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Conference Theme - Designing Digitalization

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About ISD

The International Conference on Information Systems Development (ISD) is dedicated to IS development and complements the international network of general IS conferences. ISD evolved from the first Polish-Scandinavian Seminar on Current Trends in Information Systems Development Methodologies, held in Gdansk, Poland in 1988. Since 1997 it has been held as an annual international conference and is now a highly regarded specialist IS conference.
The development of information systems has paralleled technological developments and the deployment of those technologies in all areas of society, including government, industry, community and in the home. As a practice-based discipline, ISD has always promoted a close interaction between theory and practice that has set an agenda focused on the integration of people, processes and technology within a specific context.

The theme of ISD2018 is **Designing Digitalization**. The conference focuses on mutual influences between information systems and organizational structures, processes and people and promotes research of methodological issues and ways in which the IS designers and developers are transforming organizations and society through information systems.

The ISD2017 conference tracks:
- Transforming Society with ISD
- ISD Education
- Human-Computer Interaction
- e-Health
- Information Systems Methodologies and Modelling
- Managing ISD
- Topics in ISD

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- Dijana Vukovac, Faculty of Organization and Informatics, University of Zagreb, Croatia
- Alfred Zimmermann , Reutlingen University
- Miguel Angel Zúñiga Prieto , Universitat Politècnica de València
- Henrik Åhman, Informatics and Media, Uppsala University
- Lena-Maria Öberg, Mid Sweden University

T1: Transforming Society with ISD

Track description:

Information Systems (IS) are contributing to transformative changes in business and everyday life of people. This is an era of digital Darwinism whereby digital technologies enable new types of innovation processes, and offer unprecedented opportunities for adding, recombining and integrating resources in services and products. Taken together, the exponential increases in technological capacity has been argued to distribute control and locus of innovation. These developments in Information Systems Development (ISD) can potentially increase citizen participation in democratic processes, standards of living, and transparency. Simultaneously, digitalization, poses new challenges. For example, social-media might lead to "filter bubbles" reinforcing our established beliefs, fusion of everyday practices with IS create privacy concerns, the "internet-of-things" escalates security related risks and artificial intelligence poses salient ethical considerations.

While new technological capabilities in IS are an important enabler of societal progress, technology alone does not create economic growth and social progress. Relationships are critical to beneficial interactions between technology, its users and the wider society. Without people, none of the progress and social gains IS enables would be possible. Issues like the impact of IS on quality of people's lives, employment, education, networking, communications, business and public organizations are main areas of contribution of this track, as well as the risks and ethical considerations it creates.

Track chairs:

Ida Asadi Someh, The University of Melbourne

Johan Sandberg, Umeå Universitet

Trevor Clohessy, National University of Ireland

Social Media Analysis in Crisis Situations: Can Social Media be a Reliable Information Source for Emergency Management Services?

Mehdi Ben Lazreg   *mehdi.ben.lazreg@uia.no*
University of Agder
Grimstad, Norway

Narayan Ranjan Chakraborthy   *narayan.chakraborthy@uia.no*
University of Agder
Grimstad, Norway

Stefan Stieglitz   *stefan.stieglitz@uni-due.de*
University of Duisburg-Essen
Duisburg, Germany

Tobias Potthoff   *tobias.potthoff@uni-due.de*
University of Duisburg-Essen
Duisburg, Germany

Björn Ross   *bjoern.ross@uni-due.de*
University of Duisburg-Essen
Duisburg, Germany

Tim Majchrzak   *timam@uia.no*
University of Agder
Grimstad, Norway

Abstract

Learning and understanding what happened before, during, and after a crisis is extremely important for the improvement of the response process. For this purpose, social media has become an important communication medium used by both the affected persons and the emergency management services (EMSs). However, in different crises, different information may be needed, and the information shared in social media varies in its usefulness: It could be highly critical or completely irrelevant to the rescue operation. Supplying the best possible up-to-date information is crucial to the EMS, whose actions based on that information may save lives and resources. This paper studies a particular use case of extreme weather in Norway and identifies the information needs, the problem faced by EMSs, and how they use social media. It, further, pinpoints what different social media analysis platforms can provide in this type of crisis. The results of the research are criteria that social media analysis should follow to address EMSs' concerns. The output of this work can be used to more precisely describe social media communication for crises and to design more efficient platforms for information retrieval from social media.
Keywords: Social media, Crisis management, Emergency management services.

Privacy Awareness in the GDPR Implementation Circumstances

Malgorzata Pankowska   *pank@ue.katowice.pl*
University of Economics in Katowice
Katowice, Poland

Abstract

Acting in a professional and ethical manner encourages business units to ensure that actions to protect privacy are performed in a reliable, consistent, responsible and effective manner. Some business people say that privacy protection can be considered a source of competitive advantage. General Data Protection Regulation (GDPR) fosters a privacy-positive culture development to provide a positive privacy protection influence on the Internet users' behaviors. GDPR mostly focuses on a framework of activities of business organizations and does not emphasize the role of the Internet users, whose reputation and positive image are exposed. Therefore, the paper aims to discuss hazard tolerance and resilience in the context of privacy by design approach development. The survey on usage of mobile devices and web services is the basis for the discussion. The exemplar survey reveals students' resilience to new media impact on their privacy.

Keywords: GDPR, privacy, mobile devices, web services, business analysis.

Green Support and the Use of Information Technology Products

Pakvalit Kurkoon *pakvalit_k@mail.rmutt.ac.th*
Faculty of Business Administration, Rajamangala University of Technology Thanyaburi
Thanyaburi, Pathum Thani, Thailand

Daranee Pimchangthong *daranee_p@rmutt.ac.th*
Faculty of Business Administration, Rajamangala University of Technology Thanyaburi
Thanyaburi, Pathum Thani, Thailand

Veera Boonjing *kbveera@kmitl.ac.th*
International College, King Mongkut's Institute of Technology Ladkrabang
Ladkrabang, Bangkok, Thailand

Abstract

Nowadays people need technology in their daily life. This fact involves endless manufacturing of IT products. It increases the environmental problem. Concerned parties know that green IT products and green businesses are eco-saviors. The problem is lack of the green knowledge. This paper proposes and tests a framework that predict consumer intentions to support eco-friendly IT products and businesses. Structural equation modeling techniques was employed for hypothesis testing. The result suggests that to gain support from consumers, there are five criteria: belief in the benefits of a green IT, voluntary spending extra price, green-labels recognition, environmental concerns and influence from green policies/culture. However, social influence was insignificant in the intention to support green IT products. Increasing educational experiences and age strengthen the skepticism about the green IT benefits. The resources sacrifices become stronger with the higher educational experience. The influence of environmental concern is strengthener along with age.

Keywords: Green intention, environmental friendly, green IT adoption, green purchasing

Gender-Based Perspectives of eLearning Systems:
An Empirical Study of Social Sustainability

Ahmed D. Alharthi
RMIT University
Melbourne, Australia

ahmed.alharthi@rmit.edu.au

Maria Spichkova
RMIT University
Melbourne, Australia

maria.spichkova@rmit.edu.au

Margaret Hamilton
RMIT University
Melbourne, Australia

margaret.hamilton@rmit.edu.au

Tawfeeq Alsanoosy
RMIT University
Melbourne, Australia

tawfeeq.alsanoosy@rmit.edu.au

Abstract

Digital technologies have an increasing impact on our everyday life. A large impact of software engineering on society also means that socio-cultural factors are becoming crucial for software systems. The gender and cultural diversity have significant impact not only on the software development process but also on the overall sustainability of the software as well as on the society where the software is used. Thus, these diversity aspects should be analysed while developing a software system. This paper presents an empirical study that investigates the gender and cultural differences in needs and usage of system features. Our focus is on eLearning systems used in Australia and Saudi Arabia, but the results of the study might be expanded to other application domains. To explore the differences, we applied a combination of qualitative and quantitative methods on the data collected from 177 participants. The results demonstrated the cultural and gender diversity may have a significant impact on user needs and preferences.

Keywords: Social Sustainability, Requirements Engineering, Society, Gender, Culture, eLearning Systems

Strategy Dynamics in Markets of Software Components

Di Shang   *Di.Shang@liu.edu*
Long Island University Brooklyn
New York, United States

Karl R. Lang   *Karl.Lang@baruch.cuny.edu*
Baruch College, City University of New York
New York, United States

Roumen Vragov   *rumvra@yahoo.com*
The Right Incentive LLC
Cold Spring, United States

Abstract

In this paper we propose a dynamic model of a software market for component reuse. We investigate the market dynamics using experiments with economically motivated human subjects. Our results suggest that the introduction of the software component market reduces production costs and increases vendor profits. The dynamic interactions in the component market helped vendors coordinate better their production decisions and resulted in production cost savings. The component market can thrive on a balance between competition and cooperation of software vendors. These experimental results could be applied with some modifications to the development of software products in general.

Keywords: Component markets, Strategy dynamics, Software reuse, Experimental economics

Health Data Access Barriers in a Finnish Insurance Company: A Case Study

Casandra Grundstrom   *casandra.grundstrom@oulu.fi*
University of Oulu
Oulu, Finland

Karin Väyrynen   *karin.vayrynen@oulu.fi*
University of Oulu
Oulu, Finland

Michael Persson   *michael.persson@oulu.fi*
University of Oulu
Oulu, Finland

Minna Isomursu   *miis@itu.dk*
IT University of Copenhagen
Copenhagen, Denmark

Abstract

The insurance industry in Finland is making a shift towards providing proactive healthcare services. Increasing availability of health data can provide means for creating personalized healthcare services. However, insurance companies are facing obstacles to access health data. This paper presents a case study of a large Finnish insurance company that is currently dealing with barriers of access during their transition to a more proactive organization. We identified nine barriers which fall into three categories – institutional, legislation, and use and participation. By identifying these barriers, we reveal critical factors for companies that seek to make use of their customers' health data are likely to face.

Keywords: health data access, proactive service, qualitative case study, barriers.

Information Sharing and Coordination in Collaborative Flood Warning and Response Systems

Vittorio Nespeca   *v.nespeca@tudelft.nl*
Delft University of Technology
Delft, South Holland, The Netherlands

Tina Comes   *t.comes@tudelft.nl*
Delft University of Technology
Delft, South Holland, The Netherlands

Leonardo Alfonso   *l.alfonso@un-ihe.org*
IHE Delft, Institute for Water Education
Delft, South Holland, The Netherlands

Abstract

The introduction of new information and communication technologies enables communities to share information and self-organize in the response to disasters. Crowd-sourcing approaches enable professional authorities to capture information from the ground in real-time. However, there is a gap between the professional and community-driven response: locally emergent initiatives may lack the overview needed for efficient coordination, while decisions taken by professionals may not consider the actual situation on the ground.

We study this information sharing and coordination gap through the lens of urban flood early warning and response systems. Based on a literature review combining academic articles as well as guidelines and reports from practice, we derive design principles for these systems. Considering the case study of Accra, specific requirements are individuated. The design principles are then used to address the requirements, resulting in a set of functionalities for a collaborative flood warning and response system. These functionalities provide the basis for further development and evaluation.

Keywords: Community Response, Community Resilience, Impact-Based Forecasting and Warning Systems.

