



Research in Information Systems Analysis and Design: Introduction to the Special Issue

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Abstract

Information systems analysis and design (ISAD) arguably lies in the core of the Information Systems (IS) discipline. Although ISAD is central to the IS curriculum, it remains somewhat at the periphery of research in leading journals. A recent study (Vessey, Ramesh, and Glass 2002) showed that few of the articles published in five leading IS research journals from 1995 to 1999 deal with these topics. This special issue is the outcome of a special joint initiative between the Journal of the Association for Information Systems (JAIS) and the Communications of the Association for Information Systems (CAIS), with the purpose of beginning to fill this void and to attract the attention of researchers to this important area. The papers in this issue illustrate a range of ISAD topics – conceptual modeling, database design, and the role of knowledge management in systems development project performance.

Introduction

Information systems analysis refers to a number of activities in the early stages of information systems development. The main purpose of systems analysis is to identify and document the requirements for an information system to support organizational activities. Information systems design refers to the process of defining the system architecture, components, modules, interfaces, and data for a software system to satisfy the requirements specified during systems analysis. A substantial part of system development failures can be attributed to problems that arise during systems analysis. Hence, understanding and improving systems analysis and design are central to the research mission of the Information Systems (IS) discipline.

Systems analysis and design are basic topics in the IS curriculum, and a large number of IS graduates become information systems analysts. However, research in the IS field pays relatively little attention to systems analysis and design. A recent study by Vessey, Ramesh, and Glass (2002) showed that few of the articles published in five leading IS journals from 1995 to 1999 dealt with these topics. Bajaj et al. (2005) identified the need for greater alignment between research and teaching in the area of information systems analysis and design. JAIS and CAIS have pursued this special joint theme with the purpose of attracting the attention of more researchers to the important area of systems analysis and design and alleviating the existing misalignment. This special issue of JAIS complements the December 2005 issue of CAIS (livari, Parsons, and Hevner 2005).

Developing the Special Theme

A proposal for the special theme was developed with close cooperation between JAIS and CAIS. Yair Wand and Alan Hevner acted as Senior Editors for JAIS and CAIS, respectively, and Juhani livari and Jeffrey Parsons acted as Guest Editors for both journals. The submission deadline for JAIS was March 1, 2005. Submissions were solicited via ISWORLD and SIGSAND-L (the listserve of the AIS Special Interest Group on Systems Analysis and Design). Authors had the opportunity to indicate whether their submissions were intended for either JAIS or CAIS; otherwise, assignments were made by the editors. The editors reserved the right to determine whether each submission was more appropriate for CAIS or JAIS.

Information systems analysis and design forms a rich research field. One can distinguish at least four dimensions within it:

1. ISAD activities and processes;
2. ISAD approaches, methods, techniques and tools;
3. Underlying theoretical basis of research;
4. Research methods used.

ISAD activities cover all analysis and design activities and processes included in IS development work. ISAD approaches, methods, techniques, and tools are artifacts developed to support the ISAD activities (livari et al., 2004). The underlying theoretical basis can be classified into theories for analysis and design (such as classifications and taxonomies), theories for explaining (such as grand social theories), theories for predicting (such as software cost estimation models), and theories for explaining and

predicting (Gregor, 2006).¹ Research methods may be conceptual; nomothetic, such as mathematical analysis, laboratory, or field experiments; field studies; sample surveys; idiographic methods such as case study, action research, and ethnography; or design science methods of constructing artifacts.

Assuming that each study applies some research methods, a piece of research can combine two or more of the four dimensions simultaneously. For example, one can study an ISAD activity such as communication in requirements construction in practice using the case study method, or the introduction and use of a specific ISAD method in the requirements construction activity using the action research method. Both investigations may adopt a specific theoretical perspective.

Keeping this richness in mind, the Call for Papers for the special theme welcomed work using any methodological approaches appropriate to a study's research objectives. It also welcomed polemical articles that challenge established views on issues related to information systems analysis and design, as long as they were grounded in a strong theoretical foundation and/or compelling empirical evidence.

We were pleased to receive in total 14 submissions to JAIS that addressed a number of ISAD activities, reflected a number of theoretical bases, and applied a number of research methods. The submissions were subjected to a rigorous peer review process. Of the 14 submissions, two were accepted for publication in this special issue. In addition, a third article that was not submitted originally for the special issue, but went through the regular JAIS review process, has been included due to its relevance to the theme.

Contents of This Issue

Three papers appear in this issue of JAIS on the special theme of Research in Information Systems Analysis and Design.

Bowen, O'Farrell, and Rohde examine the impact on query performance of competing database designs based on either ontological clarity considerations or traditional design approaches. Using a laboratory experiment, they find that overall query performance is better using ontologically clearer designs. A closer analysis shows that ontologically clearer designs lead to fewer query errors involving projection and restriction, but more errors involving joins. This work empirically demonstrates implications of using ontological analysis to guide information systems (database) design.

Patnayakuni, Ruppel, and Rai propose a theoretical model of the impact of knowledge management practices (collaborative exchange, explicit knowledge integration, and process formalization) on systems development performance. Using a survey, they provide evidence for the positive impact of supporting tacit and explicit knowledge processes on a range of project performance measures. Their evidence also shows that process formalization moderates the impact of other practices. The research offers a

¹ Theories for design and action in Gregor (2006) are included in ISAD approaches, methods and techniques in the ISAD context.

novel approach to understanding the impact of knowledge management practices in systems analysis and design on the performance of systems development projects.

Hadar and Soffer analyze variations in conceptual models constructed during information systems analysis and design. Developers were asked to construct conceptual class diagrams based on common problem descriptions. The researchers classify variations in the models constructed into types, thus highlighting how different modeling decisions can impact the outcome of conceptual modeling. To test whether such variations can be reduced if clear modeling guidelines were available, the paper analyzes the potential of two ontology-based modeling frameworks to provide guidance for modeling decisions related to the variations. This research offers a mechanism for understanding the kinds of variations that can occur in conceptual modeling, as well as the potential to apply ontological frameworks to reduce variations.

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About the Editors of the Special Issue

Juhani livari is Professor in Information Systems at the University of Oulu, Finland, and the Scientific Head of the INFWEST Postgraduate Education Program of six Finnish universities in the field of Information Systems. He received his M.Sc. and Ph.D. degrees from the University of Oulu. Dr. livari is the national representative of Finland in IFIP (International Federation of Information Processing) Technical Committee 8. He serves on the editorial boards of seven journals. His research focuses broadly on the theoretical foundations of information systems, information systems development methodologies and approaches, organizational analysis, implementation and acceptance of information systems, and the quality of information systems. He has published in journals such as *Communications of the ACM*, *Data Base*, *European Journal of Information Systems*, *Information & Management*, *Information Systems*, *Information Systems Journal*, *Information Systems Research*, *Journal of Management Information Systems*, *Journal of Organizational Computing and Electronic Commerce*, *MIS Quarterly*, and *Omega*.

Jeffrey Parsons is Professor of Information Systems and Associate Dean (Research) in the Faculty of Business Administration at Memorial University of Newfoundland. He received a Ph.D. from The University of British Columbia in 1992. His research interests include systems analysis and design, database management, and the Semantic Web. His research has been published in journals such as *Management Science*, *Communications of the ACM*, *ACM Transactions on Database Systems*, *Journal of Management Information Systems*, and *IEEE Transactions on Software Engineering*. He is a member of the editorial boards of *Journal of the Association for Information Systems* and *Journal of Database Management*, and is a member of the AIS, ACM, INFORMS, and the IEEE Computer Society.

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