

*Commenced Publication in 1973*

Founding and Former Series Editors:

Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

## Editorial Board

David Hutchison

*Lancaster University, UK*

Takeo Kanade

*Carnegie Mellon University, Pittsburgh, PA, USA*

Josef Kittler

*University of Surrey, Guildford, UK*

Jon M. Kleinberg

*Cornell University, Ithaca, NY, USA*

Alfred Kobsa

*University of California, Irvine, CA, USA*

Friedemann Mattern

*ETH Zurich, Switzerland*

John C. Mitchell

*Stanford University, CA, USA*

Moni Naor

*Weizmann Institute of Science, Rehovot, Israel*

Oscar Nierstrasz

*University of Bern, Switzerland*

C. Pandu Rangan

*Indian Institute of Technology, Madras, India*

Bernhard Steffen

*TU Dortmund University, Germany*

Demetri Terzopoulos

*University of California, Los Angeles, CA, USA*

Doug Tygar

*University of California, Berkeley, CA, USA*

Gerhard Weikum

*Max Planck Institute for Informatics, Saarbruecken, Germany*

Sakae Yamamoto (Ed.)

# Human Interface and the Management of Information

Information and Knowledge  
Design and Evaluation

16th International Conference, HCI International 2014  
Heraklion, Crete, Greece, June 22-27, 2014  
Proceedings, Part I



Springer

## Volume Editor

Sakae Yamamoto  
Tokyo University of Science  
Department of Management Science  
Kagurazaka Shinjuku-ku  
Tokyo, 162-8601, Japan  
E-mail: sakaeyam@jcom.home.ne.jp

ISSN 0302-9743

e-ISSN 1611-3349

ISBN 978-3-319-07730-7

e-ISBN 978-3-319-07731-4

DOI 10.1007/978-3-319-07731-4

Springer Cham Heidelberg New York Dordrecht London

Library of Congress Control Number: 2014940076

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

© Springer International Publishing Switzerland 2014

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)

# Foreword

The 16th International Conference on Human–Computer Interaction, HCI International 2014, was held in Heraklion, Crete, Greece, during June 22–27, 2014, incorporating 14 conferences/thematic areas:

Thematic areas:

- Human–Computer Interaction
- Human Interface and the Management of Information

Affiliated conferences:

- 11th International Conference on Engineering Psychology and Cognitive Ergonomics
- 8th International Conference on Universal Access in Human–Computer Interaction
- 6th International Conference on Virtual, Augmented and Mixed Reality
- 6th International Conference on Cross-Cultural Design
- 6th International Conference on Social Computing and Social Media
- 8th International Conference on Augmented Cognition
- 5th International Conference on Digital Human Modeling and Applications in Health, Safety, Ergonomics and Risk Management
- Third International Conference on Design, User Experience and Usability
- Second International Conference on Distributed, Ambient and Pervasive Interactions
- Second International Conference on Human Aspects of Information Security, Privacy and Trust
- First International Conference on HCI in Business
- First International Conference on Learning and Collaboration Technologies

A total of 4,766 individuals from academia, research institutes, industry, and governmental agencies from 78 countries submitted contributions, and 1,476 papers and 225 posters were included in the proceedings. These papers address the latest research and development efforts and highlight the human aspects of design and use of computing systems. The papers thoroughly cover the entire field of human–computer interaction, addressing major advances in knowledge and effective use of computers in a variety of application areas.

This volume, edited by Sakae Yamamoto, contains papers focusing on the thematic area of human interface and the management of information, addressing the following major topics:

- Visualisation methods and techniques
- Multimodal interaction

- Knowledge management
- Information search and retrieval
- Supporting collaboration
- Design and evaluation methods and studies

The remaining volumes of the HCI International 2014 proceedings are:

- Volume 1, LNCS 8510, Human–Computer Interaction: HCI Theories, Methods and Tools (Part I), edited by Masaaki Kurosu
- Volume 2, LNCS 8511, Human–Computer Interaction: Advanced Interaction Modalities and Techniques (Part II), edited by Masaaki Kurosu
- Volume 3, LNCS 8512, Human–Computer Interaction: Applications and Services (Part III), edited by Masaaki Kurosu
- Volume 4, LNCS 8513, Universal Access in Human–Computer Interaction: Design and Development Methods for Universal Access (Part I), edited by Constantine Stephanidis and Margherita Antona
- Volume 5, LNCS 8514, Universal Access in Human–Computer Interaction: Universal Access to Information and Knowledge (Part II), edited by Constantine Stephanidis and Margherita Antona
- Volume 6, LNCS 8515, Universal Access in Human–Computer Interaction: Aging and Assistive Environments (Part III), edited by Constantine Stephanidis and Margherita Antona
- Volume 7, LNCS 8516, Universal Access in Human–Computer Interaction: Design for All and Accessibility Practice (Part IV), edited by Constantine Stephanidis and Margherita Antona
- Volume 8, LNCS 8517, Design, User Experience, and Usability: Theories, Methods and Tools for Designing the User Experience (Part I), edited by Aaron Marcus
- Volume 9, LNCS 8518, Design, User Experience, and Usability: User Experience Design for Diverse Interaction Platforms and Environments (Part II), edited by Aaron Marcus
- Volume 10, LNCS 8519, Design, User Experience, and Usability: User Experience Design for Everyday Life Applications and Services (Part III), edited by Aaron Marcus
- Volume 11, LNCS 8520, Design, User Experience, and Usability: User Experience Design Practice (Part IV), edited by Aaron Marcus
- Volume 13, LNCS 8522, Human Interface and the Management of Information: Information and Knowledge in Applications and Services (Part II), edited by Sakae Yamamoto
- Volume 14, LNCS 8523, Learning and Collaboration Technologies: Designing and Developing Novel Learning Experiences (Part I), edited by Panayiotis Zaphiris and Andri Ioannou
- Volume 15, LNCS 8524, Learning and Collaboration Technologies: Technology-rich Environments for Learning and Collaboration (Part II), edited by Panayiotis Zaphiris and Andri Ioannou

