

## Preface

International commerce is a major goal of contemporary economies. Industrial growth following World War II was in large part based on this goal. To promote economic development, two concepts emerged. The first was use of cheap labor to manufacture products with labor intensive needs. The second was to develop manufacturing economies based on quality. For the latter development goal, service was considered an important component to the overall manufacturing strategy. Consideration was given to both pre and post service requirements. Service was considered an integral part of the cost-effectiveness of quality. For the former goal of cheap production, service was not a valued consideration for economic development and growth. However, given the complexity of manufacturing quality in the international environment, there was minimal knowledge of what service entailed as an actual component of a product. Over the years since the start of modern international industry, trial and error in efforts in the field of service have contributed to a knowledge base concerning attributes of successful service and not so successful service. The fact has emerged that service is a powerful addition to global growth. This recognition of service as a necessary factor in economic well being has resulted in the development of a new field of science in service. This book is a representation of the field of service science.

In 2010 the scientific journal, *Journal of Service Science, Management, Engineering, and Technology* (IJSSMET), published its first issue. The goal of the journal was to present an international and multi-disciplinary forum for the theory and practice of service. In short order, academics from a range of disciplines and fields of study were studying service as a discipline. At the same time, professional practitioners were elaborating and disseminating their in-house variables and techniques. Disciplines in computer science and software engineering were collaborating with operation and management sciences on service tools. Because service is a human oriented enterprise, the social science fields of psychology, communications, sociology, and education became collaborative scientist in the study of service and its potential impact on economic growth. IJSSMET quickly become a leader in service science publishing original research and theory articles while blending with practitioner articles on case studies. To broaden the dissemination of the emerging science of service, this book is presenting a baseline of the work done so far and setting the aim and scope of the field so it continues as discipline in both research and practice.

Why service is viewed as a science is important for the growth of variables and conditions associated with the field. Science is the study of hypotheses that are predictable to result in certain defined outcomes. Economic growth is possible when consumers can rely on the quality of the entity offered. If quality is questioned, the economy suffers from lack of support. Service is both a pre and post component of offered entities. For example, when purchasing an item, pre-service offers evaluation of perceived need with post-service the means of maintaining the item to quality assured.

This concept of service is complex and requires more than a trial and error approach the situation. Research and evaluation can provide the quantitative findings to validate variables and conditions of service but, also, real world environment assessment can contribute to the science of service quality. Complexity of a domain of human effort makes a science available to other participants. Dissemination of research findings and implementation enhances the concept of “best practice.” For example, the articles presented in this chapter have been evaluated as offering the international community a view of the science of service. Each article is an exemplar of this emerging science that is studying directly the service. The goal here is to set the standards for the future growth of service as it becomes more an integral part of the economy. Collaboration between academics and practitioners is the goal for advancing the field. This book will provide an initiative for this.

## THE BOOK

The book *Best Practices and New Perspectives in Service Science and Management* presents a collection of 22 manuscripts previously published in *International Journal of Service Science, Management, Engineering, and Technology* (IJSSMET). The Editor in Chief of this journal is Miguel Ángel Sicilia Urbán from the Computer Science Department at the University of Alcalá (Spain). *International Journal of Service Science, Management, Engineering, and Technology* publishes various types of manuscripts (research papers, research notes, research reviews, surveys and case studies). Published since 2010, it covers a wide range of topics related to the development of service science, management and engineering: from computational techniques applied to service science, and economic aspects of the service sector, to intelligent systems and data mining in the service industry, policy, privacy, security, and legal issues regarding services and service innovation and marketing, among other topics. Currently it is indexed in DBLP, INSPEC and Google Scholar, among other indexes.

In 2011 the journal published only one special issue, whose guest editor was Klaus-Peter Fähnrich, University of Leipzig, Germany. The title of this special issue was “Service Engineering for Innovative Service Systems: Management and Application Cases.” Manuscripts are chosen from the International Symposium on Services Science (ISSS) 2010 and the INFORMATIK 2010. The keynotes were held by Arndt Bode, who paid tribute to Konrad Zuse; Thomas Curran (Deutsche Telekom AG) and Johanne Helbig (Deutsche Post AG), who spoke about the current developments in the service economy. Matthias Jarke (cluster of excellence UMIC) commented on mobile information and communication services. The issue was also taken up by Hermann Friedrich (Siemens AG) who spoke on the Internet of Services. Finally, Gerhard Satzger (Karlsruhe Service Research Institute, IBM) gave a talk on the topic “Where is the Science in Services?” Furthermore, the conference commemorated the 100th Birthday of Konrad Zuse, the co-inventor of the modern computer.” The Special Issue offers a collection of nine manuscripts on Innovative Service Systems: Management and Application Cases.

