-automated services; customized, semi-customized, and non-customized services; personal and impersonal services; repetitive and non-repetitive services; long-term and short-term services; and services with varying

degrees of self-service responsibilities. There is no reason to limit service systems to those systems that are dynamic, are complex, require consistency, strive for profit, serve only external customers, and so on.

Point 2: Service systems are work systems. Therefore frameworks and concepts from work system theory should be applicable for describing, evaluating, and analyzing service systems. A work system is a system in which human participants and/or machines perform work using information, technology, and other resources to produce products and services for internal or external customers. Almost all significant work systems in today's organizations are IT-reliant. Any work system can be summarized and analyzed using the work system framework, whose nine elements include: processes and activities, participants, information, technologies, products and services produced, customers, environment, infrastructure, and strategies.

Service systems are work systems that produce services. By Vargo and Lusch's (2004) definition, service is "the application of specialized competences (knowledge and skills) through deeds, processes, and performances for the benefit of another entity or the entity itself." By that definition, almost any purposeful system within a business or governmental entity can be viewed as a service system because competencies are being applied to produce something for someone.

The body of knowledge that applies to work systems in general should also apply to service systems. Viewing a work system in terms of the nine elements of the work system framework provides a way to organize the relevant body of knowledge, much of which comes from complementary disciplines, such as:

- Marketing (for customers and products and services),
- Operations management and operations research (for processes and activities)
- Psychology and organizational behavior (for participants)
- Information science and accounting (for information)
- Computer science (for technology and infrastructure)
- Managerial environment (for environment)
- Management and operational strategy (for strategies).

The work system framework and related ideas provide additional ideas plus an organizing approach for combining and integrating ideas from those various disciplines.

Point 3: Service systems may have internal or external customers. In contrast, the Cambridge draft seems to assume that the customers of service systems are the firm's customers, thereby ignoring internally directed service systems through which every firm operates.

Work system theory assumes that customers are human, although, as noted in Alter (2008) based on an article by Umapathy and Puro (2007), many of the basic ideas related to service systems directed at people may be applicable to Web services and other automated processes that operate invisibly in the depths of computerized infrastructures.

Point 4: Service innovation may involve changes in anywhere from one to nine of the elements in the work system framework. A change in just one element, such as the business process or the technology used, might be a significant service innovation. However, because service systems are systems whose various components are related, changes in one element usually involve or require changes in other elements. For example, a change in a business process often involves change in technology and/or information and/or participant knowledge and skill.

Service innovations may involve any combination of: incremental value for customers (small innovations), radically better value for customers (large innovations), service system changes that improve the provider's efficiency, cost, quality, or reliability whether or not customers observe the improvements directly. There is no reason to assume that service innovation is always motivated by or linked to competitive advantage. Many service innovations are directed at internal customers or at customers of governmental or non-profit organizations for which competitive advantage may not be a major issue. Thus, the basic ideas of service innovation are about intentional changes in service systems.”
- Steven Alter, University of San Francisco, USA

“A wonderful paper, one of the best to date on SSME. I would add the necessity to define a taxonomy and the development of a methodology as pre-requisites in the study of service science. In 2.3 it would mention that this study is applicable across all defined industries and sectors. The development of soft skills in the potential audience is key to the success of service science. For section 5, one approach that has been successful in SSME program implementations is recommending academic joint programs within universities (business, engineering, psychology, and other schools).”
- Paul Kontogiorgis, IBM, USA

“I have been doing a lot of thinking and study about Web 2.0/Enterprise 2.0 - and aside from the technology - what I walk away thinking is that we have not made people part of the equation. Enterprise 1.0 automated transactions, took people out of the cycle (automated teller machines). But what you're talking about - these service systems/networks - really are about information and people being equal. Flickr is a great example - people and information are both important. Flickr with no photos is just a random chat room; Flickr with no people is just a photo repository - but the two together and you have value co-creation (trying to borrow your words). Your recommendations to business beg for this type of "Flickr system" to exist.

