GUEST EDITORIAL PREFACE

Special Issue on the Theme of Engineering and Management of IT-Based Service Systems: A Systems Approach

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This issue of the International Journal of Information Technology and the Systems Approach (*IJITSA*) is a special issue on the theme of Engineering and Management of IT-based Service Systems: A Systems Approach.

While services –as a type of business classification (Quinn, 1992)- and service systems have been engineered, managed and studied from early past century (Chase & Apte, 2007), their core re-foundations can be tracked recently (Cook et al., 1999). Furthermore, the economic relevance of service systems (or service sector in general) in the modern worldwide economy is totally recognized. As Sheenan (2006) reports "*business organizations focused on delivering help, utility, experience, information or other intellectual content ... account for more than 70% of total value added in the OECD*". Thus, service systems and service concept - as opposed to the product concept or the single post-sale business activity - have experienced fundamental changes, and acquired a high-practical business and theoretical relevance.

The service-oriented paradigm has permeated several disciplines (Chesbrough & Spohrer, 2006) and some of them are: Information Systems (Demirkan & Goul, 2006; Rai & Sambamurthy, 2006), Software Engineering (Kontogiannis et al., 2006: Zhao et al. 2008) and Systems Engineering (Tien & Berg, 2003; Tien, 2008). In particular, IT-based service systems can be defined as *"... a value coproduction configuration of people, IT, other internal and external service systems, and shared information (such as language, processes, metrics, prices, policies, and laws*." (adapted from

Spohrer et al., 2007). Accordingly, a service can be defined –in general- as *"... the application of resources (including competences, skills, and knowledge) to make changes that have value for another (system)*" (idem, 2007).

In this special issue, we pursue to advance our scientific knowledge of the processes, methodologies, techniques and tools for engineering and managing IT-based service systems under a Systems Approach. In particular, in this special issue we are interested in advancing the scientific knowledge on how to design IT-based service systems, as systems which comprise hardware, software, network infrastructure, data, IT environment and people components (Gallup et al., 2009). While models of processes for engineering and managing IT-based service systems (like ITILv2, ITIL v3, CMMI-SVC, CobIT, ITUP, MOF 4, ISO 20000) have been posed, their specific practices are still unclear and few used by most IT practitioners.

We consider such a topic to be mandatory to foster a cost-effective and trustworthy engineering and management of IT-based service systems (Buede, 2000). Additionally, since IT-based service systems are also systems (Tien, 2008; Alter, 2008; Mora et al., 2009) their essential and shared attributes for general systems (Ackoff, 1971; Gelman and Garcia, 1989) should be considered. Based on the aforementioned issues for systems, service systems, and IT-based systems, we believe that a Systems Approach (Ackoff et al., 1971; Checkland, 2000) and a Systems Engineering view (Sage, 2000; Buede, 2000) can be helpful for this aim. A Systems Approach can be defined as an answering and problem-solving system comprised of: (i) systemic philosophical paradigms (P's: an ontological, epistemological and axiological stance on the world): (ii) systemic theoretical frameworks (F's: ideas-constructs, theories, and models); (iii) systemic methodologies (M's: methods, techniques, and instruments), and (iv) situational areas identified as systems (A's: natural, artificial or social objects, artifacts and subjects under study). Similarly, a Systems Engineering discipline, can be briefly defined as "the interdisciplinary approach and means to enable the realization of successful (cost-efficient and trustworthy) systems".

This special issue releases five relevant research papers to our international research and professional community interested in addressing IT problems, opportunities and challenges found in organizations using the Systems Approach and particularly interested in IT-based service systems. First and fifth paper were invited papers from guest editors and received two internal reviews for their final publishing authorization. From second to fourth paper, were received from the open call for papers, and after a thorough 2-round cycle review, were finally accepted.

In this first paper entitled On the Transition of Service Systems from the Good-dominant Logic to Service-dominant Logic – a System Dynamics Perspective -, Carlos Legna – emeritus Professor in the La Laguna University, Tenerife, Spain – and Miroljub Kljajic – emeritus Professor in the University of Maribor, Slovenia, present an analysis of characteristics of the Service-dominant Logic (introduced by Vargo & Lusch, 2006) and contrast it with the previous and still current Good-dominant Logic for understanding human organizations (business, governmental units, foundations, etc). The authors elaborate their analysis under System Approach lenses (in particular System Dynamics). They propose more systemic interpretations for the core concept of service systems and identify that these systems generate new values but also they can destroy old ones. The authors review several published research cases in System Dynamics that qualify as service systems and conclude that System Dynamics is a powerful research tool and method for studying this new and relevant construct. This paper contributes to IT-based Service Systems research stream providing important and updated insights on the potential of System Dynamics as a research tool and method for advancing our scientific knowledge on these systems.