- Volume 16, LNCS 8525, Virtual, Augmented and Mixed Reality: Designing and Developing Virtual and Augmented Environments (Part I), edited by Randall Shumaker and Stephanie Lackey
- Volume 17, LNCS 8526, Virtual, Augmented and Mixed Reality: Applications of Virtual and Augmented Reality (Part II), edited by Randall Shumaker and Stephanie Lackey
- Volume 18, LNCS 8527, HCI in Business, edited by Fiona Fui-Hoon Nah
- Volume 19, LNCS 8528, Cross-Cultural Design, edited by P.L. Patrick Rau
- Volume 20, LNCS 8529, Digital Human Modeling and Applications in Health, Safety, Ergonomics and Risk Management, edited by Vincent G. Duffy
- Volume 21, LNCS 8530, Distributed, Ambient, and Pervasive Interactions, edited by Norbert Streitz and Panos Markopoulos
- Volume 22, LNCS 8531, Social Computing and Social Media, edited by Gabriele Meiselwitz
- Volume 23, LNAI 8532, Engineering Psychology and Cognitive Ergonomics, edited by Don Harris
- Volume 24, LNCS 8533, Human Aspects of Information Security, Privacy and Trust, edited by Theo Tryfonas and Ioannis Askoxylakis
- Volume 25, LNAI 8534, Foundations of Augmented Cognition, edited by Dylan D. Schmorrow and Cali M. Fidopiastis
- Volume 26, CCIS 434, HCI International 2014 Posters Proceedings (Part I), edited by Constantine Stephanidis
- Volume 27, CCIS 435, HCI International 2014 Posters Proceedings (Part II), edited by Constantine Stephanidis

I would like to thank the Program Chairs and the members of the Program Boards of all affiliated conferences and thematic areas, listed below, for their contribution to the highest scientific quality and the overall success of the HCI International 2014 Conference.

This conference could not have been possible without the continuous support and advice of the founding chair and conference scientific advisor, Prof. Gavriel Salvendy, as well as the dedicated work and outstanding efforts of the communications chair and editor of *HCI International News*, Dr. Abbas Moallem.

I would also like to thank for their contribution towards the smooth organization of the HCI International 2014 Conference the members of the Human-Computer Interaction Laboratory of ICS-FORTH, and in particular George Paparoulis, Maria Pitsoulaki, Maria Bouhli, and George Kapnas.

April 2014

Constantine Stephanidis  
General Chair, HCI International 2014

# Organization

## Human–Computer Interaction

**Program Chair: Masaaki Kurosu, Japan**

Jose Abdelnour-Nocera, UK  
Sebastiano Bagnara, Italy  
Simone Barbosa, Brazil  
Adriana Betiol, Brazil  
Simone Borsci, UK  
Henry Duh, Australia  
Xiaowen Fang, USA  
Vicki Hanson, UK  
Wonil Hwang, Korea  
Minna Isomursu, Finland  
Yong Gu Ji, Korea  
Anirudha Joshi, India  
Esther Jun, USA  
Kyungdoh Kim, Korea

Heidi Krömker, Germany  
Chen Ling, USA  
Chang S. Nam, USA  
Naoko Okuizumi, Japan  
Philippe Palanque, France  
Ling Rothrock, USA  
Naoki Sakakibara, Japan  
Dominique Scapin, France  
Guangfeng Song, USA  
Sanjay Tripathi, India  
Chui Yin Wong, Malaysia  
Toshiki Yamaoka, Japan  
Kazuhiko Yamazaki, Japan  
Ryoji Yoshitake, Japan

## Human Interface and the Management of Information

**Program Chair: Sakae Yamamoto, Japan**

Alan Chan, Hong Kong  
Denis A. Coelho, Portugal  
Linda Elliott, USA  
Shin'ichi Fukuzumi, Japan  
Michitaka Hirose, Japan  
Makoto Itoh, Japan  
Yen-Yu Kang, Taiwan  
Koji Kimita, Japan  
Daiji Kobayashi, Japan

Hiroyuki Miki, Japan  
Hirohiko Mori, Japan  
Shogo Nishida, Japan  
Robert Proctor, USA  
Youngho Rhee, Korea  
Ryosuke Saga, Japan  
Katsunori Shimohara, Japan  
Kim-Phuong Vu, USA  
Tomio Watanabe, Japan

