Nelson Baloian Frada Burstein
Hiroaki Ogata Flavia Santoro
Gustavo Zurita (Eds.)

LNCS 8658

Collaboration and Technology

20th International Conference, CRIWG 2014
Santiago, Chile, September 7–10, 2014
Proceedings

Lecture Notes in Computer Science 8658

Commenced Publication in 1973
Founding and Former Series Editors:
Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

Nelson Baloian Frada Burstein Hiroaki Ogata
Flavia Santoro Gustavo Zurita (Eds.)

Collaboration and Technology

20th International Conference, CRIWG 2014
Santiago, Chile, September 7-10, 2014
Proceedings

Springer

Volume Editors

Nelson Baloian
Universidad de Chile, DCC, Beauchef 851, Santiago, Chile
E-mail: nbaloian@dcc.uchile.cl

Frada Burstein
Monash University, Caulfield Campus, Melbourne, VIC 3145, Australia
E-mail: frada.burstein@monash.edu

Hiroaki Ogata
Kyushu University, 744, Motooa, Nishi-ku, Fukuoka 819-0395, Japan
E-mail: hiroaki.ogata@gmail.com

Flavia Santoro
Universidade Federal do Estado do Rio de Janeiro
Avenida Pasteur, 458, Urca, 22245-040 Rio de Janeiro, RJ, Brazil
E-mail: flavia.santoro@uniriotec.br

Gustavo Zurita
Universidad de Chile, Diagonal Paraquay 257, 8330015 Santiago, Chile
E-mail: gzurita@fen.uchile.cl

ISSN 0302-9743 e-ISSN 1611-3349
ISBN 978-3-319-10165-1 e-ISBN 978-3-319-10166-8
DOI 10.1007/978-3-319-10166-8
Springer Cham Heidelberg New York Dordrecht London

Library of Congress Control Number: 2014945635

LNCS Sublibrary: SL 3 – Information Systems and Application, incl. Internet/Web and HCI

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

Preface

This volume contains the papers presented at CRIWG 2014: the 20th International Conference on Collaboration and Technology held during September 6–9, 2014, in Santiago, Chile.

The conference is supported and governed by the Collaborative Research International Working Group (CRIWG), an open community of collaboration technology researchers. Since 1995, conferences supported by CRIWG have been focused on collaboration technology design, development, and evaluation. The background research is influenced by a number of disciplines, such as computer science, management science, information systems, engineering, psychology, cognitive sciences, and social sciences.

The 49 submitted papers were carefully reviewed in a double-blind review process involving at least two reviewers appointed by the program chairs (on average, there were 2.9 reviews per paper). Of these, 16 were selected as full papers and 17 were selected as work in progress. Thus, this volume presents the most relevant and insightful research papers carefully chosen among the contributions accepted for presentation and discussion at the conference.

We believe that papers published in the proceedings of this year's and past CRIWG conferences reflect the trends in collaborative computing research and its evolution. We have seen a growing interest in social networks analysis, crowdsourcing, and computer support for large communities in general. A special research topic that has been traditionally present in the CRIWG proceedings has been collaborative learning. This time there were seven papers selected touching this topic in one way or another.

As usual, we saw a strong participation from South American countries with authors from Brazil, Mexico, Argentina, Peru, Cuba, and Chile. There were also a good number of European authors from Germany, Norway, Portugal, and the UK and contributions from Australia, New Zealand, and China.

As editors, we would like to thank everybody who contributed to the content and production of this book, namely, all the authors and presenters, whose contributions made CRIWG 2014 a success; the Steering Committee, members of the Program Committee, and the additional reviewers. Last but not least, we would like to acknowledge the effort of the organizers of the conference, without whom this conference would not have been realized so effectively. Our thanks also go to Springer, the publisher of the CRIWG proceedings, for their continuous support.