In the second paper entitled A Systemic and Participative Design of Decision-support Services for Clinical Research, Alexandra Pomares, Rafael A. González, Wilson Bohórquez, Oscar Muñoz, Olga Milena, and Dario Londoño, at the Pontificia Universidad Javeriana, and Hospital Universitario San Ignacio, both institutions located in Colombia, report the design and evaluation of an IT-based service system in the healthcare sector. This sector has been one of the most traditional service sectors and IT has been an innovation engine for it in the last decade. The authors propose that a correct IT-based service decision support can be realized through a real systemic and participative design where IT develop team and IT users interact during the development process. Furthermore, the authors use data-mining techniques for enhancing the clinical research service provided to IT users with analysis of structured and non-structured data. This IT-based service support system is elaborated by following strict design research guidelines. The authors report that user's evaluations are positive due to these design approaches (systemic, participative, and design research). This paper, thus, contributes to the Information Systems area –in particular for the IT-based service systems design in the Healthcare sector- by providing successful evidences on the utilization of systemic-participate design techniques for elaborating complex IT-based service systems: clinical decision support systems.

In the third paper entitled Supporting the Module Sequencing Decision in ITIL Solution Implementation: an Application of the Fuzzy TOPSIS Approach, Ahad Zare, Taha Mansouri, and Mohammad Mohammadi, at Allameh Tabataba'i University, Iran, and Saeed Rouhani, at Iran University of Science and Technology, Iran, report the application of a Fuzzy TOPSIS approach to a real problem of ITIL process implementation. 40 criteria were identified and grouped by using a BSC approach (e.g. in financial, customer, internal business, and learning and growth criteria). Seven ITIL v3 modules were evaluated by ITIL implementers and ITIL users through this innovative decision support approach. Authors, thus, contribute to the IT service management research stream with the innovative proposal of using advanced techniques (as decision support systems) for making relevant ITSM/ITL implementation decisions. Given the scarce literature of similar cases, this research brings to ITSM/ITIL community the need to introduce these advanced techniques.

In the fourth paper entitled NLS: A Reflection Support System for Increased Inter Regional Security, V. Asproth, K. Ekker, S. C. Holmberg, and A. Håkansson, at Mid Sweden University, Sweden (first, third and fourth authors) and at Nord Trondelag University College, Norway (second author), report a critical case by using action research in the domain of emergence systems for country border teams. Net Agora Learning System (NLS) was designed and tested on real training rescue operations by authors with the aim of improving the support for critical emergence decisions regarding rescue teams (in particular the border between Sweden and Norway). Authors found by using anticipatory modeling and simulation techniques –under an action research paradigm- that rescue operations are delayed and misguided due to shortcomings in the communication between security command and communication centers. Thus, the authors identify that nevertheless the high preparation of the individual rescue teams and units, systemic design problems precludes of a timely and effective rescue service. The authors conclude that systems like NLS can facilitate and stimulate reflection through an action and double-loop learning, which lately can lead to improve communication patterns by anticipatory learning systems. Hence, this paper contributes to Systems Engineering and ITSM areas, providing useful research insights for improving critical rescue services by using IT-based service systems as training tools for creating awareness of the current rescue service system's shortcomings.

In the last – fifth - paper entitled An Extensive Review on IT Service Design in Seven

International ITSM Processes Frameworks: Part I, Manuel Mora, Mahesh Raisinghani, Rory O'Connor, Jorge Marx Gomez, and Ovsei Gelman, respectively at Autonomous University of Aguascalientes, Mexico; Texas Woman's University, USA; Dublin City University, Ireland; University of Oldenburg, Germany; and Universidad Nacional Autónoma de México, Mexico, report a deep conceptual descriptive-comparative study of IT service design fundamental concepts. The reviewed ITSM fundamental concepts are: design as noun, design as verb, service, service system, IT service, IT service system, and IT service architecture design. The authors elaborate this conceptual review through the analysis of the IT service design process included in seven top international IT Service Management (ITSM) processes frameworks (ITIL v2, ITIL v3 (updated to ITIL v2011), ISO 20000-4, CobIT 4.0, CMMI-SVC, MOF 4.0, and ITUP). For this analysis, the authors use systemic conceptualizations for service systems. Their main findings indicate that the frameworks ITIL v2, ISO/IEC 20000 and Cobit 4.0 are using weak systemic concepts, while the frameworks ITIL v3, CMMI-SVC, ITUP and MOF 4.0 are more foundationally congruent with the new service systems view. Hence, this paper contributes to the IT area and ITSM research stream with answering the following key research questions: (i) what are the foundational concepts of service, IT service, system and service system used in each ITSM processes framework ?; (ii) what is the used description for an IT service design architecture model in each ITSM processes framework ? and (iii) what are the degree of compliance of the first two previous elements regarding the modern view of services and service systems ? With these findings, ITSM academicians and professionals can acquire a better understanding of the fundamental concepts used in ITSM area.

