

# **29th International Conference on Informatics for Environmental Protection and the 3rd International Conference ICT for Sustainability**

**(EnviroInfo & ICT4S 2015)**

**Advances in Computer Science Research Volume 22**

**Copenhagen, Denmark  
7 – 9 September 2015**

**Editors:**

**Vivian Kvist Johannsen  
Stefan Jensen  
Volker Wohlgemuth**

**Chris Preist  
Elina Eriksson**

**ISBN: 978-1-5108-0996-3**

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

Copyright© (2015) by Atlantis Press  
All rights reserved.  
<http://www.atlantis-press.com/php/pub.php?publication=ict4s-env-15>

Printed by Curran Associates, Inc. (2015)

For permission requests, please contact Atlantis Press  
at the address below.

Atlantis Press  
29 avenue Laumière  
75019 Paris  
France

[contact@atlantispress.com](mailto:contact@atlantispress.com)

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2634  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# TABLE OF CONTENTS

## CONVERSTATION I

<b>A FRAMEWORK FOR SUSTAINABILITY ASSESSMENT OF ICT FUTURES. SCENARIOS AND SUSTAINABILITY IMPACTS OF FUTURE ICT- SOCIETIES.....</b>	<b>1</b>
<i>Yevgeniya Arushanyan, Elisabeth Ekener-Petersen, Åsa Moberg, Vlad C. Coroama</i>	
<b>ASSESSING THE USES OF NLP-BASED SURROGATE MODELS FOR SOLVING EXPENSIVE MULTI-OBJECTIVE OPTIMIZATION PROBLEMS: APPLICATION TO POTABLE WATER CHAINS .....</b>	<b>10</b>
<i>Florin Capitanescu, Antonino Marvuglia, Enrico Benetto, Aras Ahmadi, Ligia Tiruta-Barna</i>	
<b>ECO INNOVATIONS IN EUROPEAN COUNTRIES .....</b>	<b>19</b>
<i>Pawel Bartoszczuk</i>	
<b>ENVIRONMENTAL MONITORING OF CONTINUOUS PHENOMENA BY SENSOR DATA STREAMS: A SYSTEM APPROACH BASED ON KRIGING .....</b>	<b>27</b>
<i>Peter Lorkowski, Thomas Brinkhoff</i>	
<b>EXPLORING THE EFFECT OF ICT SOLUTIONS ON GHG EMISSIONS IN 2030 .....</b>	<b>37</b>
<i>Jens Malmödin, Pernilla Bergmark</i>	
<b>GIS-BASED LIFE CYCLE ASSESSMENT OF URBAN BUILDING STOCKS RETROFITTING- A BOTTOM-UP FRAMEWORK APPLIED TO LUXEMBOURG .....</b>	<b>47</b>
<i>Alessio Mastrucci, Emil Popovici, Antonino Marvuglia, Luís De Sousa, Enrico Benetto, Ulrich Leopold</i>	
<b>I AM MORE THAN THE SUM OF MY PARTS: AN E-WASTE DESIGN FICTION .....</b>	<b>57</b>
<i>Vanessa Thomas, Manu J. Brueggemann, David Feldman</i>	
<b>INDIRECT REBOUND AND REVERSE REBOUND EFFECTS IN THE ICT-SECTOR AND EMISSIONS OF CO<sub>2</sub>.....</b>	<b>66</b>
<i>Cecilia Håkansson, Göran Finnveden</i>	
<b>THE GREEN PRACTITIONER: A DECISION-MAKING TOOL FOR GREEN ICT .....</b>	<b>74</b>
<i>Karl Lundfall, Paola Grosso, Patricia Lago, Giuseppe Procaccianti</i>	
<b>LABELLING SUSTAINABLE SOFTWARE PRODUCTS AND WEBSITES: IDEAS, APPROACHES, AND CHALLENGES.....</b>	<b>82</b>
<i>Eva Kern, Markus Dick, Stefan Naumann, Andreas Filler</i>	
<b>MIDPOINT VS SINGLE SCORE IN MULTI-CRITERIA OPTIMIZATION UNDER LIFE CYCLE ASSESSMENT CONSTRAINTS: THE CASE OF POTABLE WATER TREATMENT CHAINS .....</b>	<b>92</b>
<i>Florin Capitanescu, Elorri Igos, Antonino Marvuglia, Enrico Benetto</i>	
<b>OPEN DATA MODEL FOR (PRECISION) AGRICULTURE APPLICATIONS AND AGRICULTURAL POLLUTION MONITORING .....</b>	<b>97</b>
<i>Tomáš Rezník, Karel Charvát, Vojtech Lukas, Karel Charvát Jr., Šárka Horáková, Michal Kepka</i>	
<b>PERCEPTIONS AND BEHAVIOUR TOWARDS CLIMATE CHANGE AND ENERGY SAVINGS: THE ROLE OF SOCIAL MEDIA .....</b>	<b>108</b>
<i>Lara S. G. Piccolo, Harith Alani</i>	
<b>PRE-INSTALLATION CHALLENGES: CLASSIFYING BARRIERS TO THE INTRODUCTION OF SMART HOME TECHNOLOGY.....</b>	<b>117</b>
<i>Luis Carlos Rubino De Oliveira, Andrew May, Val Mitchell, Mike Coleman, Tom Kane, Steven Firth</i>	
<b>WORK HUBS - LOCATION CONSIDERATIONS AND OPPORTUNITIES FOR REDUCED TRAVEL .....</b>	<b>126</b>
<i>Anna Kramers, Mattias Höjer, Marcus Nyberg, Malin Söderholm</i>	
<b>SOCIAL ELECTRICITY: THE EVOLUTION OF A LARGE-SCALE, GREEN ICT SOCIAL APPLICATION THROUGH TWO CASE STUDIES IN CYPRUS AND SINGAPORE .....</b>	<b>136</b>
<i>Andreas Kamilaris, Andreas Pitsillides, Christos Fidas, Sekhar Kondepudi</i>	
<b>THE CITIZEN FIELD ENGINEER: CROWDSOURCED MAINTENANCE OF CONNECTED WATER INFRASTRUCTURE. SCENARIOS FOR SMART AND SUSTAINABLE WATER FUTURES IN NAIROBI, KENYA .....</b>	<b>146</b>
<i>Fanny Von Heland, Marcus Nyberg, Anna Bondesson, Pontus Westerberg</i>	