June 2014

Frada Burstein
Hiroaki Ogata
Flavia Santoro
Gustavo Zurita
Nelson Baloian

Organization

Program Committee

Pedro Antunes	Victoria University of Wellington, New Zealand
Renata Araujo	Universidade Federal do Estado do Rio de Janeiro, Brazil
Nelson Baloian	Universidad de Chile
Lars Bollen	Universiteit Twente, The Netherlands
Frada Burstein	Monash University, Australia
Luis Carriço	University of Lisbon, Portugal
Cesar A. Collazos	Universidad del Cauca, Colombia
Gerard de Leoz	University of Omaha, USA
Marco de Sá	Yahoo! Research, USA
Gert-Jan De Vreede	University of Nebraska at Omaha, USA
Dominique Decouchant	UAM Cuajimalpa, Mexico DF, Mexico and LIG de Grenoble, France
Alicia Diaz	Universidad Nacional de La Plata, Argentina
Yannis Dimitriadis	University of Valladolid, Spain
Jesus Favela	Centro de Investigación Científica y de Educación Superior de Ensenada, Mexico
Benjamim Fonseca	Universidade de Trás-os-Montes e Alto Douro, Portugal
Kimberly Garcia	Centro de Investigación y de Estudios Avanzados del Instituto Politécnico Nacional, Mexico
Marco Gerosa	Universidade de São Paulo, Brazil
Adam Giemza	Universität Duisburg-Essen, Germany
Eduardo Guzmán	Universidad de Málaga, Spain
Andreas Harrer	Clausthal University of Technology, Germany
Valeria Herskovic	Pontificia Universidad Católica de Chile
Ulrich Hoppe	Universität Duisburg-Essen, Germany
Indratmo Indratmo	Grant MacEwan University, Canada
Tomoo Inoue	University of Tsukuba, Japan
Marc Jansen	University of Applied Sciences Ruhr West, Germany
Ralf Klamma	Rheinisch-Westfälische Technische Hochschule Aachen, Germany
Michael Koch	Bundeswehr University Munich, Germany
David Kocsis	University of Nebraska at Omaha, USA

Gwendolyn Kolfschoten	Technische Universiteit Delft, The Netherlands
Thomas Largillier	Université de Caen Basse-Normandie, France
Chen-Chung Liu	National Central University, Taiwan
Stephan Lukosch	Delft University of Technology, The Netherlands
Wolfram Luther	Universität Duisburg-Essen, Germany
Alejandra Martínez	University of Valladolid, Spain
Sonia Mendoza	Centro de Investigación y de Estudios Avanzados del Instituto Politécnico Nacional, Mexico
Roc Meseguer	Universitat Politècnica de Catalunya, Spain
Marcelo Milrad	Linnaeus University, Sweden
Alberto Moran	Universidad Autónoma de Baja California, Mexico
Andres Neyem	Pontificia Universidad Católica de Chile
Cuong Nguyen	University of Nebraska at Omaha, USA
Selmin Nurcan	Université Paris 1 Panthéon Sorbonne, France
Miguel Nussbaum	Pontificia Universidad Católica de Chile
Sergio Ochoa	Universidad de Chile
Hiroaki Ogata	Kyushu University, Japan
Hugo Paredes	Universidade de Trás-os-Montes e Alto Douro, Portugal
Niels Pinkwart	Humboldt Universität zu Berlin, Germany
Jose A. Pino	Universidad de Chile
Liana Razmerita	Copenhagen Business School, Denmark
Christophe Reffay	Institut National de Recherche Pédagogique, France
Christoph Rensing	Technische Universität Darmstadt, Germany
Ana Respicio	Universidade Federal de Pernambuco, Portugal
Ana Carolina Salgado	Universidade Federal de Pernambuco, Brazil
Flavia Santoro	Universidade Federal do Estado do Rio de Janeiro, Brazil
Rodrigo Santos	Universidad Nacional del Sur, Argentina
Till Schümmer	FernUniversität in Hagen, Germany
Marcus Specht	Open University of the Nethderlands
Diane Strode	Victoria University of Wellington, New Zealand
Pierre Tchounikine	Université de Grenoble, France
Stefan Trausan-Matu	Universitatea Politehnica din Bucuresti, Romania
Julita Vassileva	University of Saskatchewan, Canada
Vaninha Vieira	Universidade Federal da Bahia, Brazil
Adriana Vivacqua	Universidade Federal do Estado do Rio de Janeiro, Brazil
Aurora Vizcaíno	Universidad de Castilla - La Mancha, Spain