## Engineering Psychology and Cognitive Ergonomics

**Program Chair: Don Harris, UK**

Guy Andre Boy, USA

Shan Fu, P.R. China

Hung-Sying Jing, Taiwan

Wen-Chin Li, Taiwan

Mark Neerincx, The Netherlands

Jan Noyes, UK

Paul Salmon, Australia

Axel Schulte, Germany

Siraj Shaikh, UK

Sarah Sharples, UK

Anthony Smoker, UK

Neville Stanton, UK

Alex Stedmon, UK

Andrew Thatcher, South Africa

## Universal Access in Human–Computer Interaction

**Program Chairs: Constantine Stephanidis, Greece,  
and Margherita Antona, Greece**

Julio Abascal, Spain

Gisela Susanne Bahr, USA

João Barroso, Portugal

Margrit Betke, USA

Anthony Brooks, Denmark

Christian Bühler, Germany

Stefan Carmien, Spain

Hua Dong, P.R. China

Carlos Duarte, Portugal

Pier Luigi Emiliani, Italy

Qin Gao, P.R. China

Andrina Granić, Croatia

Andreas Holzinger, Austria

Josette Jones, USA

Simeon Keates, UK

Georgios Kouroupetroglou, Greece

Patrick Langdon, UK

Barbara Leporini, Italy

Eugene Loos, The Netherlands

Ana Isabel Paraguay, Brazil

Helen Petrie, UK

Michael Pieper, Germany

Enrico Pontelli, USA

Jaime Sanchez, Chile

Alberto Sanna, Italy

Anthony Savidis, Greece

Christian Stary, Austria

Hirota Ueda, Japan

Gerhard Weber, Germany

Harald Weber, Germany

## Virtual, Augmented and Mixed Reality

**Program Chairs: Randall Shumaker, USA,  
and Stephanie Lackey, USA**

Roland Blach, Germany

Sheryl Brahmam, USA

Juan Cendan, USA

Jessie Chen, USA

Panagiotis D. Kaklis, UK

Hirokazu Kato, Japan

Denis Laurendeau, Canada

Fotis Liarokapis, UK

Michael Macedonia, USA

Gordon Mair, UK



Jose San Martin, Spain  
 Tabitha Peck, USA  
 Christian Sandor, Australia

Christopher Stapleton, USA  
 Gregory Welch, USA

## Cross-Cultural Design

**Program Chair: P.L. Patrick Rau, P.R. China**

Yee-Yin Choong, USA  
 Paul Fu, USA  
 Zhiyong Fu, P.R. China  
 Pin-Chao Liao, P.R. China  
 Dyi-Yih Michael Lin, Taiwan  
 Rungtai Lin, Taiwan  
 Ta-Ping (Robert) Lu, Taiwan  
 Liang Ma, P.R. China  
 Alexander Mädche, Germany

Sheau-Farn Max Liang, Taiwan  
 Katsuhiko Ogawa, Japan  
 Tom Plocher, USA  
 Huatong Sun, USA  
 Emil Tso, P.R. China  
 Hsiu-Ping Yueh, Taiwan  
 Liang (Leon) Zeng, USA  
 Jia Zhou, P.R. China

## Online Communities and Social Media

**Program Chair: Gabriele Meiselwitz, USA**

Leonelo Almeida, Brazil  
 Chee Siang Ang, UK  
 Aneesha Bakharia, Australia  
 Ania Bobrowicz, UK  
 James Braman, USA  
 Farzin Deravi, UK  
 Carsten Kleiner, Germany  
 Niki Lambropoulos, Greece  
 Soo Ling Lim, UK

Anthony Norcio, USA  
 Portia Pusey, USA  
 Panote Siriaraya, UK  
 Stefan Stieglitz, Germany  
 Giovanni Vincenti, USA  
 Yuanqiong (Kathy) Wang, USA  
 June Wei, USA  
 Brian Wentz, USA

## Augmented Cognition

**Program Chairs: Dylan D. Schmorrow, USA,  
 and Cali M. Fidopiastis, USA**

Ahmed Abdelkhalek, USA  
 Robert Atkinson, USA  
 Monique Beaudoin, USA  
 John Blicht, USA  
 Alenka Brown, USA

Rosario Cannavò, Italy  
 Joseph Cohn, USA  
 Andrew J. Cowell, USA  
 Martha Crosby, USA  
 Wai-Tat Fu, USA

Rodolphe Gentili, USA  
Frederick Gregory, USA  
Michael W. Hail, USA  
Monte Hancock, USA  
Fei Hu, USA  
Ion Juvina, USA  
Joe Keebler, USA  
Philip Mangos, USA  
Rao Manneppalli, USA  
David Martinez, USA  
Yvonne R. Masakowski, USA  
Santosh Mathan, USA  
Ranjeev Mittu, USA

Keith Niall, USA  
Tatana Olson, USA  
Debra Patton, USA  
June Pilcher, USA  
Robinson Pino, USA  
Tiffany Poeppelman, USA  
Victoria Romero, USA  
Amela Sadagic, USA  
Anna Skinner, USA  
Ann Speed, USA  
Robert Sottolare, USA  
Peter Walker, USA

## **Digital Human Modeling and Applications in Health, Safety, Ergonomics and Risk Management**

**Program Chair: Vincent G. Duffy, USA**

Giuseppe Andreoni, Italy  
Daniel Carruth, USA  
Elsbeth De Korte, The Netherlands  
Afzal A. Godil, USA  
Ravindra Goonetilleke, Hong Kong  
Noriaki Kuwahara, Japan  
Kang Li, USA  
Zhizhong Li, P.R. China

Tim Marler, USA  
Jianwei Niu, P.R. China  
Michelle Robertson, USA  
Matthias Rötting, Germany  
Mao-Jiun Wang, Taiwan  
Xuguang Wang, France  
James Yang, USA

## **Design, User Experience, and Usability**

**Program Chair: Aaron Marcus, USA**

Sisira Adikari, Australia  
Claire Ancient, USA  
Arne Berger, Germany  
Jamie Blustein, Canada  
Ana Boa-Ventura, USA  
Jan Brejcha, Czech Republic  
Lorenzo Cantoni, Switzerland  
Marc Fabri, UK  
Luciane Maria Fadel, Brazil  
Tricia Flanagan, Hong Kong  
Jorge Frascara, Mexico

Federico Gobbo, Italy  
Emilie Gould, USA  
Rüdiger Heimgärtner, Germany  
Brigitte Herrmann, Germany  
Steffen Hess, Germany  
Nouf Khashman, Canada  
Fabiola Guillermina Noël, Mexico  
Francisco Rebelo, Portugal  
Kerem Rızvanoğlu, Turkey  
Marcelo Soares, Brazil  
Carla Spinillo, Brazil

## Distributed, Ambient and Pervasive Interactions

**Program Chairs: Norbert Streitz, Germany,  
and Panos Markopoulos, The Netherlands**

Juan Carlos Augusto, UK	Ingrid Mulder, The Netherlands
Jose Bravo, Spain	Anton Nijholt, The Netherlands
Adrian Cheok, UK	Fabio Paternó, Italy
Boris de Ruyter, The Netherlands	Carsten Röcker, Germany
Anind Dey, USA	Teresa Romao, Portugal
Dimitris Grammenos, Greece	Albert Ali Salah, Turkey
Nuno Guimaraes, Portugal	Manfred Tscheligi, Austria
Achilles Kameas, Greece	Reiner Wichert, Germany
Javed Vassilis Khan, The Netherlands	Woontack Woo, Korea
Shin'ichi Konomi, Japan	Xenophon Zabulis, Greece
Carsten Magerkurth, Switzerland	