## Contents of the Book

Next we will present a summary of each chapter published in the book *Best Practices and New Perspectives in Service Science and Management* and the authors.

The chapter “Service Quality Evaluation Method for Community-Based Software Outsourcing Process” by Shu Liu (Harbin Institute of Technology, China), Ying Liu, (IBM China Research Lab, China),

Huimin Jiang (Harbin Institute of Technology, China), Zhongjie Wang (Harbin Institute of Technology, China), and Xiaofei Xu (Harbin Institute of Technology, China) proposes a service quality evaluation method for community-based software outsourcing process. “A service quality indicator model with three layers and five dimensions is explained and applied to community-based software outsourcing service supported by Call-For-Implementation (CFI) platform. The calculation method for each quality indicator is demonstrated in detail. A prototype is developed to support the evaluation process and exhibit results of quality evaluation for the community-based software outsourcing based on CFI.” The chapter describes a service quality evaluation method of community-based software development model based on a CFI platform. It is a community-based software development method put forward by IBM China Research Lab. This enterprise-to-individual software outsourcing model targets to “help create businesses between enterprises and the large community. The community described here is a virtual group composed of individuals such as college students, high school students, and programming freelancers.”

The chapter “Creating Effective Customer Solutions: A Process-Oriented Perspective” by Ferdinand Burianek (TUM Business School, Germany), Sebastian Bonnemeier, (TUM Business School, Germany), and Ralf Reichwald (Leipzig Graduate School of Management, Germany) addresses how integrating organizational products and services into customized solutions can help firms to gain a long term competitive advantage. The manuscript provides an empirical study based on 11 in-depth interviews with managers from solution providers and an exploratory survey with 45 solution providers. The chapter “derives a value creation process as well as a set of critical activities and pitfalls within each step. Selling solutions requires relational processes between customer and supplier comprising analysis/consulting, design/configuration, implementation/delivery, and support/operation. To better understand the relational process, this perspective was adopted on creating solutions in order to identify crucial routines and activities. Two main capabilities within this process can be identified: customer interaction and project management. Both capabilities are required in order to deliver more effective as well as efficient solutions.”

The chapter “Customers as Innovators in Senior Service Markets: An Examination of Innovation Potential and Characteristics” by Lea Hennala (Lappeenranta University of Technology, Finland), Helinä Melkas (Lappeenranta University of Technology, Finland), and Satu Pekkarinen (Lappeenranta University of Technology, Finland) addresses aging customers as innovators in senior service markets by their innovation potential and characteristics as innovators in development of well-being services. The goal of the chapter is “to increase knowledge about aging people’s innovation potential and their characteristics as innovators in well-being service development. Within innovation research, studies and literature on user involvement or user-driven innovations have so far mainly focused on industrial products and appliances related to leisure time or healthcare.” It describes the development of the service concept of a foundation providing homes for aging people in Finland. The main research questions are: “What is aging people’s innovation potential like? What are they like as innovators? Managerial implications concerning these results are also discussed. The study focuses on a “well-being centre concept for aging people.” The chapter “provides an example of how that could be put in to practice. The study complements the managerial discussion concerning customer involvement and combines research on user-driven innovation as well as business and service development. It is of interest to managers and other actors in various organizations’ service innovation activities, innovation researchers, and researchers in service science and various aspects of aging.”

