

# Building Sustainable Information Systems



Henry Linger • Julie Fisher  
Andrew Barnden • Chris Barry  
Michael Lang • Christoph Schneider  
Editors

# Building Sustainable Information Systems

Proceedings of the 2012  
International Conference  
on Information Systems Development

 Springer

### *Editors*

Henry Linger  
Faculty of Information Technology  
Monash University  
Caulfield East, VIC, Australia

Julie Fisher  
Faculty of Information Technology  
Monash University  
Caulfield East, VIC, Australia

Andrew Barnden  
Centre for ICT  
Box Hill Institute  
Box Hill, VIC, Australia

Chris Barry  
National University of Ireland  
Galway, Ireland

Michael Lang  
National University of Ireland  
Galway, Ireland

Christoph Schneider  
City University of Hong Kong  
Kowloon  
Hong Kong SAR

ISBN 978-1-4614-7539-2

ISBN 978-1-4614-7540-8 (eBook)

DOI 10.1007/978-1-4614-7540-8

Springer New York Heidelberg Dordrecht London

Library of Congress Control Number: 2013952729

© Springer Science+Business Media New York 2013

This work is subject to copyright. All rights are reserved by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed. Exempted from this legal reservation are brief excerpts in connection with reviews or scholarly analysis or material supplied specifically for the purpose of being entered and executed on a computer system, for exclusive use by the purchaser of the work. Duplication of this publication or parts thereof is permitted only under the provisions of the Copyright Law of the Publisher's location, in its current version, and permission for use must always be obtained from Springer. Permissions for use may be obtained through RightsLink at the Copyright Clearance Center. Violations are liable to prosecution under the respective Copyright Law.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

While the advice and information in this book are believed to be true and accurate at the date of publication, neither the authors nor the editors nor the publisher can accept any legal responsibility for any errors or omissions that may be made. The publisher makes no warranty, express or implied, with respect to the material contained herein.

Printed on acid-free paper

Springer is part of Springer Science+Business Media ([www.springer.com](http://www.springer.com))

# Preface

Information Systems (IS) as a discipline draws on diverse domains including, technology, organisational theory, management and social science. The field is recognized as very broad and encompassing many themes and areas. However, the development of technologically based artefacts, or information systems development (ISD), in the broadest sense, is a central concern of the discipline. Significantly, IS impacts on the organisational and societal contexts in the way the IS is deployed and consequently this impact presents evolving challenges for ISD.

Today, there is universal agreement that human behaviour has led to significant degradation of the natural environment on a global scale. This is now one of the most critical challenges confronting the world. ICT is widely recognised as one means to address this challenge, and IS can make a significant contribution as it combines the social with the technical aspects of systems. Thus the impact of ISD needs to be considered and evaluated not only in terms of its impact on the work environment but also on its effect in the broader natural and built environments as well as its social impact.

Sustainable IS is an emerging theme in academic research and industry practice in response to a variety of factors. These include recognition of the role ICT and IS can play in mitigation and adaptation strategies to address global environmental degradation and, paradoxically, how to deal with the direct contribution of ICT to that degradation, within the context of embryonic regulatory environments being enacted globally.

The ISD conference is dedicated to IS development and compliments the international network of general IS conferences (ICIS, ECIS, AMCIS, PACIS, ACIS). 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 that is focused on the integration of people, processes and technology within a specific context.

This is the second occasion that Monash University has hosted the ISD conference. On the first occasion in 2003, the Faculty of Information Technology provided

funding to invite to Melbourne members of the first Polish-Scandinavian ISD Seminar that was the forerunner of the International Conference on Information Systems Development, the ISD conference. This year a member of the original ISD Seminar, Professor Karlheinz Kautz, was a keynote speaker.