I think most people in the enterprise/business world have not grasped this idea and it sits at the core of innovation in sales, service, R&D. This brings me to my only other big point. While using service science is good -- you need to make sure people understand that sales is service, service is service and R&D is service - to often this term leads people to think about call centers rather than what you're trying to get across. I'm not trying to get you to rename anything - just to more overtly remind people that Citibank (everyone that works there) - is in the service business; not just the guys at the call center.”
- Timothy Chou, Entrepreneur and author of 'End of Software', US

“This Cambridge SSME paper is important advancement in the evolution of Service Science. I urge service researchers, professors and service professionals to join the Service Research and Innovation Community (www.thesrii.org) and through collaboration, help cultivate new service science theories and frameworks.”
- Dianne Fodell, IBM, US

“The conceptual rigour of the analysis underlying the concept of ‘Service Science, Management and Engineering’ (SSME), and the overall clarity of the Discussion Paper appear to be of a high standard to a non-academic. This contribution is to point to certain issues and factors that could with benefit be included in the various elements of the programme. Although four new key concepts will be created (service system, value proposition, adaptive innovators, and SSME) they could founder on the underwater rocks or icebergs of traditional issues, including trade and economics, if their ‘marine sonar’ is not working properly.

Point 1: Measurement of services: This is still in the dark ages and relies on proxies, some of dubious value. Essentially the units of many services and the quality of those units are still not even conceptually formulated, thus productivity measures of services are inadequate, including using the hedonic approach. Progress is being made in areas such as service exports, and in service pricing.

Point 2: Laws and the regulation of services: the infrastructure services are mostly highly regulated (including telecommunications, financial services and transport) as are health and the main professional services, and must be considered separately. Thus the influence and dialogue with sector regulators, and the competition authority are critical at the national level, and at the international level the development of international standards and the cooperation of regulators and supervisors is significant (e.g. in financial services IOSCO, BCBS and IAIS). The more complex the service offers become in relation to risks to health, safety, personal and other assets, the environment and so on, the more intense their regulation and supervision is likely to become. Some of this is reflected in bilateral, regional and multilateral free trade agreements.

The standards are not developed by trade agreements but by other international bodies (ITU, WIPO, IATA, IASB and so on) that can influence the FTAs. Given the globalisation of services production and delivery, the maze of BITS (about, 2,600), bilateral FTAs and large number of recent regional FTAs, some of them overlapping and with contradictory preferences and the equivalent of ‘rules of origin’ for services, this noodle-bowl situation can act as a barrier for SMEs planning to export or continuing to do so, especially through establishing a commercial presence abroad. Also under this heading, in relation to high-skilled workforces, comes the regulation of educational diplomas and professional qualifications and licensing, which demands mutual recognition agreements (covering equivalence rather than harmonisation) for the movement of such practitioners between countries, that is very expensive, time consuming and difficult to achieve, and involves both government regulators and the private professional organisations.

Point 3: Complex systems: the degree of interaction between notionally separate systems is of growing concern due to their vulnerability if contagion sets in between them. This concept of vulnerability is a developing concept distinct from hazard and risk – see <http://www.asecinfo.org/index.html> Under this heading the prevention and management of risk are very important. The insurance sector is at the heart of this, as well as being the intermediary for savings, efficient capital allocation and economic stability (see <http://www.genevaassociation.org> for research in this field).

Perhaps also coming under this heading are the growing importance of the Corporate Social Responsibility policies of large firms, and of the Sustainability Impact Assessments for new policies and trade agreements, for example as required under EU law for European Commission initiatives, that take into account economic, social and environmental aspects, based on the methodology of the University of Manchester (see <http://www.sia-trade.org>). Beyond this are the Millennium Development goals and the relief of poverty aims which overarch or encompass services regulatory and trade policies.

Point 4: Economics of growth: Here the concepts of growth diagnostics of economists like Dani Rodrik and Jeffrey Sachs must be taken into account in the globalisation context. Also the differential

productivity increases between the manufacturing and services sectors (such as expounded by William J Baumol) which show that government services, health and education will take up increasing proportions of GDP in all economies, at whatever stage of development. Baumol also makes the distinction between ‘inventions’, which may not lead to ‘innovation’ of products or processes, and the importance of the psychology of capitalism and entrepreneurship, to explain why many breakthrough inventions, some extremely ‘disruptive’, emanate from SMEs, whereas the high R&D spending of the large firms tends to produce step by step enhancements, often of inventions purchased from the SMEs entrepreneurs. He sees this complementarity as critical for growth. Prosumerism is part of this picture, where the consumer is part ‘producer’ by using machines such as petrol pumps, ATMs, kitchen equipment and home computers.

Point 5: Consultations: It was not clear the extent to which SME entrepreneurs were consulted, particularly those that are innovators and/or exporters. By numbers, the majority of exporters are firms with under 500 employees i.e. SMEs. Even for them ‘glocalisation’ is important – a global approach and locally adapted services offers. On a personal note of relevance, as a sole unincorporated consultant with no staff, all my work activity consists of exporting via GATS Modes 1 and 4, and has for most of the past two decades.”