## Human Aspects of Information Security, Privacy and Trust

**Program Chairs: Theo Tryfonas, UK,  
and Ioannis Askoxylakis, Greece**

Claudio Agostino Ardagna, Italy	Gregorio Martinez, Spain
Zinaida Benenson, Germany	Emilio Mordini, Italy
Daniele Catteddu, Italy	Yuko Murayama, Japan
Raoul Chiesa, Italy	Masakatsu Nishigaki, Japan
Bryan Cline, USA	Aljosa Pasic, Spain
Sadie Creese, UK	Milan Petković, The Netherlands
Jorge Cuellar, Germany	Joachim Posegga, Germany
Marc Dacier, USA	Jean-Jacques Quisquater, Belgium
Dieter Gollmann, Germany	Damien Sauveron, France
Kirstie Hawkey, Canada	George Spanoudakis, UK
Jaap-Henk Hoepman, The Netherlands	Kerry-Lynn Thomson, South Africa
Cagatay Karabat, Turkey	Julien Touzeau, France
Angelos Keromytis, USA	Theo Tryfonas, UK
Ayako Komatsu, Japan	João Vilela, Portugal
Ronald Leenes, The Netherlands	Claire Vishik, UK
Javier Lopez, Spain	Melanie Volkamer, Germany
Steve Marsh, Canada	

## HCI in Business

### Program Chair: Fiona Fui-Hoon Nah, USA

Andreas Auinger, Austria	Scott McCoy, USA
Michel Avital, Denmark	Brian Mennecke, USA
Traci Carte, USA	Robin Poston, USA
Hock Chuan Chan, Singapore	Lingyun Qiu, P.R. China
Constantinos Coursaris, USA	Rene Riedl, Austria
Soussan Djamasbi, USA	Matti Rossi, Finland
Brenda Eschenbrenner, USA	April Savoy, USA
Nobuyuki Fukawa, USA	Shu Schiller, USA
Khaled Hassanein, Canada	Hong Sheng, USA
Milena Head, Canada	Choon Ling Sia, Hong Kong
Susanna (Shuk Ying) Ho, Australia	Chee-Wee Tan, Denmark
Jack Zhenhui Jiang, Singapore	Chuan Hoo Tan, Hong Kong
Jinwoo Kim, Korea	Noam Tractinsky, Israel
Zoonky Lee, Korea	Horst Treiblmaier, Austria
Honglei Li, UK	Virpi Tuunainen, Finland
Nicholas Lockwood, USA	Dezhi Wu, USA
Eleanor T. Loiacono, USA	I-Chin Wu, Taiwan
Mei Lu, USA	

## Learning and Collaboration Technologies

### Program Chairs: Panayiotis Zaphiris, Cyprus, and Andri Ioannou, Cyprus

Ruthi Aladjem, Israel	Edmund Laugasson, Estonia
Abdulaziz Aldaej, UK	Ana Loureiro, Portugal
John M. Carroll, USA	Katherine Maillet, France
Maka Eradze, Estonia	Nadia Pantidi, UK
Mikhail Fominykh, Norway	Antigoni Parmaxi, Cyprus
Denis Gillet, Switzerland	Borzoo Pourabdollahian, Italy
Mustafa Murat Inceoglu, Turkey	Janet C. Read, UK
Pernilla Josefsson, Sweden	Christophe Reffay, France
Marie Joubert, UK	Nicos Souleles, Cyprus
Sauli Kiviranta, Finland	Ana Luísa Torres, Portugal
Tomaž Klobučar, Slovenia	Stefan Trausan-Matu, Romania
Elena Kyza, Cyprus	Aimilia Tzanavari, Cyprus
Maarten de Laat, The Netherlands	Johnny Yuen, Hong Kong
David Lamas, Estonia	Carmen Zahn, Switzerland

## External Reviewers

Ilia Adami, Greece  
Iosif Klironomos, Greece  
Maria Korozi, Greece  
Vassilis Kouroumalis, Greece

Asterios Leonidis, Greece  
George Margetis, Greece  
Stavroula Ntoa, Greece  
Nikolaos Partarakis, Greece

# HCI International 2015

The 15th International Conference on Human–Computer Interaction, HCI International 2015, will be held jointly with the affiliated conferences in Los Angeles, CA, USA, in the Westin Bonaventure Hotel, August 2–7, 2015. It will cover a broad spectrum of themes related to HCI, including theoretical issues, methods, tools, processes, and case studies in HCI design, as well as novel interaction techniques, interfaces, and applications. The proceedings will be published by Springer. More information will be available on the conference website: <http://www.hcii2015.org/>

General Chair

Professor Constantine Stephanidis  
University of Crete and ICS-FORTH  
Heraklion, Crete, Greece  
E-mail: [cs@ics.forth.gr](mailto:cs@ics.forth.gr)

# Table of Contents – Part I

## Visualisation Methods and Techniques

Visualization Tool for Finding of Researcher Relations . . . . .	3
<i>Takafumi Aoki, Yoshikazu Sasamoto, Keisuke Makita, and Shingo Otsuka</i>	
Selection Classification for Interaction with Immersive Volumetric Visualizations . . . . .	10
<i>Amy Banic</i>	
Analyzing HCI Issues in Data Clustering Tools . . . . .	22
<i>Clodis Boscaroli, José Viterbo, Mateus Felipe Teixeira, and Victor Hugo Röhsig</i>	
A Post-simulation Assessment Tool for Training of Air Traffic Controllers . . . . .	34
<i>Aslak Wegner Eide, Stian Støer Ødegård, and Amela Karahasanović</i>	
Label Embedded Treemapping: A Label Overlap Prevention Technique for Zoomable Treemaps and a User Interaction Technique . . . . .	44
<i>KwangHyuk Kim and JungHyun Han</i>	
An Interactive Approach to Constraint-Based Visualizations . . . . .	54
<i>Wendy Lucas</i>	
User Similarity and Deviation Analysis for Adaptive Visualizations . . . . .	64
<i>Kawa Nazemi, Wilhelm Retz, Jörn Kohlhammer, and Arjan Kuijper</i>	
Evaluating the Dot-Based Contingency Wheel: Results from a Usability and Utility Study . . . . .	76
<i>Margit Pohl, Florian Scholz, Simone Kriglstein, Bilal Alsallakh, and Silvia Miksch</i>	
Prediction or Guess? Decide by Looking at Two Images Generated by a “MATLAB MySQL” Algorithm . . . . .	87
<i>Carlos Rodríguez</i>	
A Step Beyond Visualization: Applying User Interface Techniques to Improve Satellite Data Interaction . . . . .	98
<i>Tatiana A. Tavares and Humberto A. Barbosa</i>	
An Intuitive Way to Describe Our World: A Microblog LBS Visualization System . . . . .	108
<i>Jian-Min Wang, Lai Gan, Ri-Peng Zhang, and Fang You</i>	

