

Preface

A service economy has been recognized as the dominant paradigm in present times [1]. Such a service-oriented worldview demands new engineering and management scientific (both fundamental and applied) knowledge to cope with the planning, design, building, operation and evaluation, and disposal of non-adequate IT-based service systems [2]. Such challenges emerge from the paradigm shift from a product-based manufacturing economy to this new service-oriented one [3].

In turn, Intelligent Decision-Making Support Systems (i-DMSS) are specialized IT-based systems that support some or several phases of the individual, team, organizational, or interorganizational decision-making process by deploying some or several intelligent mechanisms [4, 5]. In particular, Artificial Intelligence (AI) has been recognized as a significant enhancement tool for DMSS [6, 7] since several decades. However, the utilization of i-DMSS for engineering and management of IT-based service systems is still scarce.

We believe that fostering its research and utilization is relevant and needed for advancing the progress of IT-service systems. Consequently, in this book we will pursue to following academic aims: (i) generate a compendium of quality theoretical and applied contributions in Intelligent Decision-Making Support Systems (i-DMSS) for engineering and management IT-based service systems (ITSS); (ii) diffuse scarce knowledge about foundations, architectures, and effective, and efficient methods and strategies for successfully planning, designing, building, operating, and evaluating i-DMSS for ITSS, and (iii) create an awareness of, and a bridge between ITSS and i-DMSS academicians and practitioners in the current complex and dynamic engineering and management ITSS organizations [8].

In this book, we have collected 11 chapters addressing such aims from international research community. These 11 chapters refer to relevant topics for both IT service systems and i-DMSS including: problems of selection of IT service providers, optimization of supply chain systems, IT governance decisions, clinical decision support, dynamic user-interface adaptation, re-engineering of processes, IT BSC decisions, and generic decision problems. Advanced IT technologies used in some chapters are: fuzzy multi-criteria mechanisms, semantic processing, data mining processing, and rough sets. Other chapters report traditional DSS mechanisms but used or suggested to be used in innovative mode for IT service engineering and management tasks.

In the first chapter entitled *Knowledge Management in ITSM: Applying the DIKW Model*, Sue Conger in University of Dallas, USA and Jack Probst, in Pink Elephant Company, USA, discuss the foundations of the data-information-knowledge-wisdom (DIKW) conceptual model and elaborate its usage justification in ITSM key activities. In particular, the DIKW model effects on the ITSM Service Desk activity are evaluated and analyzed. The authors report a case study where the utilization of a KMS and the DIKW model provides benefits from a tribal and trivial knowledge usage to advanced knowledge patterns plausible to become in wisdom chunks. This chapter, thus, contributes for both ITSM and iDMSS topics providing how KMS and DIKW model can support and enhance ITSM activities and decisions.

In the second chapter entitled *IT Governance Practice in a Malaysian Public Institute of Higher Learning and Intelligent Decision Making Support System Solution*, Abdul Rahman, Yusri Arshad, and Binyamin Ajayi, all of them in International Islamic University Malaysia, in Malaysia, present a case study conducted in a Malaysian university on their institutional efforts for introducing and using IT governance mechanisms. Authors indicate that better IT governance practices lead usually to a better utilization of IT resources (financial, technical, human, organizational, informative), which lately should impact on the university's performance. COBIT is used a model of reference. After it, authors identify the strong need to support IT governance mechanism implementation with iDMSS. Two examples of plausible utilization are reported. This chapter contributes with an empirical study on the problematic of IT governance mechanism implementation in an academic setting, and how it can be supported using iDMSS.

In the third chapter entitled *DSS-based IT Service Support Process Reengineering using ITIL: A Case Study*, Raul Valverde and Malleswara Talla, both in Concordia University, Canada, present a case study where a reengineering of ITSM processes was conducted. The authors report that while exist several ITSM frameworks, most of them report only general recommendations. Thus, companies need to invest additional resources for deploying a particular process. In this case study, the company elaborated a traditional decision support system (DSS) for tracking a set of key performance indicators (KPIs) associated to several ITSM processes. By using such traditional DSS, the company was able to reengineering their processes and obtain improved ITSM metrics. This chapter, despite does not present an iDMSS, contributes to advance our knowledge on ITSM best practices introducing DSS for tracking KPIs that lately guide and justify ITSM reengineering efforts.