- Julian Arkell, International Trade and Services Policy, Spain

“What is so painfully missing in today’s large services business is the inclusion of the human factor. Because human behaviour is messy, no one wants to tackle it. I would maintain that service professionals require significant doses of practical lessons on human behaviour and development.

For example,

- body language
- micro-body language
- organizational theory and behaviour
- understanding morale with and without surveys
- understanding human response to change
- understanding human behaviour in co-creation environments where game theory becomes important to understand operational behavior

This is all leading to an answer to the fundamental questions about service

- how do you know when you’re successful?
- how do you know when you are as successful as you can be?
- how do you make better economic judgments on service content and quality based on satisfaction?
- how do you know what to correct before the client stops buying the service
- what are the satisfaction curves for service offerings? (more step function than smooth)
- how do you know when you’re on the edge?”

- Craig Nygard, IBM US

“The document tends to summarise and view SSME through a developed first world economy perspective and within the context it was written there can be no problem with that, but while most of the comments are also valid when viewed from a developing world perspectives there are areas that are not addressed if seen from an African perspective and I think if these are addressed in the document as well it will add value to the manuscript quite significantly.

The African continent tends to suffer from what I term to be a “Skills Paradox”; it has a lot of unemployed people (large skills base) and yet suffers from a skills shortage (people without the required skills) for competing effectively in the global services economy. SSME skills development can address this. Problem is no academic institution in Africa presents such a holistic or integrated course. There are courses that embody components or individual subjects that would fit into a SSME infrastructure but it is the comprehensive integrated curriculum that is missing. If parts of a Jig Saw Puzzle are not in place it leaves gaps that make it difficult to make-sense of the whole picture - same applies with SSME. This has significance in terms of addressing the Skills Paradox. Currently in South Africa the flavour of the month is technology skills development, without the big picture of SSME being in place this will not solve the problem.

Services Science and SSME in particular is a relatively new field within the South African academia with many academics not having been exposed to the concept. An awareness of SSME thus is deemed critical if we are to make headway within Southern Africa in this field. I have written, as far as I can see, the first papers in this regard to have been published in South African journals. This in a country where 64% of GDP is services related!!! My book spells difficulties in the road ahead. With the exception of the South African Revenue Services (SARS), services in relation to public sector institutions are problematic to say the least. The use of technology is catching on but skills and expertise in the use of technology to enhance and support service delivery, with reference to business process involved is still limited. In effect we have a first and third world business context/environment co-existing at the same time and the implications of this is not always all that clear.

It would seem that The Graduate School of Technology Management at the University of Pretoria is one of very few universities in Africa that currently offers at a post graduate level courses in Engineering Management and as such plays an important role in skills and knowledge development. Quite a number of the subjects presented, as part of these courses, have a correlation with SSME programs, a case in point being people, information, systems and operations, life cycles, strategic, project, risk, and financial management, to but name a few, all of which have a very specific engineering contextual focus. Seen in context of the global services economy, Engineering Services Management can in future be expected to play a far more pertinent role and the associated skills need to be seen from a South African business, industry and public sector perspective, i.e. what are the services related skills currently required within the engineering field and what will be required in future?

These questions need to be seen from an African perspective where we still have a strong dual economy, namely manufacturing and services. As far as could be ascertained even globally the focus on Engineering Services Management is still in an evolutionary developmental phase and it is suggested that in future it will gain in prominence, as currently is the case with SSME. Once clarity as to these skills and knowledge requirements have been attained appropriate skills development programs need to be put in place, the failure of which could stifle economic development. Without doubt a lot of research is still required to address the services related questions that emanate within an engineering context.”

- Richard Weeks, University Pretoria, South Africa

“The paper gives a very clear and comprehensive description of the role and definition of an "adaptive innovator" – a term used for the first time to describe a service professional. This term has the right blend of creative communication for marketing the requirements of service innovation to the consumption and understanding of the masses. The discussion on the 3 approaches of bridging the gap between academic disciplines is a unique and enlightening perspective on giving recommendations for education. However the paper lacks a separate discussion on defining approach for recommendations to business and policy and launches itself directly and immediately into the recommendations after an academic argument.

In service businesses in emerging countries the gaps that are broadly identified by various field studies are:

- Scalability of the service business model,
- Customer retention,
- Low penetration,
- Low customer base,
- Acceptance of technology to scale to higher levels of service,
- Service Quality,
- Inefficient supply chain,
- Enhancing employee utilization,
- Providing information on demand.”

- **Zaheer Travadi, IBM India**