Benjamin Weyers	Rheinisch-Westfälische Technische Hochschule Aachen, Germany
Lung Hsiang Wong	Nanyang Technological University, Singapore
Jürgen Ziegler	Universität Duisburg-Essen, Germany
Gustavo Zurita	Universidad de Chile

Additional Reviewers

Adewoyin, Oluwabunmi	Coelho, José
Aniche, Mauricio	Duarte, Luis
Araujo, Renata	

Keynote Talks

Current Challenges in Business Process Modelling

Pedro Antunes

School of Information Management, Victoria University of Wellington
Wellington, New Zealand
pedro.antunes@vuw.ac.nz

Abstract. The Business Process Management (BPM) method has been increasingly adopted by organisations seeking to improve their business processes. BPM is seen as an enabler of business innovation, fostering change and flexibility, increasing productivity and responsiveness, and leveraging operational intelligence, while maintaining the impact of organisational complexity within reasonable bounds. Analysing these trends, we recognise that a particular IT artefact has gained unexpected importance: process models. Process models support the BPM method in two different ways. In the one hand, by providing formalised, standardised operational rules required by process-aware information systems. In the other hand, process models also influence several activities required by the BPM method such as process elicitation, documentation, analysis, and visualisation. Nowadays business process modelling represents an important market for information systems vendors, software systems developers and integrators, and consulting services providers. This market covers diverse areas of intervention such as supply chain management, customer relationships management, change management, enterprise resource planning, and quality management. It also covers different application areas such as manufacturing, financial services and healthcare. However, the complexity of existing process modelling approaches, along with the demanding characteristics of modelling languages and tools, and the skills required to translate organisational practices into process models, have turned process modelling into a complex practice. What problems are found when modelling business processes? How can process modellers overcome these problems? How can non-experts model business processes? Surprisingly, we do not know much about the process modelling practice. In this keynote we systematically review the current problems found in business process modelling. We show that most problems are related with inadequate conceptual foundations, lack of consensus about what modelling quality is, and also inadequate tool support. Considering in particular the conceptual foundations of BPM, we argue that many problems result from the prevailing mechanistic paradigm, which causes problems bridging business rules and process models, and bridging process execution with organisational behaviour. We suggest a conceptual change towards a more humanistic paradigm centred on ease-of-use, readiness and flexibility. Finally, we discuss several projects using the design-science methodology to investigate humanistic business process modelling.

Keywords: Business Process Modelling, Collaboration.

The Wisdom of Crowds and the Long Tail

Ricardo Baeza-Yates

Yahoo Labs Barcelona
Barcelona, Spain

Abstract. In this keynote we focus on the concept of wisdom of crowds in the context of the Web, particularly through social media and web search usage. As expected from Zipf's principle of least effort, the wisdom is heterogeneous and biased to active people, which may represent at the end the wisdom of a few. We also explore the impact on the wisdom of crowds of dimensions such as bias, privacy, scalability, and spam. We also cover an important related concept, the long tail of the special interests of people, as well as the digital desert, web content that nobody sees.

Summary

The Web continues to grow and evolve very fast, changing our daily lives. This activity represents the collaborative work of the millions of institutions and people that contribute content to the Web as well as more than two billion people that use it. In this ocean of hyperlinked data there is explicit and implicit information and knowledge. But how is the Web? What are the activities of people? What is the impact of these activities? Web data mining is the main approach to answer these questions. Web data comes in three main flavors: content (text, images, etc.), structure (hyperlinks) and usage (navigation, queries, etc.), implying different techniques such as text, graph or log mining. Each case reflects the wisdom of some group of people that can be used to make the Web better.

The wisdom of crowds [9] at work in the Web is best seen in social media as well as in social networks. It is also implicit in the usage of search engines [1] and other popular web applications. The wisdom behind web users is shaped by different complex factors such as the heterogeneity of user activity [10] and hence a heavy long tail [6]; different types of bias [3] that create problems such as the bubble effect [7]; privacy breaches coming from data [5]; too much data that endangers minorities [2]; or web spam in all possible ways [8].