## **CONVERSTATION II**

<b>TOWARD COLLABORATIVE LCA ONTOLOGY DEVELOPMENT: A SCENARIO-BASED RECOMMENDER SYSTEM FOR ENVIRONMENTAL DATA QUALIFICATION</b> .....	157
<i>Akkharawoot Takhom, Mitsuru Ikeda, Boontawee Suntisrivaraporn, Thepchai Supnithi</i>	
<b>ENERGY DEMAND OF WORKPLACE COMPUTER SOLUTIONS - A COMPREHENSIVE ASSESSMENT INCLUDING BOTH END-USER DEVICES AND THE POWER CONSUMPTION THEY INDUCE IN DATA CENTERS</b> .....	165
<i>Ralph Hintemann, Klaus Fichter</i>	
<b>ENERGY MATTERS IN BUILDINGS: INDIVIDUAL AND COLLECTIVE ISSUES</b> .....	172
<i>Marie Denward, Annelise De Jong, Rebekah Olsen</i>	
<b>ENERGY SAVING AT WORK - AND WHEN NOT WORKING! INSIGHTS FROM A COMPARATIVE STUDY</b> .....	180
<i>Timo Jakobi, Gunnar Stevens</i>	
<b>BIG DATA FOR BIG PROBLEMS-CLIMATE CHANGE, WATER AVAILABILITY, AND FOOD SAFETY</b> .....	190
<i>Walter Armbruster, Margaret Macdonell</i>	
<b>A SYSTEMATIC REVIEW OF ENVIRONMENTALLY CONSCIOUS PRODUCT DESIGN</b> .....	197
<i>Zhongkai Li, Jorge Marx Gómez, Alexandra Pehlken</i>	
<b>DISTANTIATION: A KEY CHALLENGE FOR 21ST CENTURY CONSERVATION</b> .....	207
<i>Leticia Margarita Ochoa-Ochoa, Sandra Nogué, Rafa Devillamagallón, Richard J. Ladle</i>	
<b>EDUCATION AND HEALTH IN ICT-FUTURES: SCENARIOS AND SUSTAINABILITY IMPACTS OF ICT-SOCIETIES</b> .....	213
<i>Luciane Aguiar Borges</i>	
<b>THE ECOPANEL - DESIGNING FOR REFLECTION ON GREENER GROCERY SHOPPING PRACTICES</b> .....	221
<i>Ulrica Bohné, Jorge Luis Zapico, Cecilia Katzeff</i>	
<b>EDUCATING FOR ICT4S: UNPACKING SUSTAINABILITY AND ETHICS OF ICT STUDENT INTAKES</b> .....	229
<i>Samuel Mann, Mike Lopez, Dobrila Lopez, Nell Smith</i>	
<b>UNDERSTANDING CLIMATE CHANGE TWEETS: AN OPEN SOURCE TOOLKIT FOR SOCIAL MEDIA ANALYSIS</b> .....	242
<i>Diana Maynard, Kalina Bontcheva</i>	