T2: ISD Education

Track description:

This track aims to bring together researchers, professionals, and practitioners dealing with various aspects of the design, implementation, and evaluation of educational approaches, methods, artifacts, learning objects, and educational activities to creatively seek for sustainable, viable, effective, and efficient educational systems in ISD and other areas. The track invites submissions on theoretical foundations and examples of good practice related to the design, implementation, evaluation, adoption, and use of information systems in formal and informal educational contexts in ISD and other areas.

Track chairs:

Arto Lanamäki, University of Oulu, Finland

Lars Svensson, University West

Peter Bellström, Karlstad University, Sweden

Business Analytics Course Development at UNL

David Louis Olson   *dolson3@unl.edu*
Department of Supply Chain Management & Analytics, University of Nebraska-Lincoln
Lincoln, NE, USA 68588-0491

Abstract

The experience of a Big Ten US University in implementing business analytics at the undergraduate and master's levels is reviewed, to include motivation, curriculum design, and course delivery. Each program element is described, to include motivating factors impinging on curricular design. Course content in each of these programs is summarily presented, along with problems encountered and the solutions implemented. Comparison with other Big Ten institutions is briefly reviewed. The impact in terms of current enrollments will be discussed.

Keywords: Business analytics, curricular development, quantitative analysis

Advancing ISD Education Research with bioecological systems theory

Niamh O Riordan   *niamh.oriordan@ucd.ie*
Assistant Professor, Management Information Systems, University College Dublin, Ireland.

Simon Warren
Associate Professor, Enheden for Akademisk Efteruddannelse, Roskilde Universitet, Danmark

Abstract

The Information Systems (IS) community designs and delivers IS curricula in higher education and faces pedagogical challenges in teaching some complex and technical material. Many of us are involved in the design, implementation, evaluation, adoption, and use of IS to support education and training in academia and in industry. Yet IS research on education is often based on technologically deterministic assumptions about the impact of technology on education outcomes and involves narrowly focused studies on the use and impact of technology in education. In this paper, we introduce IS to Bioecological Theory (BET), whose insights have had a transformative effect in the field of developmental psychology but not well known in IS. We use BET to map existing literature on IS and Higher Education and also outline how this theory can be used in IS to inform the design of technological artifacts to support students' learning processes.

The Use of Gamification in an Introductory MIS Course: the Views of Game Participants and Game Conductors

Mathupayas Thongmak   *mathupayas@tbs.tu.ac.th*
Thammasat Business School, Thammasat University
Bangkok, Thailand

Abstract

Gamification gives opportunities for instructors and majors to attract more students. However, there are limited studies and understanding about gamification in education and its suitable implementation. So, this work guide a simple process to implement gamification in classroom environments and evaluate the results of implementation using self-reported from students who are assigned to be game conductors and game participants. The results from an experimental study show the increase of students' perceived usefulness (understanding, problem solving skills, creativity, and topic interests) and their engagement intention (game engagement intention, class attendance intention, and class participation intention) after conducting or joining in-class games. Guidance to easily implement gameful experiences for students could be applied from an example in this study.

Keywords: Gamification, undergraduate student, introductory MIS course, perceived usefulness, engagement intention

Learning Programming Using Educational Robotics (paper 26)

Abstract

The research reported in this paper fits into the generic problem of programming learning. In this context, the primary research objective of this study is to analyze if robotics facilitates programming learning. To tackle the problem, we developed a robotic kit and a small course. The robotic kit used Arduino platform and was presented in the context of this course. The course consisted of programming concepts. This course was taught to higher education students, with no previous programming knowledge. In the end, we analyzed the impact of the course. Results demonstrate that students showed interest in using robotics to learn computer programming. Results also showed the main adoption determinants of the robotic kit. Enjoyment is the most relevant to the robotic kit intention to use. However, perceived ease is the dimension that has more impact on robotic kit usage.

Keywords: Educational Robotics; Arduino; Programming Component; Adoption Model.

Australian Undergraduate Information Systems Curricula: a comparative study

Joan Richardson   *joan.richardson@rmit.edu.au*
RMIT University
Melbourne, Australia

Frada Burstein   *frada.burstein@monash.com.au*
Monash University
Melbourne, Australia

Ana Hol   *A.Hol@westernsydney.edu.au*
Western Sydney University
Sydney, Australia

Rodney J Clarke   *rclarke@uow.edu.au*
University of Wollongong
Wollongong, Australia

Jim M McGovern   *jim.mcgovern@rmit.edu.au*
RMIT University
Melbourne, Australia

Abstract

The paper describes the first comprehensive comparative study of undergraduate Information Systems (IS) degree programs in Australia using the model curricula outlined in ACM/AIS IS2010 as a reference point. The study had three broad aims: 1) to compare the Australian IS curriculum with that of other major IS education systems internationally, 2) to identify what subject areas are considered mandatory and what are considered optional in Australian IS programs, and 3) to understand if the host academic division within different disciplines (e.g. Business or Science/Engineering/Information Technology) has an influence on the variations in the subject areas offered. In a first phase, 2017 IS degree program data was obtained from university websites. In a second phase, this data was validated in consultation with academic staff from those universities offering the programs. The conclusion is that a high level of adherence to the IS2010 curricula was evident in core courses; considerable diversity was found in a long tail of non-core offerings; and the location of the host academic unit within Business or Science/Engineering/Technology influenced the subject areas offered.

Keywords: IS2010. Information Systems Curricula, Computing Education,

Map My Career: Connecting University Curriculum with Employment

Sarath Tomy   *S.Tomy@latrobe.edu.au*
La Trobe University, Department of Computer Science and Information Technology
Melbourne, Australia

Eric Pardede   *E.Pardede@latrobe.edu.au*
La Trobe University, Department of Computer Science and Information Technology
Melbourne, Australia

Abstract

Often universities are criticized for not generating qualified graduates to supply to the job market, because of the mismatch between the higher education outputs and industry demands. The fast-changing skills and competence requirements make it difficult for students to understand the specific skills required for specific jobs. The research aims to propose a model called 'Map My Career' to improve the fit between university curriculum and the job market, which can reduce the university-industry skill gaps. The model is implemented as a software application using text mining and data analytics that can be used by university students to match the skills that can be achieved by completing their subjects and the required skills of particular career options. The paper examines the effectiveness of the application by evaluating its functionalities from the perspective of the prime beneficiaries of graduate employability: students, employers and universities.

Keywords: graduate employability, skill mapping, work-ready graduates.

Earliest Predictor of Dropout in MOOCs: A Longitudinal Study of FutureLearn Courses

Alexandra Ioana Cristea   *alexandra.i.cristea@durham.ac.uk*
*Computer Science, Durham University, Durham, UK

Ahmed Alamri*   *ahmed.alamri@durham.ac.uk*

Mizue Kayama   *kayama@cs.shinshu-u.ac.jp*
Shinshu University, Shinshu, Japan

Craig Stewart   *craig.stewart@coventry.ac.uk*
Coventry University, Coventry, UK

Mohammad Alshehri*   *mohammad.alshehri@durham.ac.uk*

Lei Shi   *lei.shi@liverpool.ac.uk*
University of Liverpool, Liverpool, UK

Abstract

Whilst a high dropout rate is a well-known problem in MOOCs, few studies take a data-driven approach to understand the reasons of such a phenomenon, and to thus be in the position to recommend and design possible adaptive solutions to alleviate it. In this study, we are particularly interested in finding a *novel early detection mechanism* of potential dropout, and thus be able *to intervene at an as early time as possible*. Additionally, unlike previous studies, we explore a light-weight approach, based on as little data as possible – since different MOOCs store different data on their users – and thus strive to create a truly generalisable method. Therefore, we focus here specifically on the generally available *registration date* and its relation to the course start date, via a *comprehensive, larger than average, longitudinal study of several runs of all MOOC courses at the University of Warwick between 2014-1017*, on the less explored European FutureLearn platform. We identify specific periods where different interventions are necessary, and propose, based on statistically significant results, specific *pseudo-rules for adaptive feedback.*

Keywords: Learning Analytics, FutureLearn, longitudinal study, MOOC.

How is learning fluctuating? FutureLearn MOOCs fine-grained temporal Analysis and Feedback to Teachers and Designers

Alexandra Ioana Cristea   *alexandra.cristea@durham.ac.uk*
Computer Science, Durham University, Durham, UK

Mohammad Alshehri*   *mohammad.alshehri@durham.ac.uk*

Ahmed Alamri*   *ahmed.alamri@durham.ac.uk*

Mizue Kayama   *kayama@cs.shinshu-u.ac.jp*
Shinshu University, Shinshu, Japan

Craig Stewart   *craig.stewart@coventry.ac.uk*
Coventry University, Coventry, UK

Lei Shi   *lei.shi@liverpool.ac.uk*
University of Liverpool, Liverpool, UK

Abstract

Data-intensive analysis of massive open online courses (MOOCs) is popular. Researchers have been proposing various parameters conducive to analysis and prediction of student behaviour and outcomes in MOOCs, as well as different methods to analyse and use these parameters, ranging from statistics, to NLP, to ML, and even graph analysis. In this paper, we focus on patterns to be extracted, and apply systematic data analysis methods in one of the few genuinely large-scale data collection of 5 MOOCs, spread over 21 runs, on FutureLearn, a UK-based MOOCs provider, that, whilst offering a broad range of courses from many universities, NGOs and other institutions, has been less evaluated, in comparison to, e.g., its American counterparts. We analyse temporal quiz solving patterns; specifically, the less explored issue on how the first number of weeks of data predicts activities in the last weeks; we also address the classical MOOC question on the completion chance. Finally, we discuss the type of feedback a teacher or designer could receive on their MOOCs, in terms of fine-grained analysis of their material, and what personalisation could be provided to a student.

Keywords: FutureLearn, MOOC, statistics, patterns, feedback.

Demographic Indicators Influencing Learning Activities in MOOCs: Learning Analytics of FutureLearn Courses

Lei Shi   *lei.shi@liverpool.ac.uk*
University of Liverpool
Liverpool, UK

Alexandra I. Cristea   *alexandra.i.cristea@durham.ac.uk*
Computer Science, Durham University
Durham, UK

Abstract

Big data and analytics for educational information systems, despite having gained researchers' attention, are still in their infancy and will take years to mature. Massive open online courses (MOOCs), which record learner-computer interactions, bring unprecedented opportunities to analyse learner activities at a very fine granularity, using very large datasets. To date, studies have focused mainly on dropout and completion rates. This study explores *learning activities* in MOOCs against their *demographic indicators*. In particular, pre-course survey data and online learner interaction data collected from two MOOCs, delivered by the University of Warwick, in 2015, 2016, and 2017, are used, to explore *how learner demographic indicators may influence learner activities*. Recommendations for educational information system development and instructional design, especially when a course attracts a diverse group of learners, are provided.

Keywords: demographic analytics, learning analytics, massive open online courses, MOOCs.

Towards Construction of Creative Collaborative Teams Using Multiagent Systems

Gabriela Moise   *gmoise@upg-ploiesti.ro*
UPG University of Ploiesti
Ploiesti, Romania

Monica Vladoiu   *monica@unde.ro*
UPG University of Ploiesti
Ploiesti, Romania

Zoran Constantinescu   *zoran@unde.ro*
UPG University of Ploiesti
Ploiesti, Romania

Abstract

Group creativity and innovation are of chief importance for both collaborative learning and collaborative working, as increasing the efficiency and effectiveness of groups of individuals performing together specific activities to achieve common goals, in given contexts, is of crucial importance nowadays. Nevertheless, construction of "the most" creative and innovative groups given a cohort of people and a set of common goals and tasks to perform is challenging. We present here our method for semi-automatic construction of "the most" creative and innovative teams given a group of persons and a particular goal, which is based on unsupervised learning and it is supported by a multiagent system. Individual creativity and motivation are both factors influencing group creativity used in the experiments performed with our Computer Science students. However, the method is general and can be used for building the most creative and innovative groups in any collaborative situation.