The diversity of user activity implies that an elite of users represent most of the wisdom and that we should really talk about the wisdom of a few [4]. This diversity also generates another concept that we define as *digital desert*, web content that no one ever sees.

References

1. Baeza-Yates, R., Ribeiro-Neto, B.: Modern Information Retrieval: The Concepts and Technology Behind Search, 2nd edn. Addison-Wesley (2011)

2. Baeza-Yates, R., Maarek, Y.: Usage Data in Web Search: Benefits and Limitations. In: Ailamaki, A., Bowers, S. (eds.) SSDBM 2012. LNCS, vol. 7338, pp. 495–506. Springer, Heidelberg (2012)
3. Baeza-Yates, R.: Big Data or Right Data? In: AMW 2013, Puebla, Mexico (May 2013)
4. Baeza-Yates, R., Saez-Trumper, D.: Wisdom of the Crowd or Wisdom of a Few? An Analysis of Users' Content Generation (submitted, 2014)
5. Barbaro, M., Zeller, T.: A face is exposed for aol searcher no. 4417749. The New York Times (August 9, 2006)
6. Goel, S., Broder, A., Gabrilovich, E., Pang, B.: Anatomy of the long tail: ordinary people with extraordinary tastes. In: ACM WSDM 2010, New York, NY, USA, pp. 201–210 (2010)
7. Pariser, E.: The Filter Bubble: What the Internet Is Hiding from You. Penguin Press (2011)
8. Spirin, N., Han, J.: Survey on web spam detection: principles and algorithms. ACM SIGKDD Explorations Newsletter Archive 13(2), 50–64 (2011)
9. Surowiecki, J.: The Wisdom of Crowds: Why the Many Are Smarter Than the Few and How Collective Wisdom Shapes Business, Economies, Societies and Nations. Random House (2004)
10. Zipf, G.K.: Human behavior and the principle of least effort. Addison-Wesley Press (1949)

Appendix: Biography

Ricardo Baeza-Yates is VP of Yahoo Labs for Europe and Latin America since 2006, leading the labs at Barcelona, Spain and Santiago, Chile. He is also part time professor at the Dept. of Information and Communication Technologies of Univ. Pompeu Fabra, in Barcelona, Spain. Until 2005 he was founder and first director of the Center for Web Research at the Dept. of Computing Science of the University of Chile (where he is a professor in leave of absence until today). He obtained a Ph.D. from the University of Waterloo, Canada, in 1989. Before he obtained two masters (M.Sc. CS & M.Eng. EE) and the EE degree as well as the CS B.Sc. from the University of Chile in Santiago. He is co-author of the best-seller Modern Information Retrieval textbook published in 1999 by Addison-Wesley, with a second enlarged edition in 2011 that won the ASIST 2012 Book of the Year award. From 2002 to 2004 he was elected to the board of governors of the IEEE Computer Society and in 2012 he was elected for the ACM Council. He has received the Organization of American States award for young researchers in exact sciences (1993), the Graham Medal for innovation in computing given by the University of Waterloo to distinguished ex-alumni (2007), the CLEI Latin American distinction for contributions to CS in the region (2009), and the National Award of the Chilean Association of Engineers (2010), among other distinctions. In 2003 he was the first computer scientist to be elected to the Chilean Academy of Sciences and since 2010 is a founding member of the Chilean Academy of Engineering. In 2009 he was named ACM Fellow and in 2011 IEEE Fellow.

Collaboration and Critical Thinking

Miguel Nussbaum, Daniela Caballero, Macarena Oteo,
and Damián Gelerstein

Pontificia Universidad Católica de Chile, School of Engineering
Santiago, Chile
mn@ing.puc.cl

Extended Abstract

In recent years, increasing importance has been placed on teaching and assessing 21st Century Skills such as critical thinking and collaboration [1]. In fact, the 2015 PISA will include a large scale assessment of Collaborative Problem Solving [2], where each student will be expected to be proficient in skills such as communicating, managing conflict, organising a team, building consensus and managing progress, among others [1].

