IFIP Advances in Information and Communication Technology 395

Editor-in-Chief

A. Joe Turner, Seneca, SC, USA

Editorial Board

Foundations of Computer Science
  Mike Hinchey, Lero, Limerick, Ireland
Software: Theory and Practice
  Michael Goedicke, University of Duisburg-Essen, Germany
Education
  Arthur Tatnall, Victoria University, Melbourne, Australia
Information Technology Applications
  Ronald Waxman, EDA Standards Consulting, Beachwood, OH, USA
Communication Systems
  Guy Leduc, Université de Liège, Belgium
System Modeling and Optimization
  Jacques Henry, Université de Bordeaux, France
Information Systems
  Jan Pries-Heje, Roskilde University, Denmark
ICT and Society
  Jackie Phahlamohlaka, CSIR, Pretoria, South Africa
Computer Systems Technology
  Paolo Prinetto, Politecnico di Torino, Italy
Security and Privacy Protection in Information Processing Systems
  Kai Rannenberg, Goethe University Frankfurt, Germany
Artificial Intelligence
  Tharam Dillon, Curtin University, Bentley, Australia
Human-Computer Interaction
  Annelise Mark Pejtersen, Center of Cognitive Systems Engineering, Denmark
Entertainment Computing
  Ryohei Nakatsu, National University of Singapore

IFIP – The International Federation for Information Processing

IFIP was founded in 1960 under the auspices of UNESCO, following the First World Computer Congress held in Paris the previous year. An umbrella organization for societies working in information processing, IFIP's aim is two-fold: to support information processing within its member countries and to encourage technology transfer to developing nations. As its mission statement clearly states,

> *IFIP's mission is to be the leading, truly international, apolitical organization which encourages and assists in the development, exploitation and application of information technology for the benefit of all people.*

IFIP is a non-profitmaking organization, run almost solely by 2500 volunteers. It operates through a number of technical committees, which organize events and publications. IFIP's events range from an international congress to local seminars, but the most important are:

- The IFIP World Computer Congress, held every second year;
- Open conferences;
- Working conferences.

The flagship event is the IFIP World Computer Congress, at which both invited and contributed papers are presented. Contributed papers are rigorously refereed and the rejection rate is high.

As with the Congress, participation in the open conferences is open to all and papers may be invited or submitted. Again, submitted papers are stringently refereed.

The working conferences are structured differently. They are usually run by a working group and attendance is small and by invitation only. Their purpose is to create an atmosphere conducive to innovation and development. Refereeing is also rigorous and papers are subjected to extensive group discussion.

Publications arising from IFIP events vary. The papers presented at the IFIP World Computer Congress and at open conferences are published as conference proceedings, while the results of the working conferences are often published as collections of selected and edited papers.

Any national society whose primary activity is about information processing may apply to become a full member of IFIP, although full membership is restricted to one society per country. Full members are entitled to vote at the annual General Assembly, National societies preferring a less committed involvement may apply for associate or corresponding membership. Associate members enjoy the same benefits as full members, but without voting rights. Corresponding members are not represented in IFIP bodies. Affiliated membership is open to non-national societies, and individual and honorary membership schemes are also offered.

Tobias Ley   Mikko Ruohonen
Mart Laanpere   Arthur Tatnall (Eds.)

Open and Social Technologies for Networked Learning

Springer

Volume Editors

Tobias Ley
Mart Laanpere
Tallinn University
Narva mnt 25, 10120 Tallinn, Estonia
E-mail: {tobias.ley, mart.laanpere}@tlu.ee

Mikko Ruohonen
University of Tampere
Kalevantie 4, 33100 Tampere, Finland
E-mail: mikko.j.ruohonen@uta.fi

Arthur Tatnall
Victoria University
City Flinders Campus
PO Box 14428, Melbourne, VIC 8001, Australia
E-mail: arthur.tatnall@vu.edu.au

