Guest Editorial Preface

Special Issue on Big Data Systems, Analytics, Techniques, and Services

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The special issue of IJSSOE is devoted to Big Data and its relevance to system and service oriented engineering information systems in today's world. The guest editors for this Special Issue are William H. Money and Stephen H. Kaisler. The deadline for submissions to this Special Issue was June 15, 2017. The papers included are augmented revisions of papers previously submitted and presented at the five Big Data minitrack conference proceedings for the Hawaii International Conference on System Sciences (Hicss-46 thru HICSS-50).

Approximately 40 Big Data focused papers were presented at these HICSS conferences. HICSS is a one of the largest and most impactful communities of researchers in the field of MIS and system sciences with sustained streams of innovative research ideas with 19,000+ publications, and many of them have resulted in seminal work. Overall acceptance rate for HICSS-50 was 47%. The 2016 impact factor was 2.4. All HICSS papers are blind reviewed by at least three referees and the minitrack chairs. Authors are required to attend the conference. Acceptance is based on a strict peer review in a double-blind process from June through August of each year. The papers in this special have been chosen for this issue because in their modified and amplified content they address the characteristics and describe the value of Big Data and the concerns with its impact upon system services and service oriented engineering approaches.

We believe the service-focused software engineering environment and the researchers who greatly influence the practices and tools in this field are striving to develop new and comprehensive methods for designing and engineering complex and responsive service-oriented systems. It is also clear that many researchers from various data and application focused technology fields are presenting and describing many advancements and Innovative findings and practices with Big Data. This issue targets theoreticians, educators, and researchers who seek to understand how the Big Data phenomena can be incorporated into service oriented system theories, and software engineering approaches with a focus on software utilizing services delivered through communication protocols over various transporting networks.

The article previews and their content and our rationale for publishing this special issue focusing jointly on service engineering and Big Data are presented below. First, service engineering is important because services are computational modules of software that can be utilized by system engineers to programmatically assemble applications using agreed upon protocols to construct systems and networks that work in partnership to deliver applications and functionality across and between organizations. We believe Big Data are hugely relevant and important in many areas that vary across many fields and applications from entertainment, logistics, healthcare, and finance

to communications. Big Data are a real and growing phenomenon that must be incorporated into automated decision processes that are directly relevant to processes and practices that deliver services and benefits to many fields. Big data enables organizations to recognize and respond to change and growth, and support innovation through the analysis of data sets simply too large, moving too fast, and constructed with structured and unstructured data that cannot be managed through traditional computing environments. The challenge therefore is to envision and engineer significant techniques, tool sets, methods and training for use in building systems that do more than simply study data and advance marketing and trading programs.

Thus, we postulate that services and service engineering provide an important strategy and method to aid in the integration, utilization and appreciation of the growing volumes of Big Data. The combination of the work on both areas is important to the information systems discipline because systems engineering and Big Data professionals are both engaged in improving the performance of organizations. They jointly aid in our quest to learn and develop techniques to ensure that Big Data will successfully contribute to organizational performance. Together they enhance the practical relevance of Big Data research and offer engineering solutions far beyond simple examples and assessments of the risks and opportunities that may exist in specific Big Data sets.

The Big Data papers in this issue seek to describe how services and service engineering can solve practical problems and expanding scientific knowledge by furthering our understanding of Big Data and its inclusion in the information systems arena. What, why and how things happen; and what can be used to predict the future of events may hide, to an extent, in Big Data. Answering these questions involves developing new designs, framing and executing software and systems and demonstration tasks, and employing data analytic methods that advance our understanding while recognizing the important problems, limitations, and qualifying factors in many research and practical settings.

The first article states that Big Data has almost emerged unarguably as the "new" business and social science frontier that is highly driven by technological evolution and methodological approaches that promise that in only a few years more Big Data will be obtainable in massive volumes, velocities, and varieties greater than all the data previously accumulated since history has been recorded. The astounding amounts of information suggest that an explosive amount of knowledge can (and should) be extracted from this unending and previously unimagined digital data set universe. But while it expands, and users come up with new ways to collect, massage and process data, the implications of this explosion must be understood, and planned for, and its limitations acknowledged. The paper therefore presents a time-based snap-shot of the current state of what we now know as Big Data.

The second article describes new model dynamics that are dependent on adaptive modeling. They are employed in a Big Data application applied for a real-time auction bidding scenario for mobile display advertising. Conventional modeling lifecycles no longer apply for the demand-side platform (DSP) processing tasks in this application. The paper shows how very large and volatile datasets can be joined with an equally large portfolio of dynamic propensity models and bid optimization strategies. This work begins to effectively transforms the model management landscape to focus on prediction and recommendation with new techniques and approaches.

The third article presents a process model that extracts and explains cost pool attribution and improves cost transparency. This issue is difficult to address in layered and heterogeneous system environments that are technically and functionally complex. Distribution of costs across functionally decomposed task hierarchies is difficult because of their inherent complexity and interdependencies and, thus, requires an iterative process to ensure an equitable allocation that reflects business and management goals, objectives, and priorities. Allocations of costs are then qualified with a structured cost model implemented iteratively for improved accuracy on an organization-specific basis. The resultant model is transparent and understandable from the service consumer point of view.

Finally, an introductory path forward for educating individuals about Big Data as it applies to service engineering is illustrated via the techniques and approaches used to introduce undergraduates to this topic. Real social media datasets, data wrangling, and iterative processing effectively introduce

new methods, tools, and cloud-based Big Data services. This paper provides a mechanism for evaluating the understanding of concepts and utilization of tools and techniques to wrangle data and then develop models for predictive and prescriptive results.

We believe that Big Data and service engineering have an important contribution to make and we look forward to participating in this important research area in our future work.

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William H. Money, Associate Professor, Baker School of Business, The Citadel, Charleston, SC joined the Citadel in August 2014. Dr. Money served as an Associate Professor of Information Systems at the George Washington University, and as the director of the Executive Master of Science in Information Systems program. He joined the George Washington University, School of Business and Public Management faculty in September 1992 after acquiring over 12 years of management experience in the design, development, installation, and support of management information systems (1980–1992). His publications over the last 6 years and recent research interests focus on collaborative solutions to complex business problems; business process engineering and analytics; and information system development, collaboration, and workflow tools and methodologies. Previous teaching experience includes Purdue, Kent State, and American Universities. Dr. Money's academic training includes the PhD, Organizational Behavior Northwestern University, Graduate School of Management; the MBA, Management, 1969, Indiana University; and a BA, Political Science, 1968, University of Richmond. Dr. Money has had numerous speaking engagements at professional meetings and publishes in information systems and management journals. Dr. Money has significant consulting experience in private, federal organizations, including the Department of State, D.C. Government, Department of Transportation, Coast Guard, and Department of the Navy.