Google Analytics Spatial Data Visualization: Thinking Outside  
of the Box . . . . . 120  
*Wanli Xing, Rui Guo, Ben Richardson, and Thomas Kochtanek*

A Visualization Concept for Mobile Faceted Search . . . . . 128  
*Bianca Zimmer, Romina Kühn, and Thomas Schlegel*

**Multimodal Interaction**

Food Practice Shooter: A Serious Game with a Real-World Interface  
for Nutrition and Dietary Education . . . . . 139  
*Yuichi Bannai, Takayuki Kosaka, and Naomi Aiba*

A New Computational Method for Single-Trial-EEG-Based BCI:  
Proposal of the Number of Electrodes . . . . . 148  
*Shin'ichi Fukuzumi, Hiromi Yamaguchi, Kazufumi Tanaka,  
Toshimasa Yamazaki, Takahiro Yamanoi, and Ken-ichi Kamijo*

Menu Hierarchy Generation Based on Syntactic Dependency Structures  
in Item Descriptions . . . . . 157  
*Yukio Horiguchi, Shinsu An, Tetsuo Sawaragi, and Hiroaki Nakanishi*

Liquid Tangible User Interface: Using Liquid in TUI . . . . . 167  
*Masahiro Hotta, Makoto Oka, and Hirohiko Mori*

Three Key Challenges in ARM-COMS for Entrainment Effect  
Acceleration in Remote Communication . . . . . 177  
*Teruaki Ito and Tomio Watanabe*

Two-Handed Interactive Menu: An Application of Asymmetric  
Bimanual Gestures and Depth Based Selection Techniques . . . . . 187  
*Hani Karam and Jiro Tanaka*

Measurement of Hand Raising Actions to Support Students' Active  
Participation in Class . . . . . 199  
*Ryuji Kawabe, Michiya Yamamoto, Saizo Aoyagi, and  
Tomio Watanabe*

Study on Perception of Vibration Rhythms . . . . . 208  
*Daiji Kobayashi*

Effects of Type and Strength of Force Feedback on the Path of  
Movement in a Target Selection Task . . . . . 217  
*Martin T. Koltz, R. Conrad Rorie, Jose Robles,  
Kim-Phuong L. Vu, Panadda Marayong, Thomas Z. Strybel, and  
Vernol Battiste*

Effect of Haptic Perception on Remote Human-Pet Interaction . . . . . 226  
*Kazuyoshi Murata, Kensuke Usui, and Yu Shibuya*



Development of High-Speed Thermal Display Using Water Flow . . . . .	233
<i>Masamichi Sakaguchi, Kazuki Imai, and Kyohei Hayakawa</i>	
Evoking Emotions in a Story Using Tactile Sensations as Pseudo-body Responses with Contextual Cues . . . . .	241
<i>Sho Sakurai, Toki Katsumura, Takuji Narumi, Tomohiro Tanikawa, and Michitaka Hirose</i>	
Enhancement of Accuracy of Hand Shape Recognition Using Color Calibration by Clustering Scheme and Majority Voting Method . . . . .	251
<i>Takahiro Sugaya, Hiromitsu Nishimura, and Hiroshi Tanaka</i>	
Analyzing Structure of Multiparty Interaction: Group Size Effect in Story-Retelling Task . . . . .	261
<i>Noriko Suzuki, Mamiko Sakata, and Noriko Ito</i>	
Information Coding by Means of Adaptive Controlling Torques . . . . .	271
<i>Johann Winterholler, Julian Böhle, Krzysztof Chmara, and Thomas Maier</i>	
Basic Research on the Factors Influencing Perception of Texture from Images . . . . .	281
<i>Kimihiko Yamanaka and Kazuki Nagamura</i>	

## Knowledge Management

KADEN Project–Towards the Construction of Model for Sharing Cognition in Manufacturing– . . . . .	291
<i>Takeo Ainoya</i>	
Enhancing Interdisciplinary Cooperation by Social Platforms - Assessing the Usefulness of Bibliometric Social Network Visualization in Large-Scale Research Clusters . . . . .	298
<i>André Calero Valdez, Anne Kathrin Schaar, Martina Ziefle, and Andreas Holzinger</i>	
SPARQL Query Writing with Recommendations Based on Datasets . . . . .	310
<i>Gergő Gombos and Attila Kiss</i>	
Personal Information Management Competences: A Case Study of Future College Students . . . . .	320
<i>Jerry Jacques and Pierre Fastrez</i>	
Design Knowledge Framework Based on Parametric Representation - A Case Study of Cockpit Form Style Design . . . . .	332
<i>Jing Jing, Qiang Liu, Wenyi Cai, Yang Ying, and Ting Han</i>	

A Map-Based Web Search Interface Using Point of Interest Aggregation . . . . .	342
<i>Kwangsoon Jung, Sangchul Ahn, and Heedong Ko</i>	
Quality Function Deployment Using Improved Interpretive Structural Modeling . . . . .	352
<i>Takeo Kato and Yoshiyuki Matsuoka</i>	
Finding Division Points for Time-Series Corpus Based on Topic Changes . . . . .	364
<i>Hiroshi Kobayashi and Ryosuke Saga</i>	
Computerized Information Standards Enabling Innovation in Public Procurement of Buildings . . . . .	373
<i>Christian Koch and Kim Jacobsen</i>	
Improving Academic Listening Skills of Second Language by Building up Strategy Object Mashups . . . . .	384
<i>Hangyu Li and Shinobu Hasegawa</i>	
Digital Document Network System for Organizing Individual Knowledge . . . . .	396
<i>Kenji Matsunaga and Kyoko Yoshida</i>	