Keywords: Creative Collaborative Working or Learning Groups, Multiagent System, Unsupervised Learning.

Towards Building Creative Collaborative Learning Groups Using Reinforcement Learning

Monica Vladoiu   *monica@unde.ro*
UPG University of Ploiesti
Ploiesti, Romania

Gabriela Moise   *gmoise@upg-ploiesti.ro*
UPG University of Ploiesti
Ploiesti, Romania

Zoran Constantinescu   *zoran@unde.ro*
UPG University of Ploiesti
Ploiesti, Romania

Abstract

Increasing creative skills in collaborative groups is of huge interest for stakeholders in education, industry, policy making etc. However, construction of "the most" creative groups given a cohort of people and a set of common goals and tasks to perform is challenging. The complexity of this undertaking is amplified by the necessity to first understand and then measure what "the most" creative means in a particular situation. We present here our method of semi-automatic building of "the most" creative learning groups given a cohort of students and a particular learning context based on *reinforcement learning* (an adapted Q-learning algorithm). Various attributes that influence individual and group creativity may be considered. A case study on using this method with our Computer Science students is also included. However, the method is general and can be used for building collaborative groups in any situation, with the appropriate "the most" creative goal and attributes.

Keywords: Collaborative Groups, Optimally Creative Learning Groups, Reinforcement Learning, Computer Supported Collaborative Learning

Vary: An IDE for designing algorithms and measuring quality

Tatiana Person   *tatiana.person@uca.es*

Iván Ruiz-Rube   *ivan.ruiz@uca.es*

Nuria Hurtado   *nuria.hurtado@uca.es*

Esther-Lydia Silva-Ramírez   *esther.silva@uca.es*

José Miguel Mota   *josemiguel.mota@uca.es*

Juan Manuel Dodero   *juanma.dodero@uca.es*

University of Cádiz (Escuela Superior de Ingeniería)
Puerto Real (Cádiz), Spain

Abstract

Pseudocode is one of the recommended methods for teaching students to design algorithms. Having a tool that performs the automatic translation of an algorithm into pseudocode to a programming language would allow the student to understand the complete process of program development. In addition, the introduction of quality measurement of algorithms designed from the first steps of learning programming would enable the student to understand the importance of code quality for maintenance of software processes. This work describes *Vary*, an integrated development environment based on Eclipse for writing and running pseudocode algorithms. The environment automatically transforms abstract pseudocode into runnable C/C++ source code that can be later executed. Computer programming learners and even computational scientists can use *Vary* to write and run algorithms, while taking advantage of modern development environment features. *Vary* is provided with an additional extension to automatically carry out algorithm analysis with SonarQube.

Keywords: pseudocode, algorithm, learning technology, C/C++, Eclipse, SonarQube

T3: Human-Computer Interaction

Track description:

Relating Human-Computer Interaction (HCI) studies to Information Systems Development is of particular interest for this track. Human Computer Interaction (HCI) is an interdisciplinary research that addresses the design, use, adoption, and evaluation of Information Technology with a focus on the interfaces between humans and computers. Understanding Information Systems Development from HCI can be studied from an individual, group, and organizational, social, or cultural perspective. What are the methods for bringing good usability design techniques into ordinary practices of systems development and maintenance? This is of increasing significance as systems vendors nowadays are expected to deliver systems that are accessible from a multitude of devices and environments. How is the multitude of systems accessible in the web browser via organization-internal intranets affecting employees' ability to understand the systems available? How is participatory design practices affected by the distributed work-organization in the Global Village? Submissions discussing new and emerging issues and submission representing traditional approaches are both welcome to this track.

Track chairs:

Azadeh Savoli, IESEG School of Management, France

John Sören Pettersson, Karlstad University, Sweden

Yukika Awazu, IESEG School of Management, France

The Predictive Power of Weak Signals

Daniela Gifu   *daniela.gifu@info.uaic.ro*
Alexandru Ioan Cuza University of Iasi, Faculty of Computer Science
Romanian Academy – Iasi branch, Institute of Computer Science
Romania

Octavian Popescu   *oopopescu@gmail.com*
IBM Research
New York, USA

Abstract

In this paper we present a suit of experiments carried with different machine learning systems in order to learn how to find weak signals in news. The weak signals, seen as future trends, are not defined at word level, but rather at document/paragraph level and there is no explicit definition. We annotated a corpus via tacit knowledge and then we used supervised learning to reproduce the weak signal label. We obtained excellent results via deep learning. We also devised an unsupervised experiment which had achieved very good results, insignificantly different than ones achieved with Support Vector Machines (SVM).
Keywords: weak signals, making prediction, machine learning, deep learning, societal trends.

Towards an Adaptive System: Users' Preferences and Responses to an Intelligent Virtual Advisor based on Individual Differences

Hedieh Ranjbartabar *hedieh.ranjbartabar@students.mq.edu.au*
Department of Computing, Macquarie University
Sydney, Australia

Deborah Richards *deborah.richards@mq.edu.au*
Department of Computing, Macquarie University
Sydney, Australia

Cat Kutay *cat.kutay@uts.edu.au*
Faculty of Engineering and IT,
University of Technology Sydney, Australia

Samuel Mascarenhas *samuel.mascarenhas@gaips.inesc-id.pt*
INESC-ID & Instituto Superior Técnico
Universidade de Lisboa

Abstract

Understanding individual differences in students could help Intelligent Virtual Agents (IVAs) to provide tailored educational and emotional support. Towards creating a student model that the agent can reason over and adapt to accordingly, we conducted a study to identify possible relationships and rules based on the students' personality, emotional state and character preferences. The purpose of our virtual advisors was to "Reduce Study Stress". The experiment with 73 participants, consisting of one within-subjects factor (virtual advisors with empathic and neutral dialogue) and one between-subjects factor (different order of receiving empathic and neutral advisors), formed two experimental and one control groups. We measured preferences, perceived helpfulness and study stress level. Groups using the IVAs reported significantly lower levels of study stress at the end of the study. Some differences were found in preferences for and responses to IVA behaviour based on participants' gender, personality and levels of depression, anxiety and stress.
Keywords: Intelligent Virtual Agents, User/Student Modelling, gender, personality, DASS21.

Gamifying Information System Testing– Qualitative Validation through Focus Group Discussion

Navid Memar *Navid.memar@postgrad.curtin.edu.au*
School of Electrical Engineering,
Computing and Mathematical Sciences
Curtin University, Bentley, WA – 6102, Australia

Aneesh Krishna *A.Krishna@curtin.edu.au*
School of Electrical Engineering,
Computing and Mathematical Sciences
Curtin University, Bentley, WA – 6102, Australia

David A. McMeekin *D.McMeekin@curtin.edu.au*
School of Earth and Planetary Sciences
Curtin University, Bentley, WA – 6102, Australia

Tele Tan *T.Tan@curtin.edu.au*
School of Civil and Mechanical Engineering
Curtin University, Bentley, WA – 6102, Australia

Abstract

This paper presents the evaluation of a developed gamified Information System Testing platform through results obtained from focus group sessions with software developers and testers. The purpose of this study is to understand if the developed tool and platform can help Information System Testing to be interesting while increasing the engagement of software testers in a rewarding testing environment. Findings suggest that choosing suitable game elements to design a gamified environment for performing serious tasks is very important. Moreover, findings suggest that the developed tool and gamification may be a solution to increase testers' engagement and testing experience. Furthermore, participants suggested that game elements such as feedback and comparison may increase testing motivation, engagement and experience of software testers. The majority of participants rated the feedback element as a vital element in a gamified Information System Testing environment.

A Survey of Game Usability Practices in North American Game Companies

Mikko Rajanen   *mikko.rajanen@oulu.fi*
Interact Research Unit, University of Oulu
Oulu, Finland

Juho Tapani   *juho_tapani@hotmail.com*
Interact Research Unit, University of Oulu
Oulu, Finland

Abstract

Game development market has become very competitive, so a game with bad usability can expect bad reviews and fewer sales even though the game design might be otherwise unique and captivating. This study investigates the views and practices of the North American game companies regarding game usability. A survey study was conducted in North American game companies to capture the meaning of game usability among practitioners, and the extent to which the game companies utilize usability methods, and the methods they use. The respondents, who had different roles in game development, regarded usability as being very important in games and defined game usability as the extent to which a game allows the users to complete their tasks with intuition and minimal frustration. The results were compared with results from Northern European game companies. North American game companies used multitude of usability methods, mainly playtesting, observation of live gameplay, usability testing and focus groups. Implications to research and practice are discussed.

Keywords: Usability, Game usability, Usability methods

Towards a Catalogue of Reusable Security Requirements, Risks and Vulnerabilities

Luís Pissarra Gonçalves   *luiscpgoncalves@tecnico.ulisboa.pt*
INESC-ID, Instítuto Superior Técnico, Universidade de Lisboa
Lisboa, Portugal

Alberto Rodrigues da Silva   *alberto.silva@tecnico.ulisboa.pt*
INESC-ID, Instítuto Superior Técnico, Universidade de Lisboa
Lisboa, Portugal

Abstract

Organizations are giving more importance to secure their systems due to the increasing number of cyber-attacks and inherent complexity. The aim of our work is help organizations plan and consider these security concerns from the very beginning, since the requirements and design phases, and not just later in the implementation or deployment phases. Consider security-by-design and security-by-default principles are good approaches to avoid rework costs or to mitigate security flaws. However, there is not yet a suitable approach to specify security requirements in a rigorous and systematic way. In this paper we propose an approach that allows the definition and specification of security-specific concerns like security requirements but also vulnerabilities, risks or threats. We discuss this approach based on two key parts: First, we introduce the RSLingo RSL language, that is a rigorous requirements specification language, and discuss how it is extended to support such security-specific concepts. Second, we claim the relevance for a catalogue of reusable security-specific specifications and then we show concrete examples of defining and using such specifications. The proposed catalogue can be easily used and extended by the community and involves currently 52 goals, 12 vulnerabilities and 31 risks; these concerns are defined into 9 packages each one representing a distinct asset.

Keywords: Requirements specification, Cyber-security, Catalogue of security requirements

How to Design An Interactive System for Data Science: A Literature Review

Ana Sofia Almeida   *asa@ipn.pt*
Laboratory for Informatics and Systems, Instituto Pedro Nunes
Coimbra, Portugal

Licínio Gomes Roque   *lir@dei.uc.pt*
Department of Informatics Engineering, University of Coimbra
Coimbra, Portugal

Paulo Rupino da Cunha   *rupino@dei.uc.pt*
Department of Informatics Engineering, University of Coimbra
Coimbra, Portugal

Abstract

As part of an ongoing design science research project, we present a systematic literature review and the classification of 214 papers scoping the work on Data Science (DS) in the fields of Information Systems and Human-Computer Interaction. The overall search was conducted on Web of Science, Science Direct and ACM Digital Library, for papers about the design of IT artefacts for Data Science, over the period of 1997 until 2017.
Our work confirms a rich interdisciplinary field of inquiry and identifies promising research clusters, with examples. Moreover, we found few studies with concrete guidance on how to design a system for DS when targeting for broader technical and business user profiles and multi-domain application. Being a multidimensional and creative complex process, there is potential in the development of hybrid methods of design theory and practice, for a variety of further work from researchers and practitioners.

