

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 Rannenber, 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.

Etiel Petrinja Giancarlo Succi
Nabil El Ioini Alberto Sillitti (Eds.)

Open Source Software: Quality Verification

9th IFIP WG 2.13 International Conference, OSS 2013
Koper-Capodistria, Slovenia, June 25-28, 2013
Proceedings



Springer

Volume Editors

Etiel Petrinja
Giancarlo Succi
Nabil El Ioini
Alberto Sillitti
Free University of Bozen/Bolzano
39100 Bolzano, Italy
E-mail: {etiel.petrinja, gsucci, nelioini, asillitti}@unibz.it

ISSN 1868-4238

e-ISSN 1868-422X

ISBN 978-3-642-38927-6

e-ISBN 978-3-642-38928-3

DOI 10.1007/978-3-642-38928-3

Springer Heidelberg Dordrecht London New York

Library of Congress Control Number: 2013940259

CR Subject Classification (1998): K.5.1, D.2, K.6, K.4, K.3, D.3, D.1

© IFIP International Federation for Information Processing 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.

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

The 9th International Conference on Open Source Systems of the IFIP working group was again organized in Europe after three successful editions organized in North America, South America, and Africa. This year we received several high-quality contributions, both full papers and short papers, and two workshop proposals. The conference hosted a doctoral consortium and invited distinguished speakers. The success of this year's edition was possible thanks to the contributions of the Organizing Committee, the Program Committee, workshop organizers, the Doctoral Consortium Committee, and the authors of the contributed manuscripts coming from over 20 countries. We are also thankful to the organizers of the previous conferences for all their suggestions.

We were positively surprised this year to receive contributions, from all continents, showing the truly international scope of the Open Source Systems conference and the diffusion of open source initiatives worldwide. The open source that was initially based on a rich set of free software initiatives proved to be a viable and often highly successful alternative to traditional, closed source, software development. Several key topics in open source software research were introduced in previous editions of the conference. Based on enlightening study results presented in key journals and conferences, the open source approach proved to be not limited only to software development but showed that it can also be extended to affine domains such as publishing, education and also tangible products development. These initiatives were addressed by some interesting contributions presented during this year's Open Source Systems conference.

This book is a collection of 18 carefully peer-reviewed full paper contributions and 3 short paper contributions. At the end of the volume, readers can find the presentation of the topics covered in two workshops held together with the main conference. The first part of this volume is dedicated to studies focused on the innovation and sustainability of open source systems initiatives. The second section is dedicated to contributions focused on practices and methods adopted by open source systems communities. A section is dedicated to innovative technologies for managing open source systems development and execution of open source software. Two studies focus on two important aspects: information security in open source projects and the adoption of open standards. The last section containing full papers is dedicated to business models and licensing aspects in open source initiatives.

We believe that this book will be a valuable milestone for the open source software research community and that it adds new insights into this still-growing area. We hope that the content will further enrich the open source research community, the producers, integrators, and final users of open source systems,

and will be useful to readers who are part of communities where openness is considered a valuable resource. Our thanks go particularly to all developers, documentation writers, translators, and in general to all contributors to open source initiatives that make our field of study interesting.

April 2013

Etiel Petrinja
Giancarlo Succi
Nabil El Ioini
Alberto Sillitti

OSS2013 Conference Organization

Conference Officials

General Chair

Giancarlo Succi
Free University of Bozen-Bolzano, Bolzano,
Italy

Program Chair

Etjel Petrinja
Free University of Bozen-Bolzano, Italy

Organizing Chairs

Davide Dozza
Alberto Sillitti
Make-IT, Italy
Free University of Bozen-Bolzano, Italy

Proceedings Chair

Nabil El Ioini
Free University of Bozen-Bolzano, Italy

Doctoral Consortium Chairs

Björn Lundell
Gregory Madey
Klaas-Jan Stol
University of Skövde, Sweden
University of Notre Dame, USA
Lero, University of Limerick, Ireland

Industry Chairs

Marjan Hericko
Stephane Ribas
Andrej Kositer
University of Maribor, Slovenia
INRIA, France
Agenda Open Systems, Slovenia

Public Sector Liaison Chair

Jelena Vlasenko
McGill University, Canada

Tutorials Chair

Greg Madey
University of Notre Dame, USA

Workshops Chair

Ivica Crnkovic
Mälardalen University, Sweden

Social Media Chair

Sulayman K. Sowe
United Nations University Institute for
Advanced Studies, Japan

Publicity Chair

Imed Hammouda

Tampere University of Technology, Finland

Publicity Co-chairs

(Asia)

Tetsuo Noda, Shimane University, Japan

(USA)

Lutz Wrage, Carnegie Mellon, USA

(Canada)

Jelena Vlasenko, McGill, Canada

(Central and South America)

Carlos Denner Santos Jr., University of Brasilia,
Brazil

(Central and East Europe)

Stefan Koch, Bogazici University, Turkey

(W. Europe, Scandinavia)