Preface

Sometimes shifts in technology prove to be a game-changer in certain application fields. The shift to open and social technologies plays an increasingly important role in many educational settings. Social technologies are naturally entering primary, secondary, and higher education where they blur the boundaries between formal and informal learning. Social technologies also enter the workplace where they connect learners and bridge the boundaries between individual learning and organizational knowledge processes. Not only do these technologies connect learners independent of place and time, they have also been found to exert emergent properties. For example, wikis or social tagging environments are increasingly used for collaborative knowledge construction where new knowledge emerges from a large-scale interaction of individuals. These properties and their impact on individual, group, and organizational learning have only started to be researched.

Open source software (OSS) and technologies have received extensive research attention owing to some favorable properties contrasting with a traditional understanding of software development and the use of those systems. Many OSS issues are motivations for OSS developers and licensing bodies. However, important research areas in OSS are product and implementation success and the use of OSS in different educational and enterprise settings. OSS can also serve as a platform for providing services to user communities. Especially in developing countries, OSS provides an attractive opportunity.

To address these topics, the IFIP-sponsored open conference on Open and Social Technologies for Networked Learning took place in Tallinn, Estonia, from July 30 to August 3, 2012. The conference brought together participants from five continents, and engaged them in a broad and diverse programme. All submitted papers were peer reviewed and we accepted 16 full research papers for presentation at the conference with an acceptance rate of roughly two thirds of all submissions. These were complemented by presentation of three short papers and five doctoral student papers that presented emerging topics of young researchers in this area. These research papers comprise the main body of this volume, covering topics of "Mobile Learning," "Social Networks, Analytics and Recommendation," "Workplace Learning," "Learning Analytics in Higher Education," "Collaborative Learning in Higher Education," and "Managing Open and Social Education." The authors of the accepted papers were then given the opportunity to make improvements to their papers following suggestions and feedback from other conference participants. We thank the reviewers for their dedication that helped to ensure the high quality of the final papers.

In addition to these presentations and following the tradition of earlier IFIP conferences, three discussion groups offered the opportunity for in-depth discussion of more focused topics. Kati Tikkamäki and Nicholas Mavengere from the

University of Tampere convened a group on "Organizational learning, agility and social technologies in contemporary workplaces". Jane Andersen from the IT University of Copenhagen, Denmark, convened a group on "Social technologies for improving quality and efficiency in the area between teaching/learning and administrative student support," and Mart Laanpere and Peeter Normak from Tallinn University lead a group on "Digital learning ecosystems: rethinking virtual learning environments in the age of social media." This volume includes a paper that synthesizes the discussions of the Tikkamäki and Mavengere discussion group and points toward further research.

Last but not least, the program included presentations of three invited speakers. Stefanie Lindstaedt, from Graz University of Technology, Austria, talked about a research program in which she examined the important role of reflection at the workplace. Different technological means included work-integrated learning technologies, knowledge maturing services, and different types of context-detection mechanisms from desktop and mobile applications.

Alberto Cañas from the Institute for Human and Machine Cognition, in Florida/USA presented concept mapping as a way to support knowledge construction. Several tools that his group has been developing for this purpose were also demonstrated. It is increasingly important to formulate concepts for the mass of social media phenomena, otherwise it is difficult to observe the changing arena of discussion.

Lastly, Jari Multisilta from CICERO Learning at the University of Helsinki, Finland, talked about mobile social technologies and their use in schools and beyond. His message was to pinpoint the value of a richer social media environment with massive use of digital images and, increasingly, videos. The next generation will learn by socializing their video inputs.

With the tag #ifipost12, the conference was also represented in several social media services, such as Twitter, Flickr, and Slideshare.

The conference was co-sponsored by IFIP Technical Committee 3 Education with the organizing working group WG 3.4 Professional and Vocational Education in Information Technology. This working group has focused its activities in the last few years on many of the emerging movements in the field of ICT and education, one of the editors of this book, Arthur Tatnall, is the Chair of the WG.