Keywords: Data Science, Information Systems Design, Human Computer Interaction, Design Science Research, Design methods, UI/UX design, Systematic Literature Review.

T4: e-Health

Track description:

Amid the Sustainable Development Goals era, health is one of the key goals (SDG3) for global efforts to contribute. Healthcare as we know it is increasingly unaffordable and incapable of dealing with emerging population dynamics – both in developed and developing settings. Information Systems play an important role in healthcare transformation to meet current and future needs. As healthcare expands to address wellness as well as treatment in a more people-centric context, aspects of content and process as well as technology all enter into ISD considerations.

Track chairs:

Christina Keller, Jönköping International Business School

Joseph Wu, National Taiwan University

Sofie Wass, Jönköping International Business School

Personal Health Data: Accessibility and Value in a Danish Context

Maria Karampela   *makar@itu.dk*
IT-University of Copenhagen, Denmark

Casandra Grundstrom   *casandra.grundstrom@oulu.fi*
University of Oulu, Finland

Minna Isomursu   *miis@itu.dk*
IT-University of Copenhagen, Denmark

Abstract

The rapidly-evolving digital life of individuals has led to an increasing amount of personal health data (PHD) that are stored across various databases. This study aims to examine challenges encountered by healthy participants while accessing their PHD and to discuss how this knowledge can be used for the creation of future healthcare services. The participants were tasked to find and access their PHD. Thematic analysis of semi-structured interviews and journaling were the methodologies to examine participants' experience of accessing their PHD, and the perceived value of data. Our findings point out that the participants felt that PHD are accessible through services, nevertheless accessing of PHD were found to be a laborious task. Participants were disappointed by the experience of using various interfaces of the services. The perceived value of PHD was found to be dependent on the usability and personalisation features of the services, rather than on the data itself.

Keywords: personal health data, access, value, user experience

Genomic Information Systems applied to Precision Medicine: Genomic Data Management for Alzheimer's Disease Treatment

Ana León Palacio   *aleon@pros.upv.es*
Research Center of Software Production Methods (PROS)
Universitat Politècnica de València,
Valencia, Spain

Ignacio Pascual Fernández   *i.pascual@pros.upv.es*
Research Center of Software Production Methods (PROS)
Universitat Politècnica de València,
Valencia, Spain

Óscar Pastor López   *opastor@pros.upv.es*
Research Center of Software Production Methods (PROS)
Universitat Politècnica de València,
Valencia, Spain

Abstract

The Alzheimer's Disease is one of the most prevalent neurological disorders in our current society. The study of the genetic characteristics of every patient, makes possible the study of significant DNA variations in order to ease an early diagnosis, essential to stop the progression of the disorder. The problem is that the vast amount of available information makes necessary the use of a method designed to adequately store and manage this data in an optimal way for its exploitation. In this context, the Information Systems Engineering in general and the conceptual modelling techniques in particular, provide a suitable solution in order to determine which data is relevant and how to manage the corresponding information. With these fundamentals in mind, this paper introduces a particular example to bear the methodological treatment of the search, filter and load of genomic variations related to Alzheimer's Disease for its later exploitation with clinical purposes.
Keywords: Conceptual Modelling, Alzheimer's Disease, Genomics, Information Systems.

Feature Models as Support for Business Model Implementation of Cyber-Physical Systems

Kurt Sandkuhl
The University of Rostock
Rostock, Germany

kurt.sandkuhl@uni-rostock.de

Abstract

From a business perspective Cyber-Physical Systems (CPS) can contribute to process innovation, product innovation or business model innovation. In this paper, the focus is on business model innovation based on CPS, i.e. we take the perspective of enterprises using CPS as basis for new customer services. In order to create viable CPS solutions, stakeholders from different enterprise functions should be involved, including business perspective and technical perspective. However, the business-related stakeholders often do not understand the technical possibilities and the technology-related stakeholders do understand the business opportunities. The paper proposes to use feature models as mediation support between business-oriented and technology-oriented stakeholders. Feature models conventionally are used for controlling variability, i.e. as a means for engineers to plan and design features for configuration and implementation. We propose to use them as a way to identify value propositions based on features. The main contributions of the paper are (a) to identify the potential feature models for alignment of business and technology-related stakeholders, (b) to propose feature model "slices" as support for business model development of CPS, and (c) an industrial case illustrating feasibility and utility of the approach.

Keywords: Cyber-physical systems, business model, feature model, feature model slice, business context.

An Ontology Approach for Knowledge Acquisition and Development of Health Information System (HIS)

Abid Ali Fareedi   *abid.fareedi@limesense.com*
LimeSense AB
Stockholm, Sweden

Ahmad Ghazawneh[1,2]   *ahmad.ghazawneh@hh.se*
[1]*School of Information Technology*
Halmstad University
Halmstad, Sweden

[2]*Department of Business IT*   *agha@itu.dk*
IT University of Copenhagen
Copenhagen, Denmark

Abstract

This paper emphasizes various knowledge acquisition approaches in terms of tacit and explicit knowledge management that can be helpful to capture, codify and communicate within medical unit. The semantic-based knowledge management system (SKMS) supports knowledge acquisition and incorporates various approaches to provide systematic practical platform to knowledge practitioners and to identify various roles of healthcare professionals, tasks that can be performed according to personnel's competencies, and activities that are carried out as a part of tasks to achieve defined goals of clinical process. This research outcome gives new vision to IT practitioners to manage the tacit and implicit knowledge in XML format which can be taken as foundation for the development of information systems (IS) so that domain end-users can receive timely healthcare related services according to their demands and needs.

Keywords: Knowledge management, Health Information System, conceptual modelling, information logistic, EKD, OWL, ward-round

User Interface Design for Searching Biomedical Literature

Carlos Iñiguez-Jarrín   *carlos.iniguez@epn.edu.ec*
Departamento de Informática y Ciencias de la Computación, Escuela Politécnica Nacional
Quito, Ecuador

José Ignacio Panach   *joigpana @uv.es*
Universitat de València, Departament d'Informàtica, Escola Tècnica Superior d'Enginyeria
Valencia, Spain

Oscar Pastor López   *opastor@pros.upv.es*
Universitat Politècnica de València, Centro de Métodos de Producción de Software
Valencia, Spain

Abstract

Biomedical bibliographic sources are crucial resources for the work of physicians, biologists, and bioinformatics. Many of the genetic-medical diagnoses depend on the findings in these bibliographic sources. Despite the importance and value of the information stored in these repositories, the user interface (UI) of these resources does not provide the adequate mechanisms to interact with the content, converting the query and interpretation of the information into complex and time-consuming tasks. In this sense, improving the usability of these UIs becomes a challenge since this means facilitating the interaction, analysis and comparison of biomedical information, and, consequently, improving the productivity of professionals in this domain. This paper presents a UI design for the search of biomedical bibliography that incorporates solutions to the usability problems documented and detected by a study of the literature. The proposed design becomes a usability heuristic for UI designers facing the development of UIs in this domain.

Keywords: User interface design, bioinformatics, usability.

Analyzing the role of a telemedicine system in health service personalization

Olli Korhonen   *olli.korhonen@oulu.fi*
Interact research unit, University of Oulu
Oulu, Finland

Karin Väyrynen   *karin.vayrynen@oulu.fi*
Interact research unit, University of Oulu
Oulu, Finland

Minna Isomursu   *miis@itu.dk*
Digital Design Department, IT University of Copenhagen
Copenhagen, Denmark

Abstract

In this study, we analyze how a telemedicine system can be used in health service personalization. Telemedicine refers to the use of ICT to deliver health services at a distance. Through a case study, we identify and analyze how a telemedicine system used as a monitoring platform supporting home-based self-measurement of various parameters of Asthma and Diabetes, and measurement of International Normalized Ratio (INR) and Hypertension can support personalization of health service pathways. In our qualitative analysis, we analyzed personalization in the service level and identified three different roles the telemedicine system plays for health service personalization: generating user data, detecting anomalies, and supporting interaction. The results provide insight on the role of information systems in service level personalization.

Keywords: Service personalization, Healthcare, Telemedicine, Information System.

Application of Modelling Methods from Informatics in Evidence Based Health Care.

Václav Řepa   *repa@vse.cz*
University of Economics, Prague
Prague, Czech Republic.
Czech Republic (Middle European) Centre for Evidence-Based Healthcare.

Abstract

The paper introduces the idea to use modelling methods from informatics for the further development of the Evidence Based Health Care (EBHC) in terms of both: its technology support as well as an aid for the development of its methodology.

In the paper we briefly introduce the contents of the EBHC and its predecessor Evidence Based Medicine (EBM), their evolution, current state, its main limitations and consequent challenges. We also briefly introduce the principle of modelling in informatics and those semi-formal modelling methods and techniques which we regard as relevant for the given purpose, namely conceptual modelling, object life cycle modelling, and business process modelling. Using the example, based on existing EBHC practical guidelines for febrile seizures, we then illustrate the possibilities of the use of modelling techniques for an improvement of the EBHC processes and also the related possibilities of the exploitation of modelling techniques from informatics for further development of the EBHC methodology.

In conclusions section we then summarize main opportunities of the application of modelling techniques from informatics in the field of EBHC and outline the needed future work.

Keywords: Evidence Based Health Care, Ontology, Conceptual Modelling, Object Life Cycle Modelling, MMABP, Unified Modelling Language.

An Implementation Process of Interoperability: A Case-Study of Health Information Systems (HIS)

Grace Kobusinge   *grace.kobusinge@ait.gu.se*
University of Gothenburg
Gothenburg, Sweden

Kalevi Pessi   *kalevi.pessi@ait.gu.se*
University of Gothenburg
Gothenburg, Sweden

Dina Koutskouri   *dina.koutskouri@ait.gu.se*
University of Gothenburg
Gothenburg, Sweden

Raymond Mugwanya   *ray.mugwanya@gmail.com*
Makerere University
Kampala, Uganda

Abstract

Several advances have been made towards health information systems (HIS) use and implementations. However, these advances have not been matched by equal advances in HIS interoperability implementations. Current challenges in this domain are partly due to lack of implementation knowledge hence resulting into a number of failed HIS interoperability implementations. To gain substantive implementation knowledge on HIS interoperability projects, we have carried out interviews through an interpretive case-study approach to investigate a successful HIS interoperability project. Through this approach we propose an initial set of HIS interoperability implementation best practices comprising of these key processes: discovering interoperability need, projecting outcome, managing change and adopting an appropriate interoperability strategy which together depict a contingence management relationship. We conclude that this initial set of best practices contributes substantive knowledge that can guide future HIS interoperability implementations.

Keywords: Health Information Systems, Interoperability Implementation Process, Interoperability Strategies.