**Information Search and Retrieval**

Towards Semantic Image Retrieval Using Multimodal Fusion with Association Rules Mining . . . . .	407
<i>Raniah A. Alghamdi and Mounira Taileb</i>	
Graphical Querying of Model-Driven Spreadsheets . . . . .	419
<i>Jácome Cunha, João Paulo Fernandes, Rui Pereira, and João Saraiva</i>	
Personalized Information Retrieval: Application to Virtual Communities . . . . .	431
<i>Azza Harbaoui, Sahbi Sidhom, Malek Ghenima, and Henda ben Ghezala</i>	
Content Based Image Retrieval Using Quantitative Semantic Features . . . . .	439
<i>Anuja Khodaskar and Siddharth Ladhake</i>	
Types of Document Search Tasks and Users’ Cognitive Information Seeking Strategies . . . . .	449
<i>Hee-Eun Lee and Wan Chul Yoon</i>	

User Needs Search Using the Text Mining - From Commodity Comparison, Understanding the Difference of Users Awareness . . . . .	461
<i>Yukiko Takahashi and Yumi Asahi</i>	

## Supporting Collaboration

Understanding Pragmatic Aspects with Social Values in Web-Mediated Collaborative Systems . . . . .	471
<i>Rodrigo Bonacin, Julio Cesar Dos Reis, Heiko Hornung, Roberto Pereira, and M. Cecília C. Baranauskas</i>	

Development of Digital-Device-Based Cooperation Support System to Aid Communication between MCR Operators and Field Workers in Nuclear Power Plants (NPPs) . . . . .	483
<i>Seung Min Lee, Hyun Chul Lee, and Poong Hyun Seong</i>	

Collaborative Innovation Research on Co-working Platform Based on Lean Startup Model . . . . .	491
<i>Yin Li, Qinghua Guo, and Zhiyong Fu</i>	

A Learning Method for Product Analysis in Product Design: Learning Method of Product Analysis Utilizing Collaborative Learning and a List of Analysis Items . . . . .	503
<i>Haifu Lin, Hiroshi Kato, and Takeshi Toya</i>	

Development of a Mobile Application for Crowdsourcing the Data Collection of Environmental Sounds . . . . .	514
<i>Minori Matsuyama, Ryuichi Nisimura, Hideki Kawahara, Junnosuke Yamada, and Toshio Irino</i>	

MulDiRoH: An Evaluation of Facial Direction Expression in Teleconferencing on a Multi-view Display System . . . . .	525
<i>Shiro Ozawa, Satoshi Mieda, Munekazu Date, Hideaki Takada, and Akira Kojima</i>	

Increasing Information Auditability for Social Network Users . . . . .	536
<i>Alexandre Pinheiro, Claudia Cappelli, and Cristiano Maciel</i>	

A Collaboration Support Tool for Multi-cultural Design Team Based on Extended ADT Model . . . . .	548
<i>Hidetsugu Suto, Patchanee Patitad, and Namgyu Kang</i>	

## Design and Evaluation Methods and Studies

A Study of the Factors Affecting Product Values and Preferences – Using Vacuum Cleaner as an Example . . . . .	561
<i>Wen-chih Chang and Hsiao-ying Tai</i>	

The Influence of the Designer’s Expertise on Emotional Responses . . . . .	572
<i>Hui Yueh Hsieh</i>	
Generative Product Design Inspired by Natural Information . . . . .	583
<i>Yinghsiu Huang and Jian-You Li</i>	
Application of a Requirement Analysis Template to Lectures in a Higher Education Institution . . . . .	594
<i>Koji Kimita, Yutaro Nemoto, and Yoshiki Shimomura</i>	
User Experience Evaluation Framework for Human-Centered Design . . . . .	602
<i>Hiroyuki Miki</i>	
Proposal of Evaluation Support System of Nursing-Care Service Components . . . . .	613
<i>Takuichi Nishimura, Yasuhiro Miwa, Tomoka Nagao, Kentarō Watanabe, Ken Fukuda, and Yoichi Motomura</i>	
Selecting a Function by How Characteristic Shapes Afford Users . . . . .	621
<i>Makoto Oka, Masafumi Tsubamoto, and Hirohiko Mori</i>	
Does ICT Promote the Private Provision of Local Public Goods? . . . . .	629
<i>Yurika Shiozu, Koya Kimura, Katsuhiko Yonezaki, and Katsunori Shimohara</i>	
Problems in Usability Improvement Activity by Software Engineers - Consideration through Verification Experiments for Human-Centered Design Process Support Environment . . . . .	641
<i>Yukiko Tanikawa, Hideyuki Suzuki, Hiroshi Kato, and Shin’ichi Fukuzumi</i>	
Requirements Engineering Using Mockups and Prototyping Tools: Developing a Healthcare Web-Application . . . . .	652
<i>Leonor Teixeira, Vasco Saavedra, Carlos Ferreira, João Simões, and Beatriz Sousa Santos</i>	
Suggestion of Operation Method of the Interest Shift Model of the Twitter User . . . . .	664
<i>Yusuke Ueda and Yumi Asahi</i>	
The Historical Evolution Research of Information Interaction Design . . .	678
<i>Yangshuo Zheng</i>	
<b>Author Index . . . . .</b>	<b>691</b>