These five high quality research papers constitute the IJITSA 7(2) issue. Hence, we consider that the 14th IJITSA issue contributes –as past issues- to advance our scientific and practical knowledge of structures, mechanisms, and plausible solutions on relevant theoretical and real problems found in the fields of Information Technology, Software Engineering, Systems Engineering and Philosophy of System Sciences, from an interdisciplinary systems paradigm. High quality research papers that contribute to this aim are asked in this journal.

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REFERENCES

Ackoff, R. (1971). Towards a system of systems concepts. *Management Science*, *17*(11), 661–671. doi:10.1287/mnsc.17.11.661

Alter, S. (2008). Service systems fundamentals: Work systems, value chains and life cycle. *IBM Systems Journal*, *47*(1), 71–85. doi:10.1147/sj.471.0071

Beachboard, J. et al. (2007). AMCIS 2007 panel on IT service management: IT service management in the IS curriculum. *Communications of the AIS*, *20*(35), 555–566.

Buede, E. (2000). *The engineering design of systems. (Wiley Series in Systems Engineering* (A. Sage, Ed.). New York, NY: Wiley.

Chase, R., & Apte, U. (2007). A history of research in service operations: What's the big idea? *Journal of Operations Management*, *25*(2), 375–386. doi:10.1016/j.jom.2006.11.002

Checkland, P. (2000). *Systems thinking, systems practice: Includes a 30-year retrospective*. Chichester, UK: Wiley.

Chesbrough, H., & Spohrer, J. (2006). A research manifesto for services science. *Communications of the ACM*, *49*(7), 35–40. doi:10.1145/1139922.1139945

Cook, D., Goh, C., & Chung, C. (1999). Service typologies: A state of the art survey. *Production and Operations Management*, *8*(3), 318–338. doi:10.1111/j.1937-5956.1999.tb00311.x

Demirkan, H., & Goul, M. (2006). AMCIS 2006 panel summary: Towards the service oriented enterprise vision: Bridging industry and academics. *Communications of the AIS*, *18*(26), 546–556.

Gallup, S., Dattero, R., Quan, J., & Conger, S. (2009). An overview of IT service management. *Communications of the ACM*, *52*(5), 124–127. doi:10.1145/1506409.1506439

Gelman, O., & Garcia, J. (1989). Formulation and axiomatization of the concept of general sys-tem. *Outlet of the Mexican Institute of Planning and Systems Operation*, *19*(92), 1–81.

Kontogiannis, K., Lewis, G. A., Smith, D. B., Litoiu, M., Muller, H., Schuster, S., & Stroulia, E. (2007). The landscape of service-oriented systems: A research perspective. In *Proceedings of the International Workshop on Systems Development in SOA Environments* (pp. 1-6). IEEE Computer Society. doi:10.1109/SDSOA.2007.12

Mora, M., Raisinghani, M., O'Connor, R., & Gelman, O. (2009). Toward an integrated conceptualization of the service and service system concepts: A systems approach. *International Journal of Information Systems in the Service Sector*, *1*(2), 36–57. doi:10.4018/jisss.2009040103

Quinn, J. B. (1992). *Intelligent enterprise*. New York, NY: The Free Press.

Sage, A. (2000). Systems engineering education. *IEEE Transactions on Systems, Man and Cybernetics. Part C, Applications and Reviews*, *30*(2), 164–174. doi:10.1109/5326.868437

Sheehan, J. (2006). Understanding service sector and innovation. *Communications of the ACM*, *49*(7), 43–47. doi:10.1145/1139922.1139946

Spath, D., Ganz, W., & Tombell, A. (2008). Forward-looking service research to serve the future service economy. In D. Spath, & W. Ganz (Eds.), *The future of services: Trends and perspectives* (pp. 1–13). Hanser. doi:10.3139/9783446418806

Spohrer, J., Maglio, P. P., Bailey, J., & Gruhl, D. (2007). Steps toward a science of service systems. *Computer*, *40*(1), 71–77. doi:10.1109/MC.2007.33

Spohrer, J., Vargo, S. L., Caswell, N., & Maglio, P. (2008). The service system is the basic abstraction of service science. In *Proceedings of the 41st Annual Hawaii International Conference on System Sciences* (pp. 104-104). IEEE. doi:10.1109/HICSS.2008.451

Tien, J. (2008). Services: A system's perspective. *IEEE Systems Journal*, *2*(1), 146–157. doi:10.1109/JSYST.2008.917075

Tien, J., & Berg, D. (2003). A case for service systems engineering. *Journal of Systems Science and Systems Engineering*, *12*(1), 13–38. doi:10.1007/s11518-006-0118-6

Vargo, S. L., & Lusch, R. F. (2006). Service-dominant logic: What it is, what it is not, what it might be. In R. F. Lusch (Ed.), *The service-dominant logic of marketing: Dialog, debate and directions*. Amonk, NY: M. E. Sharpe.

Zhao, J. et al. (2008). ICIS 2007 panel report: Bridging service computing and service management: How MIS contributes to service orientation. *Communication of the AIS*, *22*(22), 413–428.