The chapter “Situated Service-Oriented Modeling” by Raafat Saadé (Concordia University, Canada) and Rustam Vahidov (Concordia University, Canada) addresses how the emergence of e-services benefited the stakeholders due to ease of access to data, information and knowledge sources. It focuses on

the mapping the e-learning context into a value added service architecture. The authors state that the DSSs used within the service oriented framework “need to be seamlessly integrated into the organization’s information infrastructure to empower the stakeholders by providing them with relevant and timely information, keeping them abreast of the decision making processes, involving them with the required responses to emerging situations, and allowing them to participate in the evolution of the environment.” The goal of the chapter is to develop a situated service oriented model and show the efficiency and effectiveness of this approach in the e-learning context. The model integrates “the three layers of service oriented architecture into the kernel of the situated decision support system.” The study developed by the authors proposes “an integrated Situated Service-Oriented Model and demonstrates its value via a case study of an e-learning service-based application used over a period of 15 months. Two designs were used; component-based and service-oriented. The significance of this study is in the tangible value of the model proposed and demonstrated by the e-learning case study.”

The chapter “An IT Service Engineering and Management Framework (ITS-EMF)” by Manuel Mora (Autonomous University of Aguascalientes, Mexico), Rory V. O’Connor, (Dublin City University, Ireland), Mahesh S. Raisinghani (TWU School of Management, USA), Jorge Macías-Luévano (Autonomous University of Aguascalientes, Mexico), and Ovsei Gelman (CCADET-UNAM, Mexico) confirms the existence of literature on services from different views such as information technology and IT System Engineering. This variety generated different views. To address this problem, the chapter proposes an IT Service Engineering and Management Framework (ITS-EMF). Such system is generated by “careful review and examination of the main conceptualizations on IT, ITSE and business services. The chapter claims that ITS-EMF is useful for: (1) mapping services concepts from disparate IT literature, (2) reducing service conceptual confusion from the multiple available sources, and (3) providing conceptual links between service constructs used in business services and IT and ITSE services layers. It concludes with the implications, both academic and practical, for engineering and managing IT services in business organizations.” It elaborates on an integrated conceptualization of the IT service concept (ITS); formulates and illustrates the ITS-EMF; and identifies the academic and practical implications to engineering and managing such services in business organizations.”

The chapter “DNA Model of IT Service Assets” by Stuart Galup (Florida Atlantic University, USA), Ronald Dattero (Missouri State University, USA), and Jayne Groll, (ITSM Academy, Inc., USA) studies the service resources and capabilities associated with Information Technology (IT) services through a DNA (Dynamic Network Analysis) model. There are five types of capabilities: management, organization, processes, knowledge and people. The authors specifically analyze “the relationships among Agents, the Knowledge and Resources that Agents require to perform their job Role, and the Tasks that the Agents perform during the execution of their job Role.” Finally the chapter describes selected resulting metrics and their managerial implications to help managers improve the efficiency and effectiveness of their organizational processes.

In the chapter “Identification of Attributes of TQM in an Educational Institute: A System Model,” Rajiv Sindwani, Vikram Singh, and Sandeep Grover from YMCA University of Science & Technology (India) analyze a list of attributes of Total Quality Management (TQM) in an educational institute, and propose a model for the benefit of researchers and academicians. In particular the chapter “investigates and lists 42 attributes of TQM in educational institutions. A quantitative study, involving the administration of a survey was conducted. The survey instrument consisted of 42 items and was prepared on the basis of attributes of TQM found during Literature Review. The application of Factor Analysis technique is illustrated for grouping the various attributes into Factors. The results of this study will

help in a smoother penetration of TQM programs in educational institutes. The period of study is from 1995-2006. Considering the gamut of publications, TQM implementation has seen a steady growth and appears to be heading towards its maturity level.” The two main goals of the study is to “compile the attributes reported by various studies that correlated the quality, educational performance of the institute with performance of the students in the external environment; and development of a System Model for evaluating impact of TQM in educational institute.”

The chapter “An Ontology-Based and Model-Driven Approach for Designing IT Service Management Systems” by María-Cruz Valiente (University of Alcalá, Spain) and Cristina Vicente-Chicote (Technical University) states that the implementation of IT service oriented software systems require “performing a number of different steps in order to produce all the required artifacts (either internal or deliverable). Based on the notion that a software system is a representation of another system (i.e., the real-world), the first step is to formalize the domain concepts and the relationships between them (i.e., the ontology), in order to obtain a common vocabulary agreed by all the stakeholders involved in a given project for requirements elicitation. In addition, apart from the domain concepts, additional rules, constraints and semantics are required in order to avoid semantic ambiguities, uncertainties and contradictions.” It introduces a modeling approach, formalized in ontological terms, for defining high-level requirements models of software systems that provide support for the implementation of Information Technology Service Management Systems (ITSMSs). The use of this approach allows for: “(1) formalizing the knowledge associated to the ITSM processes contained in an ITSMS; (2) modeling the semantics of the activities associated to these processes in terms of workflows; (3) automatically generating the high-level requirements models of the workflow-based software systems needed to support (part of) the ITSM processes; and (4) from the latter, obtaining lower-level models (and eventually code) by means of automated model transformations.” The chapter also includes a case study.