## Table of Contents – Part II

### E-learning and E-education

The Effects of Using Kit-Build Method to Support Reading Comprehension of EFL . . . . .	3
<i>Mohammad Alkhateeb, Yusuke Hayashi, and Tsukasa Hirashima</i>	
Development of a Learning Support System for Source Code Reading Comprehension . . . . .	12
<i>Tatsuya Arai, Haruki Kanamori, Takahito Tomoto, Yusuke Kometani, and Takako Akakura</i>	
EA Snippets: Generating Summarized View of Handwritten Documents Based on Emphasis Annotations . . . . .	20
<i>Hiroki Asai and Hayato Yamana</i>	
Kit-Build Concept Mapping for Being Aware of the Gap of Exchanged Information in Collaborative Reading of the Literature . . . . .	32
<i>Yusuke Hayashi and Tsukasa Hirashima</i>	
Triplet Structure Model of Arithmetical Word Problems for Learning by Problem-Posing . . . . .	42
<i>Tsukasa Hirashima, Sho Yamamoto, and Yusuke Hayashi</i>	
Training Archived Physical Skill through Immersive Virtual Environment . . . . .	51
<i>Taihei Kojima, Atsushi Hiyama, Takahiro Miura, and Michitaka Hirose</i>	
An Improved Teaching Behavior Estimation Model from Student Evaluations . . . . .	59
<i>Yusuke Kometani, Takahito Tomoto, Takehiro Furuta, and Takako Akakura</i>	
A Study on Exploration of Relationships between Behaviors and Mental States of Learners for Value Co-creative Education and Learning Environment . . . . .	69
<i>Tatsunori Matsui, Yuki Horiguchi, Kazuaki Kojima, and Takako Akakura</i>	
A Music Search System for Expressive Music Performance Learning . . . . .	80
<i>Tomoya Mikami and Kosuke Takano</i>	
The Value Improvement in Education Service by Grasping the Value Acceptance State with ICT Utilized Education Environment . . . . .	90
<i>Yoshiki Sakurai</i>	

Developing an Education Material for Robot Literacy . . . . .	99
<i>Hidetsugu Suto and Makiba Sakamoto</i>	
Development of Teaching Material Volume Calculations Using a Wooden Puzzle . . . . .	109
<i>Takamitsu Tanaka, Masao Tachibana, and Ichiro Hirata</i>	
Private Cloud Collaboration Framework for e-Learning Environment for Disaster Recovery Using Smartphone Alert Notification . . . . .	118
<i>Satoshi Togawa and Kazuhide Kanenishi</i>	
Report on Practice of Note-Rebuilding Support System . . . . .	127
<i>Takahito Tomoto and Tsukasa Hirashima</i>	
Visualizing Mental Learning Processes with Invisible Mazes for Continuous Learning . . . . .	137
<i>Tomohiro Yamaguchi, Kouki Takemori, and Keiki Takadama</i>	

**Decision Support**

Association of CCR and BCC Efficiencies to Market Variables in a Retrospective Two Stage Data Envelope Analysis . . . . .	151
<i>Denis A. Coelho</i>	
Exploring Similarity: Improving Product Search with Parallel Coordinates . . . . .	160
<i>Mandy Keck, Martin Herrmann, Andreas Both, Dana Henkens, and Rainer Groh</i>	
ChoiceLog: Life Log System Based on Choices for Supporting Decision-Making . . . . .	172
<i>Junpei Koyama, Keiko Yamamoto, Itaru Kuramoto, and Yoshihiro Tsujino</i>	
Research on User Involvement in Automobile Design Development: Focusing on the Problems of Design Evaluation . . . . .	184
<i>Noboru Koyama, Mikio Yamashita, and Mizuki Nakajima</i>	
Human-Centered Interfaces for Situation Awareness in Maintenance . . . .	193
<i>Allan Oliveira, Regina Araujo, and Andrew Jardine</i>	
Data Driven Enterprise UX: A Case Study of Enterprise Management Systems . . . . .	205
<i>Sumit Pandey and Swati Srivastava</i>	
Decision Support Based on Time-Series Analytics: A Cluster Methodology . . . . .	217
<i>Wanli Xing, Rui Guo, Nathan Lowrance, and Thomas Kochtanek</i>	

## Information and Interaction in Aviation and Transport

“A Careful Driver is One Who Looks in Both Directions When He Passes a Red Light” – Increased Demands in Urban Traffic . . . . .	229
<i>Martin Götze, Florian Bißbort, Ina Petermann-Stock, and Klaus Bengler</i>	
Neural Networks for Identifying Civil Pilot’s Operation Sequences . . . . .	241
<i>Zhuoyuan Jiang, Qin Lu, Yuandong Liang, and Bin Chen</i>	
A Study of Drivers’ Blind Spot in Used of Eye Tracking . . . . .	253
<i>Yen-Yu Kang, Yuh-Chuan Shih, Chih-Chan Cheng, and Chi-Long Lin</i>	
A Study on the Interface Design of a Functional Menu and Icons for In-Vehicle Navigation Systems . . . . .	261
<i>Ming-Chyuan Lin, Yi-Hsien Lin, Chun-Chun Lin, and Jenn-Yang Lin</i>	
Advancement and Application of Unmanned Aerial System Human-Machine-Interface (HMI) Technology . . . . .	273
<i>Brent A. Terwilliger, David C. Ison, Dennis A. Vincenzi, and Dahai Liu</i>	
Roma Crash Map: An Open Data Visualization Tool for the Municipalities of Rome . . . . .	284
<i>Valentina Volpi, Andrea Ingrosso, Mariarosaria Pazzola, Antonio Opromolla, and Carlo Maria Medaglia</i>	
Predictive Probability Model of Pilot Error Based on CREAM . . . . .	296
<i>Xiaoyan Zhang, Hongjun Xue, Yingchun Chen, Lin Zhou, and Gaohong Lu</i>	

## Safety, Security and Reliability

Management of On-Line Registries Information for Patient Safety in Long-Term Care . . . . .	307
<i>Fuad Abujarad, Sarah J. Swierenga, Toni A. Dennis, and Lori A. Post</i>	
Improving Control Room State Awareness through Complex Sonification Interfaces . . . . .	317
<i>Barrett S. Caldwell and Jacob E. Viraldo</i>	
Voice Activated Personal Assistant: Acceptability of Use in the Public Space . . . . .	324
<i>Aarthi Easwara Moorthy and Kim-Phuong L. Vu</i>	