In this volume we bring together current research around the development of Sustainable IS, expressed in the theme of the 21st ISD Conference, “Building Sustainable Information Systems”. The conference, held at the Monash University Prato Centre, in Tuscany, Italy, included diverse research that examined ISD from the perspective of sustainability. Keynote addresses were an important component as they reinforced and interpreted the conference theme. The two keynote addresses were presented by Professor Doug Vogel, who spoke on Sustaining IS as a Discipline, and Professor Karlheinz Kautz, who addressed the issue of Managing Sustainable Information Systems Development—Culture, Balance and Mindfulness.

Sustainable IS, or “Green IS”, is a catch-all term used to describe the development, construction, management, use and disposal of IS, and the ICT that underpins it, in a way that minimizes its impact on the environment. As a result, the term has many different meanings as was reflected in the conference tracks that included:

- The changing landscape of information systems: properties of a new IS ecology
- Methodologies for design within complex environments
- Green IS—information systems for sustainability
- Model-driven engineering in ISD
- Sustainable ISD project management
- Sustainable knowledge management

All submitted papers were double-blind reviewed by at least two reviewers, and the quality and fairness of the reviews attest to the quality of conference and the accepted papers. As is usual for ISD, conference delegates came from many countries and institutions and this contributed to the particular social aspect of the ISD conference that is its hallmark; collegiality and friendliness.

The success of any conference is dependent on many factors. First, we would like to extend our gratitude to the work of the track chairs, all the authors, the reviewers and delegates who attended the conference. Second, we would like to acknowledge and thank the work of those behind the scenes. In particular we thank Sanaz Bayati who worked tirelessly on all aspects of the organisation of the conference. We would also like to thank the staff of the Monash Prato Centre for their support in ensuring the smooth running of the conference. Last, we acknowledge the role of the International Steering Committee for their guidance and moral support.

Caulfield East, VIC, Australia  
Caulfield East, VIC, Australia  
Box Hill, VIC, Australia

Henry Linger  
Julie Fisher  
Andrew Barnden

---

**Conference Organisation**


---

**Conference Chairs**

Henry Linger	Monash University, Australia
Julie Fisher	Monash University, Australia
Andrew Barnden	Box Hill Institute, Australia

**Organising Chair**

Sanaz Bayati	Monash University, Australia
--------------	------------------------------

**International Steering Committee**

Henry Linger	Monash University, Australia
Chris Barry	National University of Ireland Galway, Ireland
Michael Lang	National University of Ireland Galway, Ireland
Christoph Schneider	City University of Hong Kong, Hong Kong

**Track Chairs****Cloud Computing**

Edward Curry	National University of Ireland Galway, Ireland
Brian Donnellan	National University of Maynooth, Ireland
Philip A. DesAutels	Luleå University of Technology, Sweden

**Methodologies for Design within Complex Environments**

Igor Hawryszkiewicz	University of Technology Sydney, Australia
Ghassan Beydoun	University of Wollongong, Australia
Corina Radulescu	The University of Sydney, Australia

**Green IS—Information Systems for Sustainability**

Helen Hasan	University of Wollongong, Australia
Chadi Aoun	University of Technology Sydney, Australia
Lee Stewart	Fujitsu Australia Limited, Australia

**Model-Driven Engineering in ISD**

Maria José Escalona	The University of Seville, Spain
Isidro Ramos Savater	Universitat Politècnica de València (UPV), Spain
Gustavo Aragón Serrano	Everis Group

**Sustainable ISD Project Management**

Jill Owen	University of New South Wales, Australia
-----------	--

**Sustainable Knowledge Management**

Frada Burstein	Monash University, Australia
Luba Torlina	Deakin University, Australia
Suzanne Zyngier	Latrobe University, Australia
Amrik Sohal	Monash University, Australia

**General Track**

Andrew Barnden	Box Hill Institute of Technology, Australia
----------------	---

---

(continued)

(continued)