In order to bring collaboration to the classroom, design guidelines are needed to help implement such activities. To do so, the following parameters can be used to define a collaborative activity: learning objectives, task type and level of pre-structuring [3]. The learning objectives can range from open skills, such as negotiation of meaning, to closed skills, such as knowledge specification. Task type is defined by the structuring of the activity and ranges from well-structured, with limited solutions, to ill-structured, with no clear solutions. Finally, the level of pre-structuring is defined by the level of scripting that is used [4, 5, 6] and can go from high to low.

By following the outline proposed by [3], activities can be designed that are defined by these three parameters. The learning objectives can be defined using seven collaborative work structures: Identification/Exclusion, Categorizing Elements, Forming Sequences, Completing Sequences, Establishing Exact Associations, Establishing Multiple Associations and Construction [7]. Task type depends on how structured the activity is, i.e. whether it is well-structured (only one possible solution) or ill-structured (multiple solutions) [8]. Finally, the level of pre-structuring can be defined according to the pre-structuring of the roles of each member of the group. This can either be through pre-defined roles[5], [9], where the actions carried out by each student are determined by the activity, or undefined roles, where the students must negotiate the actions to be carried out by each member of the group in order to meet the objective.

The combination of these three variables will determine the degree of collaboration that is required by the activity. These activities can be classified as one of three types: Weak, Medium and Strong. Weak activities can have any type of Learning Objective, where there is only one solution (well structured activity) and the roles are defined (high level of pre-structuring). Medium activities can also have any type of Learning Objective, with two possible combinations of the

remaining variables. The first is where there is only one solution (well structured activity) and the roles are not defined (low level of pre-structuring); the second is where there are multiple solutions (ill structured activity) and the roles are defined (high level of pre-structuring). Strong activities can once again have any type of Learning Objective, where there are multiple solutions (ill structured activity) and the roles are not pre-defined (low level of pre-structuring).

It has been proven experimentally that the degree of collaboration required by an activity determines the interaction between students when working collaboratively, also defined by three variables. The first variable is the existence (or lack) of shared leadership; the second is the amount of dialogue referring to coordination and the third is the level of difficulty as perceived by the students.

Considering that studies which focus on the assessment of collaborative problem solving skills are less developed than studies on collaborative learning [10], it is essential that the effectiveness of collaborative work is also taken into consideration [1]. In order to assess the effectiveness of collaborative work, it is important to bear in mind the following dimensions: Learning about the perspectives and skills of each member of the group, Building a shared representation and negotiating the general sense of the problem (together), Communicating with the members of the group about the actions to be carried out, Monitoring and repairing shared comprehension, Discovering the type of collaborative interaction required to solve the problem according to the goals/objectives, Identifying and describing the tasks that are to be completed, Publishing plans, Monitoring the results of the actions and assessing how successfully the problem has been solved, Under-standing the roles that are required in order to solve the problem, Describing roles and organising the group (communicating protocol/ground rules), Following the ground rules (encouraging peers to carry out their tasks) and Monitoring, giving feedback and adapting the organization and roles within the group [1]. These dimensions were implemented using an instrument which looked for the members of a group to agree on a process for collaborative problem solving. This consisted of identifying geometric shapes, where each of the students played a specific role. The students could only communicate with one another via a chatroom in order to use their messages to work out how to solve the problem and thus determine the presence of the above dimensions.

Finally, it is important for every activity to consider critical thinking in its design, which involves the following abilities interpretation, analysis, evaluation, inference, explanation and self-regulation [11]. It is possible to develop critical thinking through collaboration [12], normally through the means of a specific subject matter such as mathematics [13].

Acknowledgement. This research is supported by CONICYT-FONDECYT 1120177.