T5: Information Systems Methodology and Modelling

Track description:

One of the core competencies of Information Systems Professionals – as compared to computer and business professionals – is the ability to produce models of an enterprise as a foundation for the Information Systems development and management; this is understood as "Enterprise Modelling" or "Business Process Modelling". This long-standing competency is based in a set of modelling techniques, with numerous categories or ontologies, and procedures. As most of Enterprise Modelling Languages and methods are developed in the pre-millennium shrift period, such methods could not account for the current developments of businesses, organizations and their use of digital technologies. These developments include, yet are not limited to, the massive 'servitiation' of offerings provided both by businesses and public organizations; the adoption of various digital technologies, such as cloud computing, Internet of Things, the practices of Open Source, Open Platforms, and Open API:s; the use of Big Data, Analytics, Machine Learnings, Block-Chain technologies, and Algorithmic management of operations. A core question for the existing Enterprise and Business Modelling approaches is whether these need to be modified in order to account for and benefit from the listed developments. This Track invites therefore all contribution to the development of the knowledge and practice of Enterprise Modelling for Information Systems Development.

Track chairs:

Birger Lantow, Rostock Univerisity, Germany

Darek Haftor, Linnaeus University, Sweden

Kurt Sandkuhl, Rostock Univerisity, Germany

An Improved Associative Classification Algorithm based on Incremental Rules

Mohamed Salem Almnnaee   *alsharji@wasl.ae*
 WASL
Dubai, UAE

Fadi Thabtah   *fadi.fayez@manukau.ac.nz*
Manukau Institute of Technology
Auckland, New Zealand

Joan Lu   *j.lu@hud.ac.uk*
University of Huddersfield
Huddersfield, UK

Abstract

In Associative classification (AC), the step of rule generation is necessarily exhaustive because of the inherited search problems from the association rule. Besides which, the entire rules set must be induced prior constructing the classifier. This article proposes a new AC algorithm called Dynamic Covering Associative Classification (DCAC) that learns each rule from a training dataset, removes its classified instances, and then learns the next rule from the remaining unclassified data rather than the original training dataset. This ensures that the exhaustive steps of rule evaluation and candidate generation will no longer be needed, thereby maintaining a real time rule generation process. The proposed algorithm constantly amends the support and confidence for each rule rather restricting itself with the support and confidence computed from the original dataset. Experiments on 20 datasets from different domains showed that the proposed algorithm generates higher quality and more accurate classifiers than other AC rule induction approaches.

Keywords: Associative Classification, Data Mining, Machine Learning, Rules.

Barriers to Open-Source Software Adoption: Review and Synthesis

Dmitrij Petrov   *dmitrij.petrov@email.cz*
Friedrich-Alexander-Universität Erlangen-Nürnberg
Nuremberg, Germany

Nikolaus Obwegeser   *nikolaus@mgmt.au.dk*
Aarhus University
Aarhus, Denmark

Abstract

Free/Libre and Open Source Software (FLOSS) has had a profound impact on the field of Information Technology. While the adoption rates of FLOSS have been growing, extant research reports various significant barriers that inhibit widespread adoption. To develop a comprehensive overview of FLOSS adoption barriers, this study reviewed and synthesized 44 relevant articles published between 2003 and 2016. Based on the organizing logic of the Technology, Organization, Environment and Individual (TOEI) framework, we categorized the challenges and identified major adoption barriers in each dimension. Technology barriers include vendor lock-in, lack of maturity, and lack of external support. At the organizational level, companies often lack financial and human resources, as well as adequate managerial support. Environmental aspects include culture, policies, and legal frameworks. Individual factors, such as employees' resistance to change and risk-averse leadership may also negatively influence the adoption process.
Keywords: Open Source Software, Adoption, Barriers, TOEI.

On the Influence of Tools on Collaboration in Participative Enterprise Modeling – An Experimental Comparison between Whiteboard and Multi-Touch Table

Anne Gutschmidt   *anne.gutschmidt@uni-rostock.de*
University of Rostock, Department of Computer Science
Rostock, Germany

Abstract

The paper presents an experiment about the influence of the modeling tool on group work in the context of enterprise modeling. A goal modeling task was set where three groups of three persons worked with a whiteboard, and three groups of three persons worked with a multi-touch table. Comparisons of working styles between the two tools indicate that multi-touch tables promote parallel working and that a team member's position plays a role in taking on certain tasks. Whiteboard users may more easily lose track of what teammates are doing.

Keywords: enterprise modeling, participative, multi-touch table, group work, experiment

Factors of Risk Reduction in Agile and Lean Enabled Governance of IT Project Portfolios

Goran Banjanin   *gbanjanin@imaging-advice.com*
Imaging Advice Consultancy
Rijeka, Croatia

Vjeran Strahonja   *vjeran.strahonja@foi.hr*
Faculty of Organization and Informatics
Varaždin, Croatia

Abstract

The subject of this paper is project portfolio governance and its improvement based on agile and lean methods and concepts. The main objective is to propose a new conceptual governance framework which improves the management of project portfolio processes' execution and reduces the risks of portfolio components' implementation.

The existing project portfolio models and governance processes use traditional principles, regulation, planning, and control methods, which require enhancement to ensure the portfolio management processes are followed in successful project implementation. The agile and lean project portfolio governance is a relative new domain for which the awareness and practical results related to influence on governance processes, risks, and quality are missing.

The contribution is foremost methodological in introduction of agile and lean portfolio governance methods and processes, followed by the agile and lean governance framework, and conclusively in revealing the factors of risk reduction in the agile and lean enabled project portfolio governance with the emphasis on implementation risks reduction.
Keywords: Governance, Project Portfolio, **Agile, Lean, Reduction of implementation risks.**

An Infrastructure Modeling Approach for Multi-Cloud Provisioning

Julio Sandobalin   *julio.sandobalin@epn.edu.ec*
Departamento de Informática y Ciencias de la Computación, Escuela Politécnica Nacional
Quito, Ecuador

Emilio Insfran   *einsfran@dsic.upv.es*
Departamento de Sistemas Informáticos y Computación, Universitat Politècnica de València
Valencia, Spain

Silvia Abrahao   *sabrahao@dsic.upv.es*
Departamento de Sistemas Informáticos y Computación, Universitat Politècnica de València
Valencia, Spain

Abstract

Cloud Computing has become the primary model of pay-per-use used by practitioners and researchers to obtain an infrastructure in a short time. DevOps uses the Infrastructure as Code approach to infrastructure automation based on software development practices. Moreover, the DevOps community provides different tools to orchestrate the infrastructure provisioning in a particular cloud provider. However, the traditional method of using a single cloud provider has several limitations regarding privacy, security, performance, geography reach, and vendor lock-in. To mitigate these issues industry and academia are implementing multiple clouds (i.e., multi-cloud). In previous work, we have introduced ARGON, which is an infrastructure modeling tool for cloud provisioning that leverages the model-driven engineering (MDE) to provide a uniform, cohesive, and seamless process to support the DevOps concept. In this paper, we present an extension of ARGON to support the multi-cloud infrastructure provisioning and propose a flexible migration process among cloud.

Keywords: Infrastructure Provisioning, Infrastructure as Code, Cloud Computing, Multi-Cloud, DevOps, Model-Driven Engineering.

A Constraint-Based Approach for Managing Declarative Temporal Business Process Models

Andrés Jiménez-Ramírez   *ajramirez@us.es*

Irene Barba   *irenebr@us.es*

Carmelo Del Valle   *carmelo@us.es*
Departamento de Lenguajes y Sistemas Informáticos, Universidad de Sevilla, Seville, Spain

Abstract

There is an increasing interest in aligning information systems in a process-oriented way. As an alternative of the traditional imperative models which tend to be too rigid, processes may be specified in a declarative (e.g., constraint-based) way. Nonetheless, in general, offering operational support (e.g., generating possible execution traces) to declarative business process models entails more complexity when compared to imperative modeling alternatives. Such support becomes even more complex in many real scenarios where the management of complex temporal relations between the process activities is crucial (i.e., the temporal perspective should be managed). Despite the needs for enabling process flexibility and dealing with temporal constraints, most existing tools are unable to manage both. In a previous work, we then proposed TConDec-R, which is a constraint-based process modeling language which allows for the specification of temporal constraints. However, TConDec-R revealed a number of limitations that are overcome with the present work. More specifically, this paper significantly extends and improves our previous work by (1) defining TConDec-R process models based on high-level elements from the constraint programming paradigm, (2) introducing a constraint-based tool with a client/server architecture for providing operational support to TConDec-R process models, and (3) performing an empirical evaluation of the approach.

Keywords: constraint satisfaction problems, constraint programming, business process modeling support, process flexibility.

T6: Managing ISD

Managing IS Development:

The mutual influences between information systems and organizational structures, processes and people, technologies and development teams promote the natural evolution of needs and opportunities for the digital transformation of companies and wider society. New approaches for the design, development, assessment, and management of information technology and systems within organizations, businesses, and societies are needed to handle the growing complexity in data management and processing of information systems. The "Managing IS Development" track at ISD 2018 will aim at promoting research directions and share practical experiences on managing IS development by providing a forum where academic and industrial researchers on different areas can share and disseminate ideas and experiences related to innovative practices, methods, and technologies. Authors are invited to submit papers describing original research in all areas related to managing IS development.

Track chairs:

Emilio Insfran, Universitat Politecnica de Valencia, Spain

Giuseppe Scanniello,University of Basilicata, Italy

Towards a NoSQL security map

Wilhelm Zugaj   *wilhelm.zugaj@fh-joanneum.at*
FH JOANNEUM University of Applied Sciences
Kapfenberg, Austria

Anita Stefanie Beichler   *anita.beichler@edu.fh-joanneum.at*
FH JOANNEUM University of Applied Sciences
Kapfenberg, Austria

Abstract

NoSQL solutions have recently been gaining significant attention because they address some of the inefficiencies of traditional database management systems. NoSQL databases offer features such as performant distributed architecture, flexibility and horizontal scaling. Despite these advantages, there is a vast quantity of NoSQL systems available, which differ greatly from each other. The resulting lack of standardization of security features leads to a questionable maturity in terms of security. What is therefore much needed is a systematic lab research of the availability and maturity of the implementation of the most common standard database security features in NoSQL systems, resulting in a NoSQL security map. This paper summarizes the first part of our research project trying to outline such a map. It documents the definition of the standard security features to be investigated as well as the security research and results for the most commonly used NoSQL systems.

Keywords: database security, NoSQL database systems, NoSQL security, database authentication, database authorization, database encryption

A Modeling Language for Agile Requirements Engineering

Eva-Maria Schön   *eva.schoen@iwt2.org*
University of Seville
Seville, Spain

Jörg Thomaschewski   *joerg.thomaschewski@hs-emden-leer.de*
University of Applied Sciences Emden/Leer
Emden, Germany

María José Escalona   *mjescalona@us.es*
University of Seville
Seville, Spain

Nora Koch   *nora.koch@iwt2.org*
University of Seville
Seville, Spain

Abstract

Agile methodologies have an impact on how organizations carry out Requirements Engineering (RE). In this context, organizations use different kind of agile techniques like artifacts, meetings, methods or roles, but there is a lack of specific guidelines for agile RE. The aim of this paper is to present a modeling language for supporting organizational aspects of agile RE. It allows the visualization of agile RE concepts and their relationships, which can be used to define guidelines for a specific organization, project or domain. The modeling language for agile RE is used in projects in industry and our experiences reveal that it supports organizations in detecting problems and visualizing internal conflicts during the agile requirements phase, among other benefits.