---

**Conference Organisation**


---

**Reviewers**

Abdulla Al-Ghamdi	Monash University, Australia
Naief Azyabi	Monash University, Australia
Chris Barry	National University of Ireland Galway, Ireland
Janis Barzdins	University of Latvia, Latvia
Juris Borzovs	University of Latvia, Latvia
Bob Brown	University of Wollongong, Australia
Alena Buchalceva	University of Economics, Prague
Michael Cahalane	University of New South Wales, Australia
Marian Carcary	Innovation value Institute, Ireland
Raul Carlson	Viktoria Institute, Australia
François Charoy	University Henri Poincaré Nancy 1 - LORIA, France
Andy Connor	Auckland University of Technology, New Zealand
James Connor	University of New South Wales, Australia
Gerard Conway	University College Hospital, UK
Vanessa Cooper	RMIT University, Australia
Gabriel J. Costello	Galway-Mayo Institute of Technology, Ireland
Darren Dalcher	Middlesex University, UK
Linda Dawson	University of Wollongong, Australia
Antonio Diaz Andrade	Auckland University of Technology, New Zealand
Eileen Doherty	University of Pennsylvania, United States
Maria Jose Escalona	University of Seville, Spain
Piero Fraternali	Politecnico di Milano, Italy
Odd Fredriksson	Karlstad University, Sweden
Mark Freeman	University of Wollongong, Australia
Brent Furneaux	Maastricht University, Netherlands
Francisco Garcia Sanchez	University of Murcia, Spain
David Grant	Monash University, Australia
Remigijus Gustas	Karlstad University, Sweden
Pari Haghighi	Monash University, Australia
Chihab Hanachi	University Toulouse, France
Helen Hasan	University of Wollongong, Australia
Souleiman Hasan	National University of Ireland Galway, Ireland
Igor Hawryszkiewicz	University of Technology, Sydney, Australia
Alan Hevner	University of South Florida, United States
Jens Holgersson	University of Borås, Sweden
Grant Howard	University of South Africa, South Africa
Marcel Korte	Murdoch University, Australia
Aneesh Krishna	Curtin University, Australia, Australia
Gerard Kybryk	Cité des Sciences et de l'Industrie, France
Gabriele Lakomski	University of Melbourne, Australia
Michael Lang	National University of Ireland Galway, Ireland
Kevin Lee	Murdoch University, Australia
Sharman Lichtenstein	Deakin University, Australia
Felix Lizama	Monash University, Australia

---

(continued)



(continued)

---

**Conference Organisation**


---

Antonio Lopez Lorca	University of Wollongong, Australia
Nikolaos Loutas	National University of Ireland Galway, Ireland
Graham Low	University of New South Wales, Australia
Kathryn Lynch	University of the Sunshine Coast, Australia
Leszek Maciaszek	Wrocław University of Economics, Poland
Jose-Norberto Mazon	Universidad de Alicante, Spain
Vanessa McDermott	University of New South Wales, Australia
Tim Miller	University of Melbourne, Australia
Simon Milton	University of Melbourne, Australia
Robert Moreton	University of Wolverhampton, UK
Kumaran Murugan	UNSW, Australia
Jan Newmarch	Box Hill Institute and Monash University, Australia
Bang Nguyen	Monash University, Australia
Anders Nilsson	Karlstad University, Sweden
Ovidiu Noran	Griffith University, Australia
Stacie Petter	University of Nebraska at Omaha, United States
Hamid Pousti	Monash University, Australia
Asif Qumer Gill	University of Sydney, Australia
Kai Riemer	University of Sydney, Australia
Margaret Ross	Southampton Solent University, UK
Gustavo Rossi	LIFIA-F. Informatica, UNLP, Argentina
Narczyz Roztocki	SUNY at New Paltz, United States
Christoph Schneider	City University of Hong Kong, Hong Kong
Arthur Shelley	RMIT, Australia
Stephen Smith	Macquarie University, Australia
Pamela Spink	Monash University, Australia
Susanne Strahinger	TU Dresden, Germany
Barney Tan	University of Sydney, Australia
Holly Tootell	University of Wollongong, Australia
Jesus Torres	Universidad de Sevilla, Spain
Umair Ul Hassan	National University of Ireland Galway, Ireland
Rosemary Van Der Meer	University of Wollongong, Australia
Frederik Von Briel	City University of Hong Kong, Hong Kong
Richard Watson	Sypaq Systems, Australia
Christine Welch	Portsmouth Business School, UK
Robert Winter	University of St. Gallen, Switzerland
Dongming Xu	The University of Queensland, Australia