## **CONVERSTATION III**

<b>40 GBPS ACCESS FOR METRO NETWORKS: IMPLICATIONS IN TERMS OF SUSTAINABILITY AND INNOVATION FROM AN LCA PERSPECTIVE</b> .....	251
<i>Reza Farrahi Moghaddam, Yves Lemieux, Mohamed Cheriet</i>	
<b>A SURVEY ON APPLICATION OF MATURITY MODELS FOR SMART GRID: REVIEW OF THE STATE-OF -THE-ART</b> .....	261
<i>Mathias Uslar, Julia Masurkewitz</i>	
<b>A TAXONOMY OF MOTIVATIONAL AFFORDANCES FOR MEANINGFUL GAMIFIED AND PERSUASIVE TECHNOLOGIES</b> .....	271
<i>Paul Weiser, Dominik Bucher, Francesca Cellina, Vanessa De Luca</i>	
<b>BREAKING BARRIERS ON REUSE OF DIGITAL DEVICES ENSURING FINAL RECYCLING</b> .....	281
<i>David Franquesa, Leandro Navarro, David López, Xavier Bustamante, Santiago Lamora</i>	
<b>DIGITAL TAXONOMY FOR SUSTAINABILITY</b> .....	289
<i>Jack H. Townsend</i>	
<b>EXPLORING (UN)SUSTAINABLE GROWTH OF DIGITAL TECHNOLOGIES IN THE HOME</b> .....	300
<i>Oliver Bates, Carolynne Lord, Bran Knowles, Adrian Friday, Adrian Clear, Mike Hazas</i>	
<b>A STRATEGY FOR RESEARCH ON GOVERNING THE ANTHROPOCENE</b> .....	310
<i>Rolfe A. Leary, Vivian Kvist Johannsen</i>	
<b>ICT PRACTICES IN SMART SUSTAINABLE CITIES - IN THE INTERSECTION OF TECHNOLOGICAL SOLUTIONS AND PRACTICES OF EVERYDAY LIFE</b> .....	317
<i>Miriam Börjesson Rivera, Elina Eriksson, Josefin Wangel</i>	
<b>INVESTIGATION INTO THE SLOW ADOPTION OF RETROFITTING - WHAT ARE THE BARRIERS AND DRIVERS TO RETROFITTING, AND HOW CAN ICT HELP</b> .....	325
<i>Christopher Weeks, Charles Delalonde, Chris Preist</i>	

<b>ON FAIRNESS &amp; SUSTAINABILITY: MOTIVATING CHANGE IN THE NETWORKED SOCIETY</b> .....	335
<i>Somya Joshi, Teresa Cerratto Pargman</i>	
<b>POTENTIALS OF ENERGY CONSUMPTION MEASUREMENTS IN OFFICE ENVIRONMENTS</b> .....	345
<i>Timo Jakobi, Gunnar Stevens</i>	
<b>SELF-ORGANIZING DEMAND RESPONSE WITH COMFORT-CONSTRAINED HEAT PUMPS</b> .....	353
<i>Christian Hinrichs, Michael Sonnenschein, Adam Gray, Curran Crawford</i>	
<b>SUSTAINABILITY BEGINS IN THE STREET: A STORY OF TRANSITION TOWN TOTNES</b> .....	361
<i>Xinning Gui, Bonnie Nardi</i>	
<b>Author Index</b>	