The chapter “The Impact of E-Retail Environment Characteristics on E-Satisfaction and Purchase Intent” by Jung-Hwan Kim (University of South Carolina, USA), Minjeong Kim (Oregon State University, USA) and Jay Kandampully (The Ohio State University, USA) examines the key dimensions of e-retail environment characteristics which affect consumer e-satisfaction and purchase intent. It also explores the role of e-satisfaction and the moderating effects of consumers’ previous e-shopping experience on the relationship between e-retail environment characteristics and consumer responses.

Yasuo Kadono (Tokyo University of Technology, Japan), author of the chapter “A Study on Relationships among Software Engineering Capabilities in Japan Using Panel Analysis,” has wide research experience on software industry in Japan: Yasuo Kadono states that “many companies in Japan that use enterprise software have not been fully satisfied with the quality, cost, speed and productivity of software that IT vendors deliver. At the same time, IT vendors in Japan are facing drastic changes in their business environment, such as technology, innovations and new entrants from emerging countries all over the world [...]. In order for the IT industry in Japan to meet these challenges, an important step is to understand how software engineering capability is significant for achieving medium- and long-term success.”

In 2005 he and his colleagues analyzed the relationships among SEE (Software Engineering Excellence), business performance and business environment based on data collected from 55 major IT vendors in Japan. The path analysis showed that “SEE characteristics have a direct positive impact on business performance and that the competitive environment directly and indirectly (i.e., via SEE) affects business performance.” Later in 2007, he analyzed the data collected from 100 major IT vendors in Japan. The research outcomes showed that “the level of effort expended on human resource development, quality



assurance and project management improved the performance of IT vendors in Japan in customer contact, research and development and process improvement, the same tendency we found in 2006. However, the causal relationships differ significantly depending on the vendors' origin."

Now in his chapter "A Study on Relationships among Software Engineering Capabilities in Japan Using Panel Analysis," he has two main goals: 1) assess the achievements of the Japanese software engineering discipline; and 2) understand the dynamics of how software engineering capabilities relate to IT vendors' business performance and business environment. It helps to understand how software engineering capabilities relate to IT vendors' business performance and business environment. The authors measured the software engineering excellence (SEE) survey results with regard to seven factors "including service science characteristics: deliverables, project management, quality assurance, process improvement, research and development, human development, and contact with customers. This paper integrates 233 responses to the SEE surveys into a new database and identified 151 unique IT firms. Based on the results of the panel analysis, most SEE factors for a year had significant positive influences on the same factors the next year." The chapter is structured in the following section: it discusses the proposed research model, later it introduces the survey on software engineering excellence and finally the results are analyzed.

The chapter "Value-Adding to Public Services through the Adoption of Lean Thinking" by Ayham A. M. Jaaron (An-Najah National University, Palestine) and Chris J. Backhouse (Loughborough University, UK) describes an investigation into alternative management models applied to public call centres operations with the aim of delivering significant added value to the overall public firm. The chapter reports "an investigation in a UK city council was carried out through the means of a case study using both qualitative and quantitative methods to collect data from directors, middle-managers and employees to evaluate the development of a lean thinking type of call centre. The results indicate that by implementing the lean thinking approach to the design of call centre service operations significant, but often counter-intuitive, benefits can be created."

In the chapter "A Modeling Framework for Analyzing the Viability of Service Systems" by Arash Golnam, Gil Regev, and Alain Wegmann (Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland), readers will understand how to apply a Systemic Enterprise Architecture Method (SEAM) to model a utility company in Geneva (Switzerland) as well as how a service system maintains its identity and remains viable in its environment. Their research has these features: "it is based on an explicit systems philosophy, and most specifically an epistemology in which we explicitly define what we view as viability; and it involves a systems methodological approach to either analyze the viability of a service system or to design a viable service system. This is achieved by means of applying systems modeling."