---



# Contents

<b>Managing Sustainable Information Systems Development: Complexity, Culture, Balance and Mindfulness.....</b>	<b>1</b>
Karlheinz Kautz	
<b>The Role of Trust in the Initial Adoption of Identity Management Systems.....</b>	<b>25</b>
Ali Alkhalifah and John D'Ambra	
<b>A Conceptual Framework for Aligning Business and Information Systems from Organisational Learning Perspective.....</b>	<b>41</b>
Hamad Balhareth and Kecheng Liu	
<b>Business and ICT Alignment in Higher Education: A Case Study in Measuring Maturity. ....</b>	<b>51</b>
Balbir S. Barn, Tony Clark, and Gary Hearne	
<b>Investigating Post-outsourcing Decisions: Using the Intellectual Capital View .....</b>	<b>63</b>
Hamish T. Barney, Aybüke Aurum, Graham C. Low, and Kevin Wang	
<b>Improved Initial Class Diagrams with ATSA:OO .....</b>	<b>77</b>
Robert B.K. Brown and Angela M.E. Piper	
<b>Information Systems for the Social Well-Being of Senior Australians.....</b>	<b>89</b>
Lois Burgess, Helen Hasan, and Carole Alcock	
<b>A Framework for Evaluating the Impact of High-Bandwidth Internet Provision and Use on Digital Literacy and Social Life Outcomes in Australia .....</b>	<b>101</b>
S. Dane, M. Fahey, C. Mason, R. van der Zwan, J. Tucker, D. Bradford, and C. Griffith	
<b>A Social-Creative-Cognitive (SCC) Model for Requirements Engineering.....</b>	<b>113</b>
Linda Dawson	

**Beyond Interface Design: Considering Learner Cognition When Designing E-Learning Systems** ..... 127  
Mark Freeman, Abdallah Alasraj, and Paul Chandler

**Methodological Framework for the Transition from Requirements to Software Architectures** ..... 139  
Matthias Galster, Armin Eberlein, and Li Jiang

**Integrating Enterprise Architecture and IT Service Management**..... 153  
Nelson Gama, Pedro Sousa, and Miguel Mira da Silva

**Software Process Management: A Model-Based Approach** ..... 167  
L. García-Borgoñon, J.A. García-García, M. Alba, and M.J. Escalona

**Improving NDT with Automatic Test Case Generation**..... 179  
J. Gutiérrez, M.J. Escalona, M. Mejías, F. Domínguez, and C.R. Cutilla

**Architectures for Evolving System of Systems in Complex Environments**..... 193  
Igor Hawryszkiewicz

**A Multimodeling Approach for Quality-Driven Architecture Derivation**..... 205  
Emilio Insfran, Silvia Abrahão, Javier González-Huerta, John D. McGregor, and Isidro Ramos

**IS Degrees: Sociotechnical or Technosocial? A Reflective Analysis**..... 219  
Jenny Coady, Tessa Berg, and Rob Pooley

**Model-Driven Development of Model Transformations Supporting Traces Generation**..... 233  
Álvaro Jiménez, Juan M. Vara, Verónica A. Bollati, and Esperanza Marcos

**An Approach for Identifying Business Requirements for Development of Prospective ERP Systems** ..... 247  
Björn Johansson and Sven A. Carlsson

**Conflict in the Value Chain: An Analysis of Competitive Advantage in Requirements Management of ERPs**..... 259  
Björn Johansson and Mike Newman

**Evolving IT Management Frameworks Towards a Sustainable Future** ..... 271  
Marcel Korte, Kevin Lee, and Chun Che Fung

