## IFIP Advances in Information and Communication Technology

321

#### Editor-in-Chief

A. Joe Turner, Seneca, SC, USA

#### **Editorial Board**

Foundations of Computer Science

Mike Hinchey, Lero, Limerick, Ireland

Software: Theory and Practice

Bertrand Meyer, ETH Zurich, Switzerland

Education

Bernard Cornu, CNED-EIFAD, Poitiers, France

**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** 

Barbara Pernici, Politecnico di Milano, Italy

Relationship between Computers and Society

Chrisanthi Avgerou, London School of Economics, UK

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

Max A. Bramer, University of Portsmouth, UK

**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 less 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 in information 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.

Masakatsu Nishigaki Audun Jøsang Yuko Murayama Stephen Marsh (Eds.)

# Trust Management IV

4th IFIP WG 11.11 International Conference, IFIPTM 2010 Morioka, Japan, June 16-18, 2010 Proceedings



#### Volume Editors

Masakatsu Nishigaki

Shizuoka University, Graduate School of Science and Technology

3-5-1 Johoku, Naka, Hamamatsu 432-8011, Japan

E-mail: nisigaki@inf.shizuoka.ac.jp

Audun Jøsang

University of Oslo, UNIK Graduate Center Gunnar Randers vei 19, 2007 Kjeller, Norway

E-mail: josang@unik.no

Yuko Murayama

Iwate Prefectural University, Faculty of Software and Information Science

152-52 Sugo, Takizawa, Takizawa-mura, Iwate 020-0173, Japan

E-mail: murayama@iwate-pu.ac.jp

Stephen Marsh

Communications Research Centre Canada 3701 Carling Avenue, Ottawa, Ontario K2H 8S2, Canada

E-mail: steve.marsh@crc.gc.ca

Library of Congress Control Number: 2010927596

CR Subject Classification (1998): K.6.5, C.2, E.3, D.4.6, H.4, H.5

ISSN 1868-4238

ISBN-10 3-642-13445-9 Springer Berlin Heidelberg New York ISBN-13 978-3-642-13445-6 Springer Berlin Heidelberg New York

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, re-use of illustrations, recitation, broadcasting, reproduction on microfilms or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer. Violations are liable to prosecution under the German Copyright Law.

springer.com

© IFIP International Federation for Information Processing 2010 Printed in Germany

Typesetting: Camera-ready by author, data conversion by Scientific Publishing Services, Chennai, India Printed on acid-free paper 06/3180

## **Preface**

This volume contains the proceedings of IFIPTM 2010, the 4th IFIP WG 11.11 International Conference on Trust Management, held in Morioka, Iwate, Japan during June 16-18, 2010.

IFIPTM 2010 provided a truly global platform for the reporting of research, development, policy, and practice in the interdependent arrears of privacy, security, and trust. Building on the traditions inherited from the highly successful iTrust conference series, the IFIPTM 2007 conference in Moncton, New Brunswick, Canada, the IFIPTM 2008 conference in Trondheim, Norway, and the IFIPTM 2009 conference at Purdue University in Indiana, USA, IFIPTM 2010 focused on trust, privacy and security from multidisciplinary perspectives. The conference is an arena for discussion on relevant problems from both research and practice in the areas of academia, business, and government.

IFIPTM 2010 was an open IFIP conference. The program of the conference featured both theoretical research papers and reports of real-world case studies. IFIPTM 2010 received 61 submissions from 25 different countries: Japan (10), UK (6), USA (6), Canada (5), Germany (5), China (3), Denmark (2), India (2), Italy (2), Luxembourg (2), The Netherlands (2), Switzerland (2), Taiwan (2), Austria, Estonia, Finland, France, Ireland, Israel, Korea, Malaysia, Norway, Singapore, Spain, Turkey. The Program Committee selected 18 full papers for presentation and inclusion in the proceedings. In addition, the program and the proceedings include two invited papers by academic experts in the fields of trust management, privacy and security, namely, Toshio Yamagishi and Pamela Briggs.

In the IFIPTM 2010 conference, as well as the tutorials and the demonstration sessions, we had newly established short paper sessions and poster paper sessions. In addition, five related workshops were held with IFIPTM 2010. We believe the deep and wide profiles produced by all of the events helped to solidify IFIPTM 2010 as an international, multidisciplinary trust conference.

