

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 Rannenber, 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.

Elisabeth de Leeuw

Simone Fischer-Hübner Lothar Fritsch (Eds.)

# Policies and Research in Identity Management

Second IFIP WG 11.6 Working Conference, IDMAN 2010  
Oslo, Norway, November 18-19, 2010  
Proceedings



Springer

## Volume Editors

Elisabeth de Leeuw  
Pracanalaan 80, 1060 RC Amsterdam, The Netherlands  
E-mail: elisabeth.de.leeuw@xs4all.nl

Simone Fischer-Hübner  
Karlstad University, Department of Computer Science  
Universitetsgatan 1, 65188 Karlstad, Sweden  
E-mail: simone.fischer-huebner@kau.se

Lothar Fritsch  
Norsk Regnesentral  
Gautadaleen 23, PO Box 114 Blindern, 0314 Oslo, Norway  
E-mail: lothar.fritsch@nr.no

Library of Congress Control Number: 2010939052

CR Subject Classification (1998): K.6.5, D.4.6, E.3, J.1

ISSN 1868-4238  
ISBN-10 3-642-17302-0 Springer Berlin Heidelberg New York  
ISBN-13 978-3-642-17302-8 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 219/3180

# Preface

The world of the twenty-first century is, more than ever, global and impersonal. Criminal and terrorist threats, both physical and on the Internet, increase by the day. The demand for better methods of identification is growing, not only in companies and organizations, but also in the world at large.

Identity management is put under pressure, due to the growing number of frauds who want to hide their true identity. Identity management challenges the information security research community to focus on interdisciplinary and holistic approaches while retaining the benefits of previous research efforts.

As part of this tendency, surveillance and monitoring are more prominently present in society, both in the public and private domain. The original intention being to contribute to security and safety, surveillance and monitoring might, in some cases, have unintended or even contradictory effects. Besides, the omnipresence of surveillance and monitoring systems might be at daggers drawn with public and democratic liberties.

In this context, IFIP (International Federation for Information Processing) Working Group 11.6 on Identity Management organized its second working conference on Policies and Research in Identity Management (IDMAN 2010) in Oslo, Norway, November 18–19, 2010. Papers offering research contributions focusing on identity management in general and surveillance and monitoring in particular were solicited for submission. The submitted papers were in general of high quality. All papers were reviewed by two to five members of the international Program Committee. Nine of the submitted papers, which are published in these proceedings, were finally unanimously accepted for presentation by the Program Committee.

We are very grateful to the Norwegian government for funding this conference. In addition, the EU FP7 project PrimeLife and the Norwegian Petweb II project supported IDMAN 2010.

We also want to thank the invited speakers, the members of the international Program Committee and the external reviewers, who all did an excellent job reviewing the submitted papers, as well as the members of the Organizing Committee.

October 2010

Elisabeth de Leeuw  
Simone Fischer-Hübner  
Lothar Fritsch

# Organization

IFIP IDMAN 2010 was organized by the Norwegian Computing Center (Norsk Regnesentral) in Oslo, Norway in cooperation with the International Federation for Information Processing (IFIP) WG 11.6 - Identity Management. The conference and the proceedings were supported financially by the Research Council of Norway (Norges Forskningsrådet) and the research council's VERDIKT project PETweb II - Privacy respecting identity management for e-Norge.

## Executive Committee

Conference General Chair  
Program Co-chairs

Elisabeth de Leeuw (The Netherlands)  
Simone Fischer-Hübner (Karlstad University,  
Sweden)  
Lothar Fritsch (Norwegian Computing Center,  
Norway)

Publication Chair

John Borking (Borking Consultancy,  
The Netherlands)

## Program Committee

### Referees

Claudio Agostino Ardagna  
Katja Boettcher  
Bill Caelli  
Jan Camenisch  
Andre Deuker  
Sara Foresti  
Lothar Fritsch  
Stefanos Gritzalis  
Marit Hansen  
Alejandro Hevia  
Jaap-Henk Hoepman  
Gus Hosein  
Bart Jacobs  
Spyros Kokolakis

Ronald Leenes  
Javier Lopez  
Ruud van Munster  
Jan Muntermann  
Martijn Oostdijk  
Ebenezer Paintsil  
Aljosa Pasic  
Kai Rannenber  
Anne Karen Seip  
Rama Subramaniam  
Pedro Veiga  
Jozef Vyskoc  
Bjarte M. Østvold

## Sponsoring Institutions

The Research Council of Norway  
The Norwegian Computing Center (Norsk Regnesentral)

# Table of Contents

## Policies and Research in Identity Management

Mixing Identities with Ease .....	1
<i>Patrik Bichsel and Jan Camenisch</i>	
Using CardSpace as a Password Manager .....	18
<i>Haitham S. Al-Sinani and Chris J. Mitchell</i>	
Foreign Identities in the Austrian E-Government: An Interoperable eID Solution .....	31
<i>Mario Ivkovic and Klaus Stranacher</i>	
Understanding the Economics of Electronic Identity: Theoretical Approaches and Case Studies .....	41
<i>Anssi Hoikkanen, Margherita Bacigalupo, Wainer Lusoli, Ioannis Maghiros, and Stavri Nikolov</i>	
Profitable Investments Mitigating Privacy Risks .....	59
<i>John Borking</i>	
A Security Analysis of OpenID .....	73
<i>Bart van Delft and Martijn Oostdijk</i>	
Personal Federation Control with the Identity Dashboard .....	85
<i>Jonathan Scudder and Audun Jøsang</i>	
The Plateau: Imitation Attack Resistance of Gait Biometrics .....	100
<i>Bendik B. Mjaaland</i>	
Privacy-Friendly Incentives and Their Application to Wikipedia .....	113
<i>Jan Camenisch, Thomas Groß, Peter Hladky, and Christian Hoernagl</i>	
Policy Provisioning for Distributed Identity Management Systems .....	130
<i>Hidehito Gomi</i>	
<b>Author Index</b> .....	145