The chapter "A Business Model Approach for Service Engineering in the Internet of Services" by Holger Kett (Fraunhofer-Institut für Arbeitswirtschaft und Organisation IAO, Germany) focuses on the development of business models from a strategic-/market-oriented perspective, prior to consider the service business processes as well as the underlying IT-oriented service concept. It also addresses the role of the business strategist and its goals. The methodology for the study was developed in the Theseus/TEXO project which is funded by the German Federal Ministry of Economy and Technology. The chapter focuses on "the ISE methodology and its strategic perspective on a developing electronic business service. Relevant approaches for designing business models have been examined in the state-of-the-art by comparing the requirements from the viewpoint of organisations which collaborate to offer a service over the Internet. The major targets of applying business models in this context is to identify the crucial elements, describe and discuss them, assess the business model's feasibility, and finally, use

and detail it in the further steps of ISE. None of the identified approaches sufficiently meet the targets. None of the identified approaches sufficiently meet the targets. Therefore, a new approach for creating business models has been developed and integrated into the overall ISE methodology.”

The chapter “Service Oriented Innovation Management: An Open Innovation Approach for Collaboration in Innovation Networks” by Michael Thieme (Institute for Applied Informatics (InfAI), Germany) introduces the idea of service oriented innovation management into the scientific discussion and gives an outlook on possible application. In a previous research, the author describes how SME can profit from knowledge-based resources existing research institutions and how this knowledge can be transferred and applied. The innovation model is based on the idea of bottom-up innovations and focuses on the aspects of knowledge transfer and cooperation. Now in this chapter the author addresses how the SOA-principles are adopted and applied in the field of innovation management with several stakeholders involved in the innovation process. In addition the chapter includes a “use case in form of a management concept for an innovation center in the creative industries.” Especially small and medium-sized enterprises consider that a strategic task is to develop innovation networks as they need to find solutions to overcome their limited human resources and their lack of financial capacity to create and manage a research laboratory.

The chapter “Customer Integration in Innovation Processes via Operating Information Systems” by Benjamin Strehl (USU Software AG, Germany) describes the requirements and an overall solution system for the integration of certain customer contacts via service centers. The authors discuss “the positive effects of customer integration in corporate innovation activities are undisputed. Further, several concepts for an improved cooperation with customers have already been developed and even implemented in many cases. Most of these methods target a special group of customers, the so-called lead-users. Besides being proven as beneficial, this selected integration neglects the majority of a company’s human client interactions which occur in the often centralized service centers, for example call centers. Many studies confirm the innovation potential of these existing, regular customer interactions.”

The chapter “A Method for the Management of Service Innovation Projects in Mature Organizations” by Bernhard Schindlholzer, Falk Uebernickel, and Walter Brenner (University of St. Gallen, Switzerland) describes a method for managing service innovation projects in mature organizations, using the elements of method engineering. This method offers “insights from a real-world service design project in the financial industry where special attention has been given to the enabling factors such as team constellation, organizational environment and IT infrastructure.” According to authors the key finding of the case study is that “while processes, methods, and tools are important for managing service innovation projects, socio-technical aspects such as context, environment, team management, and project setup also are essential for the successful design of innovative services. The current literature provides rudimentary guidance in these areas, yet a thorough description of these factors and their integration into a complete method has not yet been documented.”

The chapter “How IT-Enabled Services Can Help to Change our World: Building Networks for the Energy-Efficient City of Tomorrow” by Kyrill Meyer (Universität Leipzig, Germany) proposes that an advanced understanding of existing infrastructure and the willingness to change on an individual and social level are needed, while determining factors (for example, demographic change) are considered. The chapter introduces the energy-efficient city of tomorrow as a city of socio-technical networks that interact and are a basis for energy-related optimizations. In addition it discusses “the special role that IT-enabled services can play in understanding and changing those networks. To illustrate, the authors present a service as a case study that illustrates how services can provide relevant information and help to induce change.”