In the fourth chapter entitled *Managing Cloud Services with IT Service Management Practices*, Koray Ere, Thorsten Pröh, and Rüdiger Zarnekow in Technical University of Berlin, elaborate the case of the relevance of cloud computing for modern ITSM practices. The authors point out the importance of utilization of ITSM best practices in organizations, as well as the explosive growth of cloud computing service providers. However, the interrelationships and effects of the latter (cloud computing) on the former (ITSM practices) has been scarcely studied. Thus, the authors discuss and analyze the implications of hiring IT services from

cloud computing model on the internal ITSM practices. They suggest that such implications should be considered when the organization relies on distributed services in order to obtain an effective management. This chapter strictly does not report a particular application of iDMSS to ITSM. Nevertheless, this chapter presents a core topic in services (cloud computing services) and elaborates a map of current ITSM tools which could be enhanced with iDMSS capabilities.

In the fifth chapter entitled *Towards Semantic Support for Business Process Integration*, Roberto Pérez and Inty Sáez, in Central University “Marta Abreu” of Las Villas, Cuba, and Jorge Marx-Gómez in Carl von Ossietzky University of Oldenburg, Germany, present an analysis of the major contributions of the semantic processing approach to the business process integration. The authors also report a suggested design framework and its illustration with supply chain management processes. This chapter does not address directly the ITSM theme. However, from a software engineering view, the integration of process in workflow and business process management systems (BPMS) is a relevant theme. Furthermore, such problematic implies both the deployment of services and advanced IT mechanisms (like semantic processing). Thus, we believe this chapter can be useful to foster-related research in the specific themes of ITSM and iDMSS.

In the sixth chapter entitled *Integrating ERP with Negotiation Tools in Supply Chain*, Paolo Renna in Università degli Studi della Basilicata, Italy, report a new architecture of a multi-agent system for supply chain negotiations and its simulation results. In particular, this study refers to the Build to Order (BTO) operation mode where no previous stock exists of products. Thus, negotiations for getting timely and cost-effective components in a buyer centric e-marketplace become critical. Similar to the previous chapter, this does not address directly the ITSM theme. However, being ERP and SCS two of the most used IT services, their improvements are relevant for IT service implementers. Thus, we believe this chapter can be useful to foster related research in the specific themes of ITSM and iDMSS.

In the seventh chapter entitled *Adaptive Applications: Definition and Usability in IT-based Service Systems Management*, Ammar Memari and Jorge Marx-Gomez, both in Carl von Ossietzky University of Oldenburg, Germany, study the notion of adaptive application. First, the authors elaborate an informal definition from the literature review. Second, by using rough sets, the authors elaborate a formal definition. Finally, authors illustrate its usefulness in the field of IT service management. This chapter contributes directly to both ITSM and iDMSS research streams introducing the description power of rough sets, and how this mechanism can be used to formalize relevant concepts in ITSM. Such foundations can be further incorporated in a particular iDMSS.

In the eighth chapter entitled *Attitude-based Consensus Model for Heterogeneous Multi-criteria Large-Scale Group Decision Making: Application to IT-based Services Management*, Ivan Palomares and Luis Martinez in University of Jaen, Spain, present an innovative mechanism for reaching consensus in large decision groups: a fuzzy multi-criteria attitude-based model. The authors describe the characteristics, concepts, and algorithms of this mechanism and illustrate its

usefulness with a real case of selection of IT services in the banking domain. This chapter contributes directly and strongly to both ITSM and iDMSS research streams. Group decision-making is a relevant topic scarcely studied and applied in ITSM at present. Thus, this chapter helps to promote and foster the research and utilization of advanced decision-making practices in ITSM.

In the ninth chapter entitled *Improving Decision-Making for Clinical Research and Health Administration*, Alexandra Pomares and Rafael Gonzalez in Javeriana University, and Wilson Bohórquez, Oscar Muñoz, Dario Londoño, and Milena García, in San Ignacio University Hospital, in Colombia, report the experience gained in the development and implementation of a health decision-support system called DISEArch using a service approach. DISEArch uses data mining mechanisms for extracting useful knowledge from EHR (electronic health records). Initial empirical results show clear benefits of the iDMSS on the provided IT health service in the real setting. This chapter, thus, contributes to ITSM and iDMSS—from a software engineering view—with a report on the knowledge and learned lessons of an advanced IT service.

In the tenth chapter entitled *Architecture for business intelligence design on the IT service management scope*, Pablo Marin-Ortega and Patricia Pérez-Lorences in Central University of Las Villas, Cuba, and Jorge Marx-Gómez in Carl von Osietszky University Oldenburg, Germany, develops a working prototype of an intelligent DMSS for supporting IT BSC decisions and metrics. For its design authors use Principal Component Analysis statistical method and Compensatory Fuzzy Logic mechanisms. Authors illustrate the potential usefulness of this intelligent DMSS with data from an IT area in a real business setting.