Running an international conference requires immense effort from all parties involved. We would like to thank the Program Committee members and external referees for having provided timely and in-depth reviews of the submitted papers. We would also like to thank the Workshop, Tutorial, Poster and Demonstration, Publications, Local Organization, Registration, Publicity, Liaison, Website Chairs, and Advisory Committee, for having provided great help organizing the conference.

#### VI Preface

We are also grateful to the Japan Society for the Promotion of Science (JSPS), Japan, National Institute of Information and Communications Technology (NICT), Japan, Information-Technology Promotion Agency (IPA), Japan, and Iwate Prefectural University, Japan for their financial support of IFIPTM 2010.

We hope you enjoy the proceedings.

June 2010

Masakatsu Nishigaki Audun Jøsang Yuko Murayama Stephen Marsh

## Organization

#### **Executive Committee**

**General Chairs** 

Yuko Murayama Iwate Prefectural University, Japan

Stephen Marsh Communications Research Centre (CRC),

Canada

**Program Chairs** 

Masakatsu Nishigaki Shizuoka University, Japan

Audun Jøsang University of Oslo, Norway

Workshop Chairs

Hiroaki Kikuchi Tokai University, Japan

Justin Zhan CMU, USA

**Tutorial Chair** 

Ayako Komatsu Information-Technology Promotion Agency

(IPA), Japan

Poster and Demonstration Chair

Katsumi Takahashi NTT Corp., Japan

**Local Organization Chairs** 

Yasuhiro Fujihara Iwate Prefectural University, Japan Norihisa Segawa Iwate Prefectural University, Japan

**Publications Chairs** 

Tetsutaro Uehara Kyoto University, Japan Kanta Matsuura University of Tokyo, Japan

Registration Chairs

Masato Terada Hitachi Ltd., Japan

Toyoo Takata Iwate Prefectural University, Japan

Publicity Chairs

Yuji SUGA Internet Initiative Japan Inc. (IIJ), Japan Hidema Tanaka National Institute of Information and

Communications Technology (NICT), Japan

#### VIII Organization

Liaison Chairs

Masayuki Terada NTT Docomo, Inc., Japan Kozo Noaki NTT Docomo, Inc., Japan

Website Chairs

Yoshia Saito Iwate Prefectural University, Japan Kentarou Yamaguchi Institute of Information Security, Japan

#### Advisory Committee

Yoichi Shinoda National Institute of Information and

Communications Technology (NICT), Japan and Japan Advanced Institute of Science and

Technology (JAIST)

Ryoichi Sasaki Tokyo Denki University, Japan Eiji Okamoto University of Tsukuba, Japan

Koji Nakao National Institute of Information and

Communications Technology (NICT), Japan

and KDDI CORPORATION, Japan Katsuya Uchida Institute of Information Security, Japan Kenzo Itoh Iwate Prefectural University, Japan

### **Program Committee**

Elisa Bertino Purdue University, USA

Gary Bolton Pennsylvania State University, USA
L. Jean Camp Indiana University at Bloominton, USA

Licia Capra University College London, UK

Cristiano Castelfranchi ISTC-CNR, Italy

Christian Damsgaard Jensen
Anupam Datta
Chrysanthos Dellarocas
Theo Dimitrakos
Pierpaolo Dondio

Technical University of Denmark
Carnegie Mellon University, USA
University of Maryland, USA
BT Innovate & Design, UK
Trinity College Dublin, Ireland

Naranker Dulay Imperial College London, UK

Sandro Etalle T.U. Eindhoven and University of Twente,

The Netherlands

Rino Falcone ISTC-CNR, Italy

Elena Ferrari University of Insubria, Italy Giusella Finocchiaro University of Bologna, Italy Jennifer Golbeck University of Maryland, USA

Dieter Gollmann Hamburg University of Technology, Germany

Elizabeth Grav Accenture, USA

Ehud Gudes Ben Gurion University of the Negev, Israel

Jochen Haller SAP Research, Germany

Peter Herrmann The Norwegian University of Science and

Technology

Kevin Hoffman Purdue University, USA

Steffen Huck University College London, UK Roslan Ismail Universiti Tenaga Nasional (UNITEN), Malaysia