The chapter “Mobile Emergency Management Services Targeting Large Public Events” by Jan Zibuschka (Fraunhofer-Institut für Arbeitswirtschaft und Organisation IAO, Germany), Heiko Roßnagel (Fraunhofer-Institut für Arbeitswirtschaft und Organisation IAO, Germany), Jan Muntermann (University of Göttingen, Germany), and Tobias Scherner (Marketing Partner, Germany) states that the tourism industry has been especially impacted by certain emergencies such as natural disasters and terrorist attack and to mitigate the effects of such events, guaranteeing an adequate level of preparedness is essential. However, few tourism organizations have properly developed emergency strategies as an integral part of their business plans. The authors propose a “reference architecture that allows the integration of mobile value-adding services, allowing for broad usage outside of emergency cases and thus an increased familiarity. It also presents a specific system design focusing on the case of large public events as an instantiation of the reference architecture, describe the implementation in some detail, and present the evaluation of the prototype implementation in a simulation study at a large public event.”

The chapter “MoBiFlow: Principles and Design of a Workflow System for Molecular Biology” by Markus Held (Bundesanstalt für Finanzdienstleistungsaufsicht, Germany), Wolfgang Küchlin (Eberhard Karls Universität Tübingen, Germany), and Wolfgang Blochinger (Universität Stuttgart, Germany) briefly summarizes previous research done by the authors, on bioinformatics workflow system MoBiFlow and the software ecosystem, which enable biologists and computer scientists to approach problems in collaboration. Later, the chapter focuses on a workflow platform MoBiFlow and describes the principles, design, and use cases. The authors formalize common e-science processes in biology as a meta-process and derive requirements for next generation as well as explain how low-level workflow languages can be combined with domain-specific workflow notations in order to provide simultaneously both ease-of-use and flexibility. In addition it describes “the design principles behind the MoBiFlow system, which represents a solution for high-level and low-level collaborative workflow development and usage.”

The chapter “uRun: A Framework for User-Generated Mobile Services in the Health and Fitness Domain” by Alexandra Chapko (German Research Center for Artificial Intelligence, Germany), Andreas Emrich (German Research Center for Artificial Intelligence, Germany), Stephan Flake (Orga Systems GmbH, Germany), Frank Golatowski (University of Rostock, Germany), Marc Gräßle (German Research Center for Artificial Intelligence, Germany), Andreas Kohlos (Morpho Cards GmbH, Germany), Nico Laum (University of Rostock, Germany), Christian Lerche (University of Rostock, Germany), Carsten Rust (Morpho Cards GmbH, Germany), Jürgen Tacke (Orga Systems GmbH, Germany), Dirk Werth (German Research Center for Artificial Intelligence, Germany), and Carsten Zoth (Orga Systems GmbH, Germany) describes a framework which enables end users to create small, sharply focused mobile services directly on a mobile device. Therefore end users are no longer only consumers of mobile services; they also become producers and providers of mobile services. The authors address “the underlying platform for easy creation of mobile services and describes the implementation of a Web-based editor for easy mobile service creation as well as our solution to access device capabilities out of Web applications.” They offer a detailed view of the uService architecture. As a concrete application area of a super consumer scenario,” the uService project investigates, among others, the health and fitness domain. This is due to the fact that people are increasingly looking for products and services that allow them to track, socially interact, and share data related to health and fitness while being on the move. This framework can be understood as an “instantiation of the uService platform for the domain of user-generated health and fitness mobile services.”



The chapter “An Information and Cooperation Portal for Supporting Public Authorities and Organizations with Safety and Security Responsibilities Before and During Large Public Events” by Sandra Frings (Fraunhofer-Institut für Arbeitswirtschaft und Organisation IAO, Germany), David López Remondes (City of Cologne and University of Applied Sciences Cologne, Germany), and Wolf Engelbach (Fraunhofer-Institut für Arbeitswirtschaft und Organisation IAO, Germany) describes the research project VeRSierti, “a web-based information and cooperation portal was designed for the region of Cologne and implemented for these purposes. Its intention is to support collaboration of the participating organizations prior to, during execution and post-event analysis of a large public event, while taking into account unplanned risks ranging from storms to acts of terrorism.” VeRSierti (Networking of local passenger transport companies, relief personnel, organizers and passengers for greater security in public transport at mass events) aimed at “improving the security of event participants, security personnel and skilled help, as well as personnel of transport organization during mass events.”

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