In the last eleventh chapter entitled *Improving IT Service Management with Decision-Making Support Systems*, Manuel Mora in Autonomous University of Aguascalientes, Mexico, Gloria Phillips-Wren in Loyola University, USA, Francisco Cervantes-Pérez in CCADET UNAM México, Leonardo Garrido in Monterrey Tech, México, and Ovsei Gelman, in CCADET UNAM México, elaborate the case on the need of incorporating traditional and advanced decisional support through decision support systems (DSS) and intelligent DSS in all of the ITSM processes. Firstly, authors describe the foundations of decision-making process and DSS and i-DMSS. Secondly, using ITIL v3 a reference model, they describe the main ITSM processes and their implicit and explicit decisional situations. Finally, authors illustrate two examples (one for DSS and the other for i-DMSS) on how two specific ITSM decision situations can be supported by such systems. Lately, authors suggest that your research can be useful to foster more specific research on DSS and i-DMSS for ITSM.

Hence, we believe that these 11 chapters fit the aims of this book either directly or indirectly. However, we are sure that all of them report relevant and rigorous research useful for ITSM and iDMSS research streams and they are worthy to be disseminated in our research communities. Thus, we thank our colleagues who have contributed to the realization of this book submitting a high quality chapter, helping with the internal asked reviews, and improving their accepted chapters using the reviewer's recommendations. These colleagues represent an adequate

international landscape: USA, Germany, Canada, Italy, Spain, Mexico, Colombia, Malaysia, and Cuba.

We also thank Prof. Dr. Janusz Kacprzyk of the Polish Academy of Sciences, Systems Research Institute, Poland, and to Prof. Dr. Lakhmi C. Jain, Founding Director of the KES Centre, University of South Australia, Australia, editors of the Springer Intelligent Systems Reference Library book series, and the Springer staff for all the provided support for this book. Finally, we thank respectively our working institutions: Autonomous University of Aguascalientes, Mexico; Oldenburg University, Germany; Tecnológico de Monterrey, México; and CCADET Universidad Nacional Autónoma de México, México; for their continual support for our research activities.

Aguascalientes, Mexico
Oldenburg, Germany
Monterrey, México
Ciudad Universitaria, México

Manuel Mora
Jorge Marx Gómez
Leonardo Garrido
Francisco Cervantes Pérez

References

1. Chesbrough, H., Spohrer, J.: A research manifesto for services science. *Commun. ACM* **49**(7), 35–40 (2006)
2. IfM and IBM. *Succeeding Through Service Innovation: Developing a Service Perspective for Education, Research, Business and Government*. University of Cambridge Institute for Manufacturing, Cambridge (2008)
3. Dermikan, H., Spohrer, J., Krishna, V.: Introduction of the science of service systems. In: Dermikan, H., Spohrer, J., rishna, V. (eds.) *The Science of Service Systems*. Service Science: Research and Innovations in the Service Economy Series, 1–10, Springer, New York (2011)
4. Forgionne, G.A., Gupta, J.N.D., Mora, M.: Decision making support systems: achievements, challenges and opportunities. In: Mora, M., Forgionne, G., Gupta, J.N.D. (eds.) *Decision Making Support Systems: Achievements and Challenges for the New Decade*, pp. 392–403. Idea Group, Hershey (2002)
5. Phillips-Wren, G., Mora, M., Forgionne, G., and Gupta, J.: An integrative evaluation framework for intelligent decision support systems. *Eur. J. Oper. Res.*, **195**(3), 642–652 (2009)
6. Goul, M., Henderson, J., Tonge, F.: The emergence of artificial intelligence as a reference discipline for decision support systems research. *Decis. Sci.*, **23**, 1263–1276 (1992)
7. Eom, S.: An overview of contributions to the decision support systems area from artificial intelligence. *Proceedings of the AIS Conference*, Baltimore, 14–16 Aug (1998)
8. Mora, M., O'Connor, R., Raisinghani, M., Macias-Luevano, J., and Gelman, O.: An IT service engineering and management framework. *Int. J. Serv. Sci. Manage. Eng. Tech.* **2**(2), 1–16 (2011)

Engineering and Management of IT-based Service
Systems

An Intelligent Decision-Making Support Systems
Approach

Mora, M.; Marx Gómez, J.; Garrido, L.; Pérez, F.C. (Eds.)

2014, XII, 232 p. 64 illus., Hardcover

ISBN: 978-3-642-39927-5