A Framework of Human Reliability Analysis Method Considering Soft Control in Digital Main Control Rooms . . . . .	335
<i>Inseok Jang, Ar Ryum Kim, Wondea Jung, and Poong Hyun Seong</i>	
A Resilient Interaction Concept for Process Management on Tabletops for Cyber-Physical Systems . . . . .	347
<i>Ronny Seiger, Susann Struwe, Sandra Matthes, and Thomas Schlegel</i>	
From the Perspective of Service Engineering, The Development of Support Systems for Residents Affected by the Major Earthquake Disaster . . . . .	359
<i>Sakae Yamamoto, Kazuo Ichihara, Naoko Nojima, Yuichi Takahashi, Kosuke Ootomo, and Kenta Watanabe</i>	

**Communication, Expression and Emotions**

Investigating the Effective Factors of Communication for Family Members Living Apart . . . . .	373
<i>Nana Hamaguchi, Daisuke Asai, Masahiro Watanabe, and Yoko Asano</i>	
Learning Winespeak from Mind Map of Wine Blogs . . . . .	383
<i>Sachio Hirokawa, Brendan Flanagan, Takahiko Suzuki, and Chengjiu Yin</i>	
Age Difference in Recognition of Emoticons . . . . .	394
<i>Kun-An Hsiao and Pei-Ling Hsieh</i>	
Basic Study on Personal Space while Using Mobile Devices in Public . . .	404
<i>Shigeyoshi Iizuka and Kentaro Go</i>	
Soft Interface with the Ambiguity Creation of the Action by Avatar Controller Inducing the Embodiment . . . . .	413
<i>Shiroh Itai, Takeo Yasui, and Yoshiyuki Miwa</i>	
Development and Application of Manga-Style Chat System Aiming to Communicate Nonverbal Expression . . . . .	423
<i>Junko Itou, Yuichi Motojin, and Jun Munemori</i>	
Concepts and Applications of Human-Dependent Robots . . . . .	435
<i>Youssef Khaoula, Naoki Ohshima, P. Ravindra S. De Silva, and Michio Okada</i>	
Co-creative Bodily Expression through Remote Shadow Media System . . . . .	445
<i>Yoshiyuki Miwa, Atsushi Nishide, Naruhiro Hayashi, Shiroh Itai, and Hiroko Nishi</i>	



Favor Information Presentation and Its Effect for Collective-Adaptive Situation . . . . .	455
<i>Asami Mori, Tomohiro Harada, Yoshihiro Ichikawa, and Keiki Takadama</i>	
The Effectiveness of Assistance Dogs Mounting ICT Devices: A Case Study of a Healthy Woman and Her Dog . . . . .	467
<i>Chika Oshima, Chisato Harada, Kiyoshi Yasuda, Kimie Machishima, and Koichi Nakayama</i>	
Effects of Peer Pressure on Laughter . . . . .	479
<i>Mamiko Sakata and Noriko Suzuki</i>	
User Analysis and Questionnaire Survey . . . . .	489
<i>Misaki Tanikawa and Yumi Asahi</i>	

## Art, Culture and Creativity

To Relive a Valuable Experience of the World at the Digital Museum . . .	501
<i>Yasushi Ikei, Yujiro Okuya, Seiya Shimabukuro, Koji Abe, Tomohiro Amemiya, and Koichi Hirota</i>	
A Knowledge Distribution Model to Support an Author in Narrative Creation . . . . .	511
<i>Hochang Kwon, Sukhwan Jung, Hyuk Tae Kwon, and Wan Chul Yoon</i>	
Digital Museums of Cultural Heritages in Kyoto: The Gion Festival in a Virtual Space . . . . .	523
<i>Liang Li, Kyoko Hasegawa, Takahiro Fukumori, Wataru Wakita, Satoshi Tanaka, Takanobu Nishiura, Kozaburo Hachimura, and Hiromi T. Tanaka</i>	
Polyhedron Network Model to Describe Creative Processes . . . . .	535
<i>Tetsuya Maeshiro and Midori Maeshiro</i>	
3D CG Integral Photography Artwork Using Glittering Effects in the Post-processing of Multi-viewpoint Rendered Images . . . . .	546
<i>Nahomi Maki and Kazuhisa Yanaka</i>	
Steps towards Enhancing the User Experience in Accessing Digital Libraries . . . . .	555
<i>Carlo Meghini and Valentina Bartalesi</i>	
Switching the Level of Abstraction in Digital Exhibitions to Provide an Understanding of Mechanisms . . . . .	567
<i>Takuji Narumi, Hiroshi Ohara, Ryo Kiyama, Tomohiro Tanikawa, and Michitaka Hirose</i>	

## Information and Knowledge in Business and Society

Operations Research and Recommender Systems . . . . .	579
<i>Thomas Asikis and George Lekakos</i>	
E-Governance Transparency in Brazil – The Lack of Usability Is Detrimental to Citizenship . . . . .	590
<i>Cayley Guimarães, Leandro Daniel Reis Silva, Diego Roberto Antunes, and Rodrigo Formighieri</i>	
Qualitative Study for the Design of Assistive Technologies for Improving Quality of Life of Visually Impaired . . . . .	602
<i>Yosuke Kinoe and Asuka Noguchi</i>	
Modeling Consumers with TV and Internet . . . . .	614
<i>Akifumi Nozaki and Kenichi Yoshida</i>	
The Relationships between the Products and Affective Evaluation Concerning Uniqueness . . . . .	622
<i>Yusuke Ohta and Keiko Kasamatsu</i>	
Factors Influencing the Adoption of Cloud Computing by Small and Medium Size Enterprises (SMEs) . . . . .	631
<i>Shima Ramezani Tehrani and Farid Shirazi</i>	
Learning Effect Evaluation of an Educational Tool for Product-Service System Design Based on Learner Viewpoints . . . . .	643
<i>Kentaro Uei, Takashi Fujiwara, Akira Kazawa, Yutaro Nemoto, Koji Kimita, and Yoshiki Shimomura</i>	
<b>Author Index . . . . .</b>	<b>653</b>