Jonas Gamalielsson, University of Skövde,
Sweden

Program Committee

Alberto Sillitti

Free University of Bozen-Bolzano, Italy

Andrea Capiluppi

University of East London, UK

Anthony Wasserman

Carnegie Mellon Silicon Valley, USA

Björn Lundell

University of Skövde, Sweden

Carlos Denner Dos Santos

Universidade de Brasilia, Brazil

Charles M. Schweik

University of Massachusetts, USA

Chintan Amrit

University of Twente, The Netherlands

Cornelia Boldyreff

University of East London, UK

Daniela Cruzes

Norwegian University of Science and
Technology, Norway

Davide Tosi

University of Insubria, Italy

Diomidis Spinellis

Athens University of Economics and Business,
Greece

Dirk Riehle

University of Erlangen-Nuremberg, Germany

Etiel Petrinja

Free University of Bozen-Bolzano, Italy

Fabio Kon

University of São Paulo, Brazil

Francesco Di Cerbo

SAP Labs, France

Gregorio Robles

Universidad Rey Juan Carlos, Spain

Gregory Madey

University of Notre Dame, USA

Guy Martin

Red Hat, USA

Imed Hammouda

Tampere University of Technology, Finland

Jesus M. Gonzalez-Barahona

Universidad Rey Juan Carlos, Spain

John Noll

Lero - the Irish Software Engineering Research
Centre, Ireland

Jonas Gamalielsson

University of Skövde, Sweden

Klaas-Jan Stol, Lero

University of Limerick, Ireland

Luigi Lavazza

Università degli Studi dell'Insubria, Italy

Maha Shaikh

London School of Economics, UK

Marcos Sfair Sunye

Federal University of Paraná, Brazil

Netta Iivari
Patrick Wagstrom
Rafael Prikladnicki
Reidar Conradi

Richard Torkar
Sandro Morasca
Stefan Koch
Wasif Afzal
Witold Pedrycz
Yeliz Eseryel

University of Oulu, Finland
IBM T.J. Watson Research Center, USA
PUCRS, Brazil
Norwegian University of Science and
Technology, Norway
Blekinge Institute of Technology, Sweden
Università degli Studi dell'Insubria, Italy
Bogazici University, Turkey
Blekinge Institute of Technology, Sweden
University of Alberta, Canada
University of Groningen, The Netherlands

Table of Contents

Part I: Full Papers

Innovation and Sustainability

Technological Innovation and Resource Bricolage in Firms: The Role of Open Source Software	1
<i>Aarti Mahajan and Bart Clarysse</i>	
Empirical Study of the Relation between Open Source Software Use and Productivity of Japan's Information Service Industries	18
<i>Keisuke Tanihana and Tetsuo Noda</i>	
How Healthy Is My Project? Open Source Project Attributes as Indicators of Success	30
<i>James Piggot and Chintan Amrit</i>	
Identifying Success Factors for the Mozilla Project	45
<i>Robert Viseur</i>	
Is It All Lost? A Study of Inactive Open Source Projects	61
<i>Jymit Khondhu, Andrea Capiluppi, and Klaas-Jan Stol</i>	

Practices and Methods

Community Dynamics in Open Source Software Projects: Aging and Social Reshaping	80
<i>Anna Hannemann and Ralf Klamma</i>	
Exploring Collaboration Networks in Open-Source Projects	97
<i>Andrejs Jermakovics, Alberto Sillitti, and Giancarlo Succi</i>	
Socio-technical Congruence in OSS Projects: Exploring Conway's Law in FreeBSD	109
<i>M.M. Mahbubul Syeed and Imed Hammouda</i>	
Modeling Practices in Open Source Software	127
<i>Omar Badreddin, Timothy C. Lethbridge, and Maged Elassar</i>	
The Role of Microblogging in OSS Knowledge Management	140
<i>Jonathan Lewis</i>	

A Preliminary Analysis of Localization in Free Software: How Translations Are Performed 153
Laura Arjona Reina, Gregorio Robles, and Jesús M. González-Barahona

FOSS Technologies

Authoritative Linked Data Descriptions of Debian Source Packages Using ADMS.SW 168
Olivier Berger and Christian Bac

An Open Source Monitoring Framework for Enterprise SOA 182
Nabil El Ioini, Alessandro Garibbo, Alberto Sillitti, and Giancarlo Succi

Security and Open Standards

Information Security and Open Source Dual Use Security Software: Trust Paradox 194
Mario Silic and Andrea Back

Open Standards and Open Source in Swedish Schools: On Promotion of Openness and Transparency 207
Björn Lundell and Jonas Gamalielsson

Business Models and Licensing

Effect on Business Growth by Utilization and Contribution of Open Source Software in Japanese IT Companies 222
Tetsuo Noda, Terutaka Tansho, and Shane Coughlan

Misconceptions and Barriers to Adoption of FOSS in the U.S. Energy Industry 232
Victor Kuechler, Carlos Jensen, and Deborah Bryant

A Dual Model of Open Source License Growth 245
Gottfried Hofmann, Dirk Riehle, Carsten Kolassa, and Wolfgang Mauerer

Part II: Short Papers

Towards a Reference Model on How to Utilise Open Standards in Open Source Projects: Experiences Based on Drupal 257
Jonas Gamalielsson, Björn Lundell, Alexander Grahn, Stefan Andersson, Jonas Feist, Tomas Gustavsson, and Henrik Strindberg

How to Calculate Software Metrics for Multiple Languages Using Open
Source Parsers 264
Andrea Janes, Danila Piatov, Alberto Sillitti, and Giancarlo Succi

The Emergence of Quality Assurance Practices in Free/Libre Open
Source Software: A Case Study 271
Adina Barham

Author Index 277