Whether the increased use of social and open technologies proves to be a game-changer in education has not been decided. The contributions in this volume, however, show that significant progress has been made in the application of open and social technologies in all areas of education, and a number of exciting research questions still remain to be tackled.

Tobias Ley
Mikko Ruohonen
Arthur Tatnall
Mart Laanpere

Organization

Organizing Committee

Conference Co-chairs

Tobias Ley   Tallinn University, Estonia
Mikko Ruohonen   University of Tampere, Finland

Organisation Chair

Mart Laanpere   Tallinn University, Estonia

Social Media Chair

Hans Põldoja   Tallinn University, Estonia

Doctoral Consortium

Pertti Järvinen   University of Tampere, Finland
Terje Väljataga   Tallinn University, Estonia

Posters and Demos

Karin Schöfegger   Tallinn University, Estonia
Kaido Kikkas   Tallinn University, Estonia

Program Committee

Graham Attwell   Pontydysgu, UK
Dirk Börner   Open University of The Netherlands
Linda Castañeda   University of Murcia, Spain
John Cook   London Metropolitan University, UK
Raquel M. Crespo García   Universidad Carlos III de Madrid, Spain
Bill Davey   Royal Melbourne Institute of Technology,
                                 Australia
Valentina Dagiene   Vilnius University, Lithuania
Michael Derntl   RWTH Aachen, Germany
Hannes Ebner   KTH Stockholm, Sweden
Helen Edwards   University of Sunderland, UK
Alev Elci   Eastern Mediterranean University, Magusa,
                                 North Cyprus
Dragan Gasevic   Computing and Information Systems,
                                 Athabasca University, Canada
Israel Gutiérrez Rojas   Universidad Carlos III de Madrid, Spain

Anneke Hacquebard   CEN ICT/SKILLS Workshop, The Netherlands
Raimo Hälinen   University of Applied Sciences, Hämeenlinna,
          Finland
Marek Hatala   Simon Fraser University, Canada
Teresa Holocher-Ertl   Zentrum für Soziale Innovation, Vienna,
          Austria
Malinka Ivanova   Technical University of Sofia, Bulgaria
Pertti Järvinen   University of Tampere, Finland
Jelena Jovanovic   University of Belgrade, Serbia
Kaido Kikkas   Tallinn University, Estonia
Ralf Klamma   RWTH Aachen, Germany
Tomaž Klobucar   Jožef Stefan Institute, Ljubljana, Slovenia
Milos Kravcik   RWTH Aachen, Germany
Timo Lainema   University of Turku, School of Economics,
          Finland
Effie Law   ETH Zürich, Switzerland
Teemu Leinonen   Aalto University, Helsinki, Finland
Stefanie Lindstaedt   Graz University of Technology & Know Center,
          Austria
Allison Littlejohn   Glasgow Caledonian University, UK
Johannes Magenheim   University of Paderborn, Germany
Claudia Müller-Birn   Free University of Berlin, Germany
Paul Nleya   University of Botswana, Botswana
Jan M. Pawlowski   University of Jyväskylä, Finland
Sandra Schön   Salzburg Research, Salzburg, Austria
Melody Siadaty   Simon Fraser University and Athabasca
          University, Canada
Rory Sie   Open University of The Netherlands
Lampros Stergioulas   Brunel University
Antti Syvänen   University of Tampere, Finland
Arthur Tatnall   Victoria University, Melbourne, Australia
Stefan Thalmann   University of Innsbruck, Austria
Stefaan Ternier   Open University of The Netherlands
Riina Vuorikari   European Schoolnet, Belgium
Martin Wolpers   Fraunhofer FIT, Germany

Table of Contents

Learning Analytics in Higher Education

Collaborative Learning in Higher Education

Managing Open and Social Education

Doctoral Student Papers

Discussion Groups