**Improving Efficiency of Managing Projects by Quality-Oriented Modelling of Processes**..... 285  
Michał Kuciapski

<b>A Performance Management Model for Agile Information Systems Development Teams .....</b>	<b>297</b>
Garry Lohan, Michael Lang, and Kieran Conboy	
<b>ELISA: Extensible Layer for Internet Services and Applications .....</b>	<b>309</b>
Lubos Matl, Vladimir Kloucek, Viktor B. Bohdal, Jan Kubr, and Tomas Cerny	
<b>Knowledge Networks and Innovation-Driven Collaborations: A Study in Victoria's Biotechnology Industry.....</b>	<b>323</b>
Adel Moslehi, Henry Linger, and Kerry Tanner	
<b>Global Development, ICT4D, Education for All .....</b>	<b>337</b>
Anders G. Nilsson and Thérèse H. Nilsson	
<b>Towards Improving Information Systems Interoperability in Disaster Management.....</b>	<b>351</b>
Ovidiu Noran	
<b>Enterprise Architecture Modelling for Corporate Sustainability .....</b>	<b>365</b>
Malgorzata Pankowska	
<b>Understanding IS Risk Emergence from Escalation Perspective.....</b>	<b>377</b>
Nipon Parinyavuttichai and Angela Y. Lin	
<b>Profiles in Professional Social Networks.....</b>	<b>387</b>
Jaroslav Pokorný	
<b>XML Query Adaptation as Schema Evolves.....</b>	<b>401</b>
Marek Polák, Irena Mlýnková, and Eric Pardede	
<b>Handling the Complexity of ISD Projects with Agile Methods: A Conceptual Foundation .....</b>	<b>417</b>
Corina Radulescu and Asif Qumer Gill	
<b>OptBPPlanner: Automatic Generation of Optimized Business Process Enactment Plans.....</b>	<b>429</b>
Andrés Jiménez, Irene Barba, Carmelo del Valle, and Barbara Weber	
<b>Modelling Life Cycles of Generic Object Classes .....</b>	<b>443</b>
Vaclav Repa	
<b>It Is About Time: Investigating the Temporal Parameters of Decision-Making in Agile Teams.....</b>	<b>455</b>
Niamh O. Riordan, Tom Acton, Kieran Conboy, and Willie Golden	
<b>Towards Monitoring Correspondence Between Education Demand and Offer.....</b>	<b>467</b>
Peteris Rudzajs and Marite Kirikova	

**IT Governance: A Baseline Implementation Roadmap  
of a Bank in Thailand.....** 481  
Sureerat Saetang, Abrar Haider, and Andy Koronios

**DBMS Application Layer Intrusion Detection for Data Warehouses.....** 493  
Ricardo Jorge Santos, Jorge Bernardino, and Marco Vieira

**Crowdsourcing Large-Scale Ecological Monitoring:  
Identifying Design Principles to Motivate Contributors.....** 509  
Christoph Schneider and Frederik von Briel

**An Analysis of Enterprise Architecture Frameworks  
from a Coherent Enterprise Description Viewpoint.....** 519  
Vladimir Selcan and Alena Buchalceva

**Query-Driven Method for Improvement  
of Data Warehouse Conceptual Model.....** 531  
Darja Solodovnikova, Laila Niedrite, and Aivars Niedritis

**Capabilities and Affordances of Virtual Worlds  
for People with Lifelong Disability .....** 543  
Karen Stendal and Judith Molka-Danielsen

**A Triple-Helix Model of Sustainable Government  
Information Infrastructure: Case Study of the eProcurement  
System in the Indonesian Public Sector .....** 555  
Fathul Wahid

**Usability Work in Agile Systems Development Practice:  
A Systematic Review .....** 569  
Adeola Wale-Kolade, Peter Axel Nielsen, and Tero Päivärinta

**Data and Information Quality Research in Engineering  
Construction Projects: A Review of Literature.....** 583  
Soffi Westin

**Aligning Communication Analysis with the Unifying  
Meta-model for Enterprise Modeling .....** 595  
Iyad Zikra, Sergio España, Marcela Ruiz, Oscar Pastor, and Janis Stirna

**Index.....** 609