Keywords: Agile Software Development, Requirements Engineering, Human-Centered Design, Metamodel, Profile

Selecting a Software Tool for ITIL using a Multiple Criteria Decision Analysis Approach

Nuno Encantado Faria   *nuno.e.faria@ist.utl.pt*
Instituto Superior Técnico
Lisbon, Portugal

Miguel Mira da Silva   *mms@tecnico.ulisboa.pt*
Instituto Superior Técnico
Lisbon, Portugal

Abstract

The opportunity to improve service quality using ITIL has led many organizations to invest in the implementation of this framework. Selecting a software tool for ITIL is still one of the most difficult decisions due to lack of meaningful evaluation criteria and guidelines to help on that decision, making this, one of the most important and error-triggering steps in this way. A multi-criteria value model to evaluate software tools for ITIL using a multi-criteria decision analysis (MCDA) approach based on MACBETH is then proposed to address this problem. A focus on the functionality of the tool to extract criteria from the literature to assess four representative software solutions for ITIL in the market is made along with its demonstration in a company of the bank sector. Finally, using Moody and Shanks Framework, the proposed method is evaluated showing that is suitable for evaluating software tools for ITIL.

Keywords: ITSM, ITIL, Software Selection Method, Multiple Criteria Decision Analysis, MACBETH.

A Tool for Supporting the Co-Evolution of Enterprise Architecture Meta-models and Models

Nuno Miguel Silva   *nuno.miguel@tecnico.ulisboa.pt*
Universidade de Lisboa/INOV Inesc Inovação
Lisboa, Portugal

Miguel Mira da Silva   *mms@tecnico.ulisboa.pt*
Universidade de Lisboa/INOV Inesc Inovação
Lisboa, Portugal

Pedro Sousa   *pedro.manuel.sousa@tecnico.ulisboa.pt*
Universidade de Lisboa/Link Consulting SA
Lisboa, Portugal

Abstract

Enterprise architecture models capture the concepts and relationships that together describe the essentials of the various enterprise domains. This model of the enterprise is tightly coupled to a domain-specific modeling language that defines the formalisms for creating and updating such model. These languages are described as meta-models by the model-driven engineering field. Results from surveys on enterprise architecture tool analysis showed a lack of support concerning the co-evolution of enterprise architecture meta-model and models. This paper presents a tool that automates enterprise architecture models co-evolution according to a set of meta-model changes. A Portuguese governmental organization used and validated the tool using observational, analytical and descriptive evaluation methods.

Keywords: Enterprise architecture, Meta-model, Model, Co-Evolution, Tool.

Towards a Systematic Approach of
Relational Database Watermarking

Monica Vladoiu   *monica@unde.ro*
UPG University of Ploiesti
Ploiesti, Romania

Gabriela Moise   *gmoise@upg-ploiesti.ro*
UPG University of Ploiesti
Ploiesti, Romania

Zoran Constantinescu   *zoran@unde.ro*
UPG University of Ploiesti
Ploiesti, Romania

Abstract

Nowadays more and more data of socio-technical systems become available online to anyone interested to access it or process it (without data alteration or copyright infringement). Generally, these data are stored in relational databases. However, to comply with this new paradigm new models of data access and security are necessary. One upcoming trend for relational databases is to watermark the database instance, i.e. to compute a secret code, which can be either embedded directly into the database or registered to a trusted authority. Current watermarking schemes only apply to either a particular database relation or index and, generally, distort the data. In this paper, we propose a methodology for distortion-free watermarking of both the database schema and instance that takes into account the database semantics, its dynamic, and also ensuring various security levels within the database. A possible scenario on using this methodology on a real-world database is also available.

Keywords: database security; database consistency and integrity; watermarking methodology.

Using Gamification for Adopting Scrum in Practice

Rita Marques
INOV/IST
Lisbon, Portugal

rita.marques@tecnico.ulisboa,pt

Gonçalo Costa
INOV/IST
Lisbon, Portugal

goncalo.m.da.costa@tecnico.ulisboa,pt

Miguel Mira da Silva
INOV/IST
Lisbon, Portugal

mms@tecnico.ulisboa,pt

Daniel Gonçalves
INESC-ID/IST
Lisbon, Portugal

daniel.goncalves@inesc-id.pt

Pedro Gonçalves
Xpand IT
Viana do Castelo, Portugal

pedro.goncalves@xpand-it.com

Abstract

Despite the wide adoption of agile methodologies, software development teams still struggle to meet time, budget and scope, partially due to practitioners' lack of motivation to apply agile techniques in practice. In this paper, we present a software tool based on gamification to make Scrum techniques more fun and engaging for practitioners. This paper presents results of the first iteration of a larger research effort that follows the Design Science Research methodology, where a prototype was developed as a Jira Software app and evaluated with a Scrum team in practice. Results suggest that the team's Scrum practices slightly improved after using the app. Quantitative analysis and a set of interviews with the team members allowed to understand that the proposal should be more challenging and the score system more customized. Hereafter the app will be improved based on received feedback.

Keywords: Gamification, software development, software process, agile, Scrum, motivation.

Towards Effective and Efficient Data Management in Embedded Systems and Internet of Things

Zoran Constantinescu   *zoran@unde.ro*

Monica Vladoiu   *monica@unde.ro*
UPG University of Ploiesti, Ploiesti, Romania

Abstract

The majority of today low-end and low-cost embedded devices work in dynamic environments under several constraints such as low power, reduced memory, limited processing and communication, etc. Therefore, their data management is critical. We introduce here a general method for data representation, storage, and transmission in embedded systems based on a compact representation scheme and some heuristics. This method has been implemented, tested, and evaluated within a vehicle tracking system that uses an in-house very low cost microcontroller-based telemetry device, which provides for near-real-time remote vehicle monitoring, energy consumption, ubiquitous health, etc. However, our method is general and can be used for any type of low-cost and resource-constrained embedded device, where data communication from the device to the Internet (or cloud) is involved. Its efficiency and effectiveness are proven by significant reductions of mobile data transmitted, as our case study shows. Further benefits are reducing power consumption and transmission costs.

Keywords: mobile device; data storage, compression, and communication; telemetry; remote monitoring; embedded systems; pervasive computing; Internet of Things.

The impact of Knowledge Creation on Organizational Resilience towards Organizational Performance

Ali Alharthy   *a.alharthy@tvtc.gov.sa*
Computer Technology Department,
Madinah College of Technology, Technical and Vocational Training Corporation
Riyadh, Saudi Arabia
School of Systems, Management and Leadership
University of Technology Sydney
Sydney, Australia

Osama Sohaib   *Osama.Sohaib@uts.edu.au*
School of Systems, Management and Leadership
University of Technology Sydney
Sydney, Australia

Igor Hawryszkiewycz   *Igor.Hawryszkiewycz@uts.edu.au*
School of Systems, Management and Leadership
University of Technology Sydney
Sydney, Australia

Abstract

Due to complex situations faced by many business organizations, knowledge creation has become a source of sustained competitive advantage. This study investigates the influence of knowledge creation process (KCP) for enhancing the organizational resilience capabilities namely – adoptability, agility, and innovation towards organization performance based on the balanced scorecard. Data were collected from the Saudi banks. The study results revealed KCP positively influence the organizational resilience capabilities. The results also showed that the resilience capabilities (agility and innovation) have a positive significant influence on banking performance. However, the relationship between adoptability and organization performance is not significant in the Saudi context.

Keywords: Balanced scorecard, organization resilience, knowledge creation, knowledge sharing, organization performance, PLS-SEM

Using Contextual Features for Online Recruitment Fraud Detection

Syed Mahbub   *S.Mahbub@latrobe.edu.au*
La Trobe University, Department of Computer Science and Information Technology
Melbourne, Australia

Eric Pardede   *E.Pardede@latrobe.edu.au*
La Trobe University, Department of Computer Science and Information Technology
Melbourne, Australia

Abstract

The recent growth of online recruitment and candidate management systems has established yet another media for fraudsters on the internet. The ever-growing size of the candidate pool has forced different industries to move to web-based candidate management systems. The advantages of such web-based systems are substantial. On one hand, they are the best means to filter through thousands of applicants for employers and on the other hand, the candidates find themselves in a convenient position while applying for a position. People with fraudulent motivations explore these systems to lure candidates in a hoax and extract sensitive information (e.g. contact information) using fake job advertisements. In this paper, we analyzed a publicly available dataset and used machine learning algorithms to classify job postings as fraudulent or legitimate. The contribution of this research is the inclusion of contextual features in the feature space, which revealed compelling improvements of accuracy, precision and recall.

Keywords: Online recruitment, Fraud detection, Employment scam, Online recruitment fraud, Contextual features.

Practices for vertical and horizontal coordination in the Scaled Agile Framework

Tomas Gustavsson   *tomas.gustavsson@kau.se*
Karlstad University
Karlstad, Sweden

Abstract

Scrum and eXtreme programming, the first agile development frameworks, were designed with very few advice on coordination for work in larger scale were several teams cooperate toward a common goal. This lead to both wrong assumptions regarding the usefulness of agile ways of working in larger organizations as well as much individual tailoring with coordination practices in organizations. Now, the Scaled Agile Framework is gaining much attention in software development. This study contains an analysis of inter-team coordination practices prescribed in the framework and how they have been implemented in three organizations. Previous research on coordination has been criticized for having a static view on coordination with not enough focus on how to manage emerging dependency issues. The result of this study shows that the Scaled Agile Framework have four practices that cover both planning and emerging issues and three practices solely aimed at managing these emerging dependency issues.

Keywords: Agile software development, Large-scale, Scaled Agile Framework, Inter-team coordination.

How do practitioners understand external platforms and services? A Grounded Theory investigation

Anar Bazarhanova   *anar.bazarhanova@aalto.fi*
Aalto University
Espoo, Finland

Jesse Yli-Huumo   *jesse.yli-huumo@aalto.fi*
Aalto University
Espoo, Finland

Kari Smolander   *kari.smolander@lut.fi*
Aalto University and Lappeenranta University of Technology
Espoo and Lappeenranta, Finland

Abstract

In this article, we investigate how practitioners understand external platforms, whose core offering is shared and utilized by a number of heterogeneous and interconnected organizations in an ecosystem. We especially look into situations where organizations wish to extend their own capability instead of building services that extend the functionality of the platform. Such dependencies to external platforms can be envisioned as the contemporary evolution from traditional outsourcing service models. We interviewed twenty-four practitioners from eight IT organizations and discovered a considerable ambiguity in understanding of what are the external platforms utilized by the organizations. We further elaborate that the diversified meanings that various stakeholders give to the concept of external platforms, can hinder efficient communication and may have implications on important strategic decision making.

Keywords: External platforms, industry platforms, ecosystems, dependencies, integration

Enterprise Composition Architecture for Micro-Granular Digital Services and Products

Alfred Zimmermann   *alfred.zimmermann@reutlingen-university.de*
Reutlingen University
Reutlingen, Germany

Rainer Schmidt   *rainer.schidt@hm.edu*
Munich University of Applied Sciences
Munich, Germany

Kurt Sandkuhl   *kurt.sandkuhl@uni-rostock.de*
University of Rostock
Rostock, Germany

Abstract

The digitization of our society changes the way we live, work, learn, communicate, and collaborate. This defines the strategical context for composing resilient enterprise architectures for micro-granular digital services and products. The change from a closed-world modeling perspective to more flexible open-world composition and evolution of system architectures defines the moving context for adaptable systems, which are essential to enable the digital transformation. Enterprises are presently transforming their strategy and culture together with their processes and information systems to become more digital. The digital transformation deeply disrupts existing enterprises and economies. Since years a lot of new business opportunities appeared using the potential of the Internet and related digital technologies, like Internet of Things, services computing, cloud computing, big data with analytics, mobile systems, collaboration networks, and cyber physical systems. Digitization fosters the development of IT systems with many rather small and distributed structures, like Internet of Things or mobile systems. In this paper, we are focusing on the continuous bottom-up integration of micro-granular architectures for a huge amount of dynamically growing systems and services, like Internet of Things and Microservices, as part of a new digital enterprise architecture. To integrate micro-granular architecture models to living architectural model versions we are extending more traditional enterprise architecture reference models with state of art elements for agile architectural engineering to support the digitalization of services with related products, and their processes.