References

1. OECD, PISA 2015 Collaborative Problem Solving Framework. (2013), http://www.oecd.org/pisa/pisaproducts/DraftPISA2015CollaborativeProblemSolvingFramework.pdf (retrieved)
2. De Jong, J.H.: Framework for PISA 2015: What 15-years-old should be able to do. In: 4th Annual Conference of Educational Research Center, Broumana, Lebanon (2012)
3. Strijbos, J.W., Martens, R.L., Jochems, W.M.G.: Designing for interaction: Six steps to designing computer-supported group-based learning. Computers & Education 42(4), 403–424 (2004)
4. Dillenbourg, P. (n.d.).: Over-scripting CSCL: The risks of blending collaborative learning with instructional design
5. Strijbos, J.-W., Weinberger, A.: Emerging and scripted roles in computer-supported collaborative learning. Computers in Human Behavior 26(4), 491–494 (2010)
6. Weinberger, A., Ertl, B., Fischer, F., Mandl, H.: Epistemic and social scripts in computer-supported collaborative learning. Instructional Science 33(1), 1–30 (2005)
7. Nussbaum, M., Rosas, R., Peirano, I., Cardenas, F.: Development of intelligent tutoring systems using knowledge structures. Computers & Education 36, 15–32 (2001)
8. Cohen, E.: Restructuring the Classroom: Conditions for Productive Small Groups. Review of Educational Research 64(1), 1–35 (1994)
9. Martel, C., Vignollet, L., Ferraris, C., David, J.P., Lejeune, A.: Modeling Collaborative Learning Activities on e-Learning Platforms. In: ICALT, pp. 707–709 (2006)
10. Looi, C.K.: Testing collaboration at school (2013), https://cerp.aqa.org.uk/perspectives/testing-collaboration-school (accessed September 9, 2013)
11. Facione, P.A.: Critical Thinking: A Statement of Expert Consensus for Purposes of Educational Assessment and Instruction. Research Findings and Recommendations (1990), http://assessment.aas.duke.edu/documents/Delphi_Report.pdf (retrieved)
12. Johnson, R.T., Johnson, D.W., Stanne, M.B.: Effects of Cooperative, Competitive, and Individualistic Goal Structures on Computer-Assisted Instruction. Journal of Educational Psychology 77(6), 668–677 (1985)
13. Willingham, D.T.: Critical thinking: Why is it so hard to teach? Arts Education Policy Review 109(4), 21–32 (2008)

Table of Contents

Understanding How Network Performance Affects User Experience of Remote Guidance

Angus Donovan[1], Leila Alem[1], Weidong Huang[2], Ren Liu[1], and Mark Hedley[1]

[1] CSIRO
[2] University of Tasmania

Abstract. Much research has been done to support remote collaboration on physical tasks. However, the focus of the research has been mainly on system and interface design and their impact on collaboration. Relatively less attention has been paid to investigating how network performance can affect user experience and task performance. In this paper, we present a preliminary user study on this issue in which participants were asked to work collaboratively in pair using a remote mobile tele-assistance system we developed. In this study, five network scenarios were examined and network performance (QoS) was measured using four metrics including delay, jitter, bandwidth and packet loss. User experience (QoE) was measured using both objective and subjective metrics. The formal included time taken and number of instructions repeated for task performance while the latter included user ratings of quality of audio experience, quality of video experience and overall quality of experience. The results indicated that the packet loss rate in QoS is the biggest contributor to loss in QoE. We also discuss implications of the study and possible directions of future work.

1 Introduction

Nowadays technologies are becoming increasingly ubiquitous and complex. As a result, expertise is often required for performing physical tasks on these technologies. Physical tasks are ones that require collaborators working on physical objects such as equipment maintenance. However, it is common that users do not have the required skills set and help is required to, for example, fix the technology when it breaks down. This can be potentially a big issue for many users as access to sound expertise and guidance is often lacking, particularly in rural and remote areas and in emergency situations. In response to the demand and in order to make expertise more accessible to users, a number of systems have been developed (e.g., [7, 12, 13]).

These systems typically have two network-connected units: one helper unit and one worker unit, and are constructed in a way that the remote helper is enabled to guide the local worker performing collaborative psychical tasks using both audio and visual communications just like they were co-located. Recently, we have developed a remote mobile tele-assistance tool called ReMoTe [9, 15]. The tool's worker unit is a wearable system that supports mobility of the worker

N. Baloian et al. (Eds.): CRIWG 2014, LNCS 8658, pp. 1–12, 2014.