INRIA, France

Valerie Issarny James Joshi University of Pittsburgh, USA Yuecel Karabulut SAP Office of the CTO, USA Günter Karjoth IBM Research, Switzerland Reid Kerr University of Waterloo, Canada Claudia Keser University of Goettingen, Germany

Hiroaki Kikuchi Tokai University, Japan

Mark Kramer MITRE, USA

Xixi Luo

Pratvusa Manadhata

D. Harrison McKnight

Fabio Massacci

Kanta Matsuura

Adam J. Lee University of Pittsburgh, USA Ninghui Li Purdue University, USA Tie-Yan Liu Microsoft Research, China Stephane Lo Presti Brunel University, UK

Emiliano Lorini Institut de Recherche en Informatique de

> Toulouse (IRIT), France Beihang University, China Symantec Research, USA University of Trento, Italy University of Tokyo, Japan

Michigan State University, USA

Walter Quattrociocchi ISTC-CNR, Italy

Mark Rvan University of Birmingham, UK

Jordi Sabater-Mir IIIA - CSIC, Spain

Kent Seamons Brigham Young University, USA Jean-Marc Seigneur University of Geneva, Switzerland

Simon Shiu HP Labs, UK Joel Snyder Opus One, USA Jessica Staddon PARC, USA

Ketil Stolen SINTEF & University of Oslo, Norway

Vipin Swarup MITRE, USA Kenji Takahashi NTT, Japan

Sotirios Terzis University of Strathclyde, UK Mahesh Tripunitara University of Waterloo, Canada

Kyoto University, Japan Tetsutaro Uehara

William H. Winsborough University of Texas at San Antonio, USA Marianne Winslett University of Illinois at Urbana-Champaign,

USA

Danfeng Yao Rutgers University, New Brunswick, USA

#### **External Reviewers**

Naveed Ahmed Kazuhiro Minami Sruthi Bandhakavi Nima Mousavi Rafael Deitos Susanta Nanda Changyu Dong Aida Omerovic Nurit Gal-Oz Milan Petkovic Bin Gao Rachid Saadi Hirovuki Sato Rvota Hashimoto Tormod Havaldsrud Hassan Takabi Hiroki Itoh Xavier Titi

Kevin Killourhy Joana Matos Fonseca da Trindade

Yun Hee Lee Daniel Trivellato Olav Ligaarden Yue Zhang

Amirreza Masoumzadeh

## Supported by

Japan Society for the Promotion of Science (JSPS) National Institute of Information and Communication Technology (NICT), Japan Information-Technology Promotion Agency (IPA), Japan Iwate Prefectural University, Japan

## In Cooperation with

Information Processing Society of Japan

## **Table of Contents**

Privacy and Trust	
Schemes for Privately Computing Trust and Reputation	1
Self-service Privacy: User-Centric Privacy for Network-Centric Identity	17
Naïve Security in a Wi-Fi World	32
Security Through Trust	
Securing Class Initialization	48
xESB: An Enterprise Service Bus for Access and Usage Control Policy Enforcement	63
Metric Strand Spaces for Locale Authentication Protocols	79
Visitor Access Control Scheme Utilizing Social Relationship in the Real World	95
Trust Models and Management	
Impact of Trust Management and Information Sharing to Adversarial Cost in Ranking Systems	108
Shinren: Non-monotonic Trust Management for Distributed Systems Changyu Dong and Naranker Dulay	125
Modeling and Analysis of Trust Management Protocols: Altruism versus Selfishness in MANETs	141

## Trust Models

Trustworthiness in Networks: A Simulation Approach for Approximating Local Trust and Distrust Values	157
Design of Graded Trusts by Using Dynamic Path Validation	172
Implementation and Performance Analysis of the Role-Based Trust Management System, $RT^C$	184
A Formal Notion of Trust – Enabling Reasoning about Security Properties	200
Andreas Fuchs, Sigrid Gürgens, and Carsten Rudolph	200
Experimental and Experiential Trust	
Leveraging a Social Network of Trust for Promoting Honesty in E-Marketplaces	216
Does Trust Matter for User Preferences? A Study on Epinions Ratings  Georgios Pitsilis and Pern Hui Chia	232
Bringing the Virtual to the Farmers' Market: Designing for Trust in Pervasive Computing Systems	248
Incorporating Interdependency of Trust Values in Existing Trust Models for Trust Dynamics	263
Author Index	277