Keywords: Service-Dominant Digital Products, Digital Transformation, Internet of Things,

Productivity Gains of DevOps Adoption in an IT Team: A Case Study

Miguel Angelo Silva   *marsa@iscte-iul.pt*
Instituto Universitário de Lisboa (ISCTE-IUL)
Lisbon, Portugal

João Pedro Faustino   *jpcfo11@iscte-iul.pt*
Instituto Universitário de Lisboa (ISCTE-IUL)
Lisbon, Portugal

Rúben Pereira   *ruben.filipe.pereira@iscte-iul.pt*
Instituto Universitário de Lisboa (ISCTE-IUL)
Lisbon, Portugal

Miguel Mira da Silva   *mms@ist.utl.pt*
Instituto Superior Tecnico (IST), Universidade de Lisboa (UL)
Lisbon, Portugal

Abstract

The main purpose of this research is to determine the productivity gains from the merge of two traditional IT teams: Development and Operations into a single DevOps team implementing 6 DevOps capabilities In this research the authors go through the existing DevOps literature to better frame this research to the reader. To answer the formulated research questions the authors analyzed the team capacity divided by tasks before and after a DevOps transition and interviewed 5 senior team members to collect their opinion about this transition. The main object objective is to analyze if there were productivity gains of that team after making the transition to a DevOps approach.

Keywords: DevOps, Agile, SCRUM, Continuous Delivery, Continuous Integration

User Participation in Information Systems Development for Emerging Public Sector Initiatives

Kayvan Yousefi Mojir   *kayvan.y.mojir@liu.se*
Department of Management and Engineering, Linköping University
Linköping, Sweden

Sofie Pilemalm   *sofie.pilemalm@liu.se*
Department of Management and Engineering, Linköping University
Linköping, Sweden

Tobias Andersson Granberg   *tobias.andersson@liu.se*
Division of Communication and Transport Systems (ITN), Linköping University
Linköping, Sweden

Abstract

This study is a-posteriori analysis of information systems (IS) development in a cross-sector collaboration case to identify and address user participation challenges in emerging public sector initiatives. The major challenges in the studied case was to develop IS for future cross-sector collaboration in a setting that does not yet exist, i.e. where the tasks, stakeholders and end-users are undefined. To address identified challenges, we suggest a combination of activities based on multiple design groups, scenario-based Future Workshops, focus groups, context-specific frameworks, and practical exercises with after-action-review. We argue that while similar challenges have been discussed in relation to large-scale projects and, sometimes, cross-sector collaboration, IS development for emerging public sector initiatives pose specific issues that need to be addressed.

Keywords: User participation, future service design, cross-sector collaboration

Bonus Computing: An Evolution from and a Supplement to Volunteer Computing

Zheng Li *imlizheng@gmail.com*
Department of Computer Science, University of Concepción
Concepción, Chile

Yiqun Chen *yiqun.c@unimelb.edu.au*
Centre for Spatial Data Infrastructures & Land Administration, University of Melbourne
Melbourne, Australia

María Andrea Rodríguez *andrea@udec.cl*
Department of Computer Science, University of Concepción
Concepción, Chile

Lu Deng *mf1632014@smail.nju.edu.cn*
Software Institute, Nanjing University
Nanjing, China

Abstract

Despite the huge success in various worldwide projects, volunteer computing also suffers from the possible lack of computing resources (one volunteered device can join one project at a time) and from the uncertain job interruptions (the volunteered device can crash or disconnect from the Internet at any time). To relieve the challenges faced by volunteer computing, we have proposed bonus computing that exploits the free quotas of public Cloud resources particularly to deal with problems composed of fine-grained, short-running, and compute-intensive tasks. In addition to explaining the loosely-coupled functional architecture and six architectural patterns of bonus computing in this paper, we also employ the Monte-Carlo approximation of Pi (π) as a use case demonstration both to facilitate understanding and to help validate its functioning mechanism. The results exhibit not only effectiveness but also multiple advantages of bonus computing, which makes it a valuable evolution from and supplement to volunteer computing.

Keywords: Bonus Computing, Master-worker Model, Parasitic Computing, Recipient-broker-contributor Model, Volunteer Computing

Enterprise IT Governance and its Impact on Agile Software Development Project Success

Muhammad Awais   *muhammadawais.a.bajwa@student.uts.edu.au*
Faculty of Engineering and Information Technology
University of Technology Sydney (UTS), Sydney, Australia

Julia Prior   *julia.prior@uts.edu.au*
Faculty of Engineering and Information Technology
University of Technology Sydney (UTS), Sydney, Australia

Samuel Ferguson   *samuel.ferguson@uts.edu.au*
Faculty of Engineering and Information Technology
University of Technology Sydney (UTS), Sydney, Australia

John Leaney   *john.leaney@uts.edu.au*
Faculty of Engineering and Information Technology
University of Technology Sydney (UTS), Sydney, Australia

Abstract

Enterprise IT (EIT) governance has become the primary approach in leveraging the IT function to achieve business objectives. We found in previously published work that decision making is the core of EIT governance. We collected quantitative data from professionals on decision making in Agile Software Development (ASD) projects, which we analyzed using Spearman's Ranked Correlation Coefficient. Decision-making clarity in implementation and decision-making distribution in the organization layers positively impact ASD project success. However, our finding that tailoring the decision-making process does not impact ASD project success was most surprising. We conclude that the impact of decision-making factors in an ASD project's success needs to be explored more deeply.
Keywords: Decision Making, Decision-Making, EIT Governance, Agile Software Development, Agile Projects, ASD Projects, Governance Clarity, Distribution, and Tailoring

T7: Topics in ISD

Track description:

The everyday practice of information systems development is very diverse. Application domains, analysis and design techniques, programming languages, development paradigms, and project strategies can all vary over different spectra. Many information systems development projects often fail to deliver the expected benefits. Current trends in the development of information systems are in linking users and databases across functional and organizational boundaries and at the same time increasing the importance of organizational factors. Risks of failure in ISD projects increase where no participant has a global view or control of the activities. Hardware and software are components of a more complex socio-technical ensemble that includes people, work processes, and institutional and cultural factors.

Information systems development is becoming increasingly important aspect of transforming organizations and society. Issues like design methods, models and evaluation techniques, methodological aspects of ISD and novel IS domains are main areas of contribution of this track. Additionally, in the area of project management, focus on topics like design methods, models and evaluation techniques, methodological aspects of Project Management within ISD and novel IS domains are main areas of contribution of this track.

Track chairs:

Mostafa Mesgari, Elon University

Michael Lang, National University of Ireland

Towards a Lightweight Enterprise Architecture Approach for Building Transformational Preparedness

Ovidiu Noran   *O.Noran@griffith.edu.au*
Griffith University
Nathan 4111, Australia

Pat Turner   *patrick.turner@aspl.net.au*
ASPL Pty Ltd
Brisbane, Australia

Peter Bernus   *P.Bernus@griffith.edu.au*
Griffith University
Nathan 4111, Australia

Abstract

The need for business agility in order to cope with the increasing rate of changes brought by disruptive technologies and paradigms is more stringent than ever; unfortunately however, it also encounters many hurdles. To start with, typical strategic transformation planning featuring successive specify-design-implement phases is no longer suitable, as the resulting sequentially staged processes can no longer catch up with the changes in internal structure and external environment. The blurring of top organisational role boundaries in regards to the allocation of management and architecture skillsets is another issue significantly affecting agility. Finally, the lack of structure and integration of business transformation and architecting methodologies offered by various disciplines and vendors affects the ability to use them for specific endeavours. This paper elaborates on and illustrates the above-mentioned problems through a case study and proposes a way to solve them in a holistic, lifecycle-aware manner using a 'lightweight' architectural framework approach.

Keywords: Enterprise Architecture, Information Systems, Transformation, Preparedness, Lifecycle, Agile

A Process Model of Co-Creation as an Approach to Information Systems Development

Karlheinz Kautz   *karlheinz.kautz@rmit.edu.au*
School of Business IT and Logistics, College of Business
Melbourne, Australia

Gro Bjerknes   *gro.bjerknes@monash.edu*
Faculty of Information Technology, Monash University
Melbourne, Australia

Julie Fisher   *j.fisher@bigpond.net.au*
Melbourne, Australia

Tomas Jensen   *tjensen@unicef.org*
United Nations Children's Fund (UNICEF)
Phnom Penh, Cambodia

Abstract

This paper investigates the development of a digital game on a social media platform which involved primarily youths as co-creators. We applied a process model for crowdsourced development as a framework to understand information systems development (ISD) as co-creation in a not-for-profit environment. Using innovation theory we further discuss why co-creation fostered the co-creators to successfully carry out the investigated project. On this background, we provide lessons learned for practical use.
Keywords: Co-creation, information systems development, process model.

Applying a Taxonomy as a Framework to Understand Co-Creation as an Approach to Information Systems Development

Karlheinz Kautz   *karlheinz.kautz@rmit.edu.au*
School of Business IT and Logistics, College of Business
Melbourne, Australia

Gro Bjerknes   *gro.bjerknes@monash.edu*
Faculty of Information Technology, Monash University
Melbourne, Australia

Julie Fisher   *j.fisher@bigpond.net.au*
Melbourne, Australia

Tomas Jensen   *tjensen@unicef.org*
United Nations Children's Fund (UNICEF)
Phnom Penh, Cambodia

Abstract

Our paper investigates how co-creation as an information systems development (ISD) approach is performed. Our empirical practice study of co-creation for and with youths involved in developing a digital game on a social media platform in a not-for-profit environment contributes to broadening the perspective on ISD and co-creation research. We apply an established taxonomy of co-creation and demonstrate how the taxonomy can be used as a framework to understand what co-creation is, how, when and where it can be performed as an instance of ISD practice. As a result we demonstrate the value and the shortcomings of the taxonomy.
Keywords: Co-creation, information systems development, taxonomic framework

The Weight of User Decision Making During Online Interactions - Planning an Experiment

Chris Barry   *chris.barry@nuigalway.ie*
National University of Ireland Galway
Galway, Ireland

Mairéad Hogan   *mairead.hogan@nuigalway.ie*
National University of Ireland Galway
Galway, Ireland

Abstract

This paper lays out the design of a research study, using eye tracking technology, to measure participant cognitive load when encountering decision constructs during webpage interactions. It elaborates and improves on a pilot study that was used to test the experiment design. Cognitive load is discussed in detail, in both physiological and subjective terms, as well as techniques to capture participants' thoughts and feelings immediately after the experiment. This mixed method approach will generate a more holistic comprehension of participants' decision making and their rationale; and hopefully, improve information systems design ethics.

Keywords: Eye tracking, decision constructs, cognitive load, NASA-TLX, ethics in ISD.

Cargo Cults in Information Systems Development: a Definition and an Analytical Framework

Tanja Elina Mäki-Runsas   *tanja.maki-runsas@oru.se*
CERIS, Department of Informatics, Örebro University
Örebro, Sweden

Kai Wistrand   *kai.wistrand@oru.se*
CERIS, Department of Informatics, Örebro University
Örebro, Sweden

Fredrik Karlsson   *fredrik.karlsson@oru.se*
CERIS, Department of Informatics, Örebro University
Örebro, Sweden

Abstract

Organizations today adopt agile information systems development methods (ISDM), but many do not succeed with the adoption process and in achieving desired results. Systems developers sometimes fail in efficient use of ISDM, often due to a lack of understanding the fundamental intentions of the chosen method. In many cases organizations simply imitate the behavior of others without really understanding why. This conceptual paper defines this phenomenon as an ISDM cargo cult behavior and proposes an analytical framework to identify such situations. The concept of cargo cults originally comes from the field of social anthropology and has been used to explain irrational, ritualistic imitation of certain behavior. By defining and introducing the concept in the field of information systems development we provide a diagnostic tool to better understand one of the reasons why ISDM adoption sometimes fail.

   Keywords: Agile development, Cargo cult, Method Rationale, Self-Determination theory, Social-action theory, Information systems development, Information systems development methods, Software development, Software development methods

SNS Relational Behavior, Organisation-Public Relationships and Co-creation: A Case of Nonprofit Organisations

Fatuma Namisango   *fnamisango@gmail.com*
University of Technology Sydney
Sydney, Australia

Kyeong Kang   *Kyeong.Kang@uts.edu.au*
University of Technology Sydney
Sydney, Australia

Abstract

Social networking sites (SNS) provide a rich and inexpensive environment for nonprofit organisations (NPOs) to work closely with a wider community to enhance social services and social value. Although extant literature provides a number of SNS functions for NPOs, many other functions remain unexplored. This paper considers that SNS allow NPOs to engage their community in designing and delivering enhanced social services through a process widely recognised as co-creation. Further still, the effect of SNS based organisation-public relationships (OPR) on co-creation also remains unexplored. The study aims at identifying SNS based co-creation practices among NPOs. The paper proposes a study on the relationship between SNS relational behaviors – i.e., post content, likes, comments and shares, OPR and co-creation (of social services). The theoretical stance is that SNS relational behavior among NPOs, the type and structure of OPR cultivated on SNS do influence organisations' co-creation outcomes on SNS.

Keywords: Social Networking Sites, Organisation-Public Relationship, Co-creation, Non-profit Organisations.

An Institutional Perspective on BIM Implementation – A Case Study of an Intercity Railway Project in Norway

Nam Bui   *nam.bui@oslomet.no*
Oslo Metropolitan University
Oslo, Norway

Christoph Merschbrock   *christoph.merschbrock@ju.se*
Jönköping University
Jönköping, Sweden

Bjørn Erik Munkvold   *bjorn.e.munkvold@uia.no*
University of Agder
Kristiansand, Norway

Ann Karina Lassen   *Ann-Karina.Lassen@oslomet.no*
Oslo Metropolitan University
Oslo, Norway

Abstract

Architecture and engineering offices around the world increasingly replace their dated Computer-Aided-Design (CAD) solutions with Building Information Modelling (BIM) solutions. There is a profound IT-enabled change in the way in which commercial and residential buildings are designed and produced. However, parts of the industry remain largely excluded from this trend, as roads and railroads continue to be designed based on two-dimensional CAD systems. This paper reports from a case study of BIM implementation in a Norwegian railroad project Based on institutional theory, we identified how institutional pressures affected the BIM implementation of the project team in the InterCity railway project. The cases study highlights the important role of the client's BIM manager in enforcing these pressures in practice. Furthermore, the paper provides useful insights not only for construction project teams seeking to implement BIM in infrastructure projects but also for other organizations adopting new technologies.

Keywords: Institutional pressure, building information modelling, infrastructure, railway.

The Dynamics of Transformation in the Development of Digital Services

Ahmad Ghazawneh[1,2]   *ahmad.ghazawneh@hh.se*

[1]*School of Information Technology*
Halmstad University
Halmstad, Sweden

                                                                         agh@itu.dk

[2]*Department of Business IT*
IT University of Copenhagen
Copenhagen, Denmark

Abstract

Service providers are increasingly depending and using digital infrastructure and tools provided by digital platforms to transform their services and develop digital ones that meet the needs of heterogeneous end users. However, while there is an emerging literature of developing digital services, little is known about the dynamics of transformation. Using multiple cases of firms that develop digital services, the digital service taxonomy was synthesized to understand the dynamics of transformation in developing digital services. This study identifies five main dynamics: the services experience, the service process, the service capabilities, the service environment and the service delivery. Each of those dynamics and their associated factors is explored under the objectives of business, interaction and technology. This enables us to extend the existing literature on digital service development in particular and contributes to the research of digital innovation in general.

Keywords: digital services, service transformation, platforms, ecosystems, development

Design and Evaluation of a Gamification-based Information System for Improving Student Attendance

Nearchos Paspallis   npaspallis@uclan.ac.uk
UCLan Cyprus & InSPIRE Research Center
Larnaca,Cyprus

Panayiotis Andreou   pgandreou@uclan.ac.uk
UCLan Cyprus & InSPIRE Research Center
Larnaca, Cyprus

Alberto Bullo   abullo@inspirecenter.org
InSPIRE Research Center
Nicosia, Cyprus

Abstract

Declining student attendance is a recurring concern in most educational environments, including tertiary education. Depending on the assumed cause of low attendance, different approaches have been proposed as a means of intervention for mitigating the problem. On the other hand, gamification is a relatively new approach that aims to increase engagement of participants in non-game contexts by utilizing techniques developed for and used in computer games. In this paper, we propose a novel approach that aims at intervening by applying gamification techniques for the purpose of increasing the extrinsic motivation for attendance in tertiary-level education settings. The approach is based on a cloud-based platform which features web and mobile clients. The main stakeholders are the lecturers, who can configure the environment, and the students who are the targeted participants. Unlike similar works, this approach aims at improving the student attendance at a wider scale, e.g. at the programme level rather than focusing on individual modules or classes. Additionally, it provides fine customization allowing the lecturers to opt in with custom settings. Finally, the paper describes some early results and paves the road for an extensive evaluation.
Keywords: Gamification, Behavioural change, Information System.

Challenging TESTAR in an industrial setting: the rail sector

Hatim Chahim
The Netherlands
h_chahim@hotmail.com

Mehmet Duran
The Netherlands
mduran@live.nl

Tanja E.J. Vos
Open University, The Netherlands
Universidad Politecnica de Valencia, Spain
tanja.vos@ou.nl

Abstract

TESTAR is a traversal-based and scriptless tool for test automation at the Graphical User Interface (GUI) level. It is different from existing test approaches in that no test cases need to be defined beforehand such that testing can start immediately. This paper presents an empirical case study in a realistic industrial context where we compare TESTAR to a manual test approach of a web-based application in the rail sector. Both qualitative and quantitative research methods are used to investigate learnability, effectiveness, efficiency, and satisfaction. The results show that TESTAR was able to detect more faults and higher functional test coverage than the used manual test approach. As far as efficiency is concerned, the preparation time of both test approaches is identical, but TESTAR can realize test execution without the use of human resources. Finally, TESTAR turns out to be a learnable test approach. As a result of the study described in this paper, TESTAR technology was successfully transferred and the company will use both test approaches in a complementary way in the future.

Keywords: GUI test automation tools, TESTAR, compare test approaches, Industrial case study, Technology Transfer, Railway sector.

Developing crisis training software for local governments – from user needs to generic requirements

Monika Magnusson   *monika.magnusson@kau.se*
Information Systems, Karlstad University
Karlstad, Sweden

John Sören Petterson   *john_soren.pettersson@kau.se*
Information Systems, Karlstad University
Karlstad, Sweden

Peter Bellström   *peter.bellstrom@kau.se*
Information Systems, Karlstad University
Karlstad, Sweden

Henrik Andersson   *henrik.andersson@kau.se*
Information Systems, Karlstad University
Karlstad, Sweden

Abstract

In this paper we analyze and present the generic requirements identified for a software aiming at supporting crisis management training in local governments. The generic requirements are divided into overall requirements, requirements connected to the trainer's role and requirements connected to the trainee's role. Moreover, the requirements are mapped to problems as well as opportunities. Finally, we present examples of elaborations of the addressed requirements based on software design considerations. In our work we applied a design science approach and the artifact presented in this paper is a list of generic requirement. The presented requirements and the systems development process used, provide guidelines for systems analysts and developers in future systems development projects aiming at constructing new software for crisis management training.

Keywords Crisis Training, Crisis Exercises, Design Science Research, Requirements Engineering, Needs Analysis

Optimal Reasoning of Opposing Non-functional Requirements based on Game Theory

Sreenithya Sumesh   *S.Sumesh@student.curtin.edu.au*
School of Electrical Engineering,
Computing and Mathematical Sciences
Curtin University, Bentley, WA – 6102, Australia

Aneesh Krishna   *A.Krishna@curtin.edu.au*
School of Electrical Engineering,
Computing and Mathematical Sciences
Curtin University, Bentley, WA – 6102, Australia

Chitra M Subramanian   *Chitra.Muniyapp@curtin.edu.au*
School of Electrical Engineering,
Computing and Mathematical Sciences
Curtin University, Bentley, WA – 6102, Australia

Abstract

Goal-Oriented Requirement Engineering is a modeling technique that represents software system requirements using goals as goal models. In a competitive environment, these requirements may have opposing objectives. Therefore, there is a requirement for a goal reasoning method, which offers an alternative design option that achieves the opposing objectives of inter-dependent actors. In this paper, a multi-objective zero-sum game theory-based approach is applied for choosing an optimum strategy for dependent actors in the $i*$ goal model. By integrating Java with IBM CPLEX optimisation tool, a simulation model based on the proposed method was developed. A successful evaluation was performed on case studies from the existing literature. Results indicate that the developed simulation model helps users to choose an optimal design option feasible in real-time competitive environments.

Keywords: Goal models, Requirements engineering, Game theory.

Improving Digital Decision Making Through Situational Awareness

Ovidiu Noran   *O.Noran@griffith.edu.au*
Griffith University
Nathan 4111, Australia

Peter Bernus   *P.Bernus@griffith.edu.au*
Griffith University
Nathan 4111, Australia

Abstract

Technical advances in Information and Communication Technology have enabled the collection and storage of large amounts of data, rising hopes of digitalising and thus potentially improving decision making and related support systems. Unfortunately however, the pre-existing gap between required decision making knowledge and the useful information provided by current technologies appears to increase rather than contract. Thus, the multitude of patterns presently provided by current data analytics techniques do not deliver an adequate set of scenarios to enable effective decision making by humans. This paper advocates a digital decision analytics solution featuring the use of Situated Logic to create 'narratives' describing the meaning of data analytics results and the use of Channel Theory in order to support adequate situational awareness. This approach is explained in the context of a System-of-Systems paradigm highly relevant to today's typically complex clusters of distributed collaborative decision making centres and their associated decision support systems.

Keywords: digital decision making, decision support systems, situational awareness, big data, data warehousing, decision model, situated reasoning, channel theory