

**CONFERENCE CHAIRS:** JAN KROEZE | RUTH DE VILLIERS  
**PROGRAMME CHAIRS:** HELÈNE GELDERBLOM | HUGO LOTRIET

# SAICSIT 2012

Contemplate | Connect | Collaborate



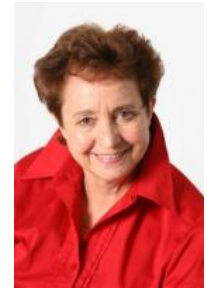
## PROGRAMME

1-3 OCTOBER 2012  
CENTURION, SOUTH AFRICA





## Message from the conference chairs



In 1995, the 'first symposium' of the South African Institute for Computer Scientists and Information Technologists (SAICSIT) was hosted at the University of South Africa (UNISA) under the presidency of Prof Lerine Steenkamp, who welcomed the delegates to 'this forum for the exchange of ideas and results on research and development in the disciplines of Computer Science, Software Engineering and Information Systems'. SAICSIT had succeeded the former 'SAICS', and the preface to the proceedings emphasised the need to acknowledge the interrelationships between the various focus areas in the broader field of Information Technology. Seventeen years later, the same disciplines are playing prominent roles in SAICSIT 2012, with the focus areas of Human-Computer Interaction and ICT for Development also coming to the forefront. This befits the current ethos of mobile and ubiquitous computing by laymen, as well as professionals, and the social milieu of contemporary South African and African society. A further link to the first conference in 1995 is the role played and resources contributed by Unisa's Centre for Software Engineering (CENSE), currently under the management of Prof André van der Poll. Under the leadership of Prof Paula Kotzé, Unisa has subsequently hosted or co-hosted three other SAICSIT conferences.

SAICSIT will be formally opened by Prof Mamokgethi Setati, Unisa's Vice-Principal: Research and Innovation. We are privileged to have keynote plenary addresses by Prof Ben Bederson of the University of Maryland, USA, Prof Hans van Ditmarsch from the University of Seville, Spain, and Chris Wendt and Prof Judith Bishop of Microsoft Research in Redmond, Washington, USA.

Another notable event at SAICSIT 2012 is the M & D Symposium, where more than forty master's and doctoral students will give presentations on their work to senior professors. On the first day, a rich variety of workshops will be available – some as part of the main SAICSIT conference and others as associated events. Delegates can attend workshops on design science research, artificial intelligence, saving indigenous languages through translation, successful website design, and the formal development and verification of software with Event-B/ RODIN. Forty-two full papers will be read by delegates at the main conference.

Gratitude is expressed to our main sponsor, Microsoft, for their generous support, as well as our other sponsors, Masterskill, Pearson, CENSE and CSET, for their contribution and presence. In particular, sincere appreciation is expressed to Prof Irwin Brown, national SAICSIT president and the chair of SAICSIT 2011, for continuous support and leadership to the academic society.

The wheel has turned full circle as Unisa welcomes you to SAICSIT 2012. We thank the members of the organising committee who gave time and enthusiastic efforts in bringing this event to reality. May the peer networking and the work conducted contribute to the enhancement of productive research. As we *contemplate, connect and collaborate*, our wish is that the conference will stimulate innovation and development!

Welcome to Irene Country Lodge!

Jan Kroeze and Ruth de Villiers  
Conference Chair and Co-chair





## Message from the programme chairs



Welcome to SAICSIT 2012, hosted on 1 – 3 October 2012 by the UNISA School of Computing and the Centre for Software Engineering at the Irene Country Lodge in Centurion, South Africa.

A total of 120 submissions from authors in Africa, Europe, and Asia were received in response to the call for papers. All papers were subjected to a stringent double-blind peer review process, with every paper being double-blind reviewed by at least two reviewers. Ultimately, 42 full research papers were accepted for the final programme at an overall acceptance rate of 35%. The accepted research papers reflect a diversity of research projects in Computer Science, Information Technology, and Information Systems. Similar to previous years the conference proceedings are available online in the ACM Digital Library.

We wish to thank the numerous persons who were involved in tasks related to the conference programme. These include the reviewers that constituted the Programme Committee, members of the SAICSIT 2012 organizing committee and ACM staff who assisted with the publication of the proceedings in the ACM Digital Library.

We trust that you will find the contents of the programme stimulating and insightful and that these papers will serve to inform future academic discourse and endeavour in the areas of Computer Science, Information Technology, and Information Systems.

Helène Gelderblom and Hugo Lotriet  
SAICSIT 2012 Programme Chairs

### Organising committee

*Conference chairs:* Prof Jan Kroeze, Prof Ruth de Villiers

*Programme chairs:* Prof Helène Gelderblom, Prof Hugo Lotriet

*Treasurer:* Prof Leila Goosen; *Secretary:* Mr Colin Pilkington

*M & D Symposium:* Prof Ian Sanders, Mr Shawren Singh, Ms Estelle de Kock

*Website:* Dr Mac van der Merwe, Ms Hanifa Abdullah, Mr Evan Dembskey

*Workshops:* Dr Bobby Tait

*CENSE:* Prof André van der Poll, Ms Elmarie Havenga

*Local Arrangements:* Ms Bester Chimbo, Prof Ernest Mnkandla,

Mr Baldreck Chipangura, Mr Ted White

*Proceedings (editing):* Dr Grant O'Reilly

*Conference with a Conscience:* Prof Keshnee Padayachee, Ms Patricia Gouws

*Registration:* Ms Belda Shipalana

## Conference Sponsors

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# Keynote Addresses

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Prof Ben Bedersen  
Department of Computer Science, University of Maryland  
United States of America



## *Social Participation: How Collective Activity Can Make Change*

While technology-mediated collaboration is as old as technology itself, recent trends in social participation offer new opportunities for bringing people together to solve problems that they could not do before. In this talk, I will characterize systems that exploit social participation - ranging from the basic (e.g., public commenting on blogs) to the highly structured (e.g., real-time crowdsourcing to help blind people navigate the world). I will argue that structured crowdsourcing has only just begun to be explored. I will show several examples of my own work on collaborative translation, peer learning, and decision making as examples of the kinds of problems we can look forward to collectively solving.

Benjamin B. Bederson is a Professor of Computer Science and a past director of the Human-Computer Interaction Lab at the Institute for Advanced Computer Studies and iSchool at the University of Maryland. An ACM Distinguished Scientist, his research is on human computation, mobile device interfaces, interaction strategies, digital libraries, and online education. He is also Co-founder and Chief Scientist of Zumobi, a premium mobile app network.

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Prof Judith Bishop  
Director of Computer Science, Microsoft Research  
United States of America



## *Computer Societies – Past and Future*

Since the 1950s, the computing community has organized itself into scientific societies with the primary purpose of interchange of information. Conferences and journals were the first ways in which we spread the word. With advent of easier travel and then the Internet, there has been a vast change in the way in which societies position themselves. National societies, such as the ACM, have become global, and international societies such as IFIP have seen their role waning somewhat. Societies sometimes try to address the needs of academia and industry, such as the BCS, with mixed success. Interaction with the strong engineering and information systems societies, such as the IEEE and ASIS&T, is profitable, but not always easy. In South Africa, we have at least four bodies that scarcely talk to each other: SAICSIT, CSSA, SACL A and SAIEEE. I have been a member of, or spoken at, at least 10 such societies world-wide. After a brief historical overview, this talk looks mainly at the future. I'll explore the opportunities that are open to SAICSIT right now to operate on a global scale to advance the interests of its members and open the floor to discussion.

Judith Bishop is director of computer science at Microsoft Research, where she works to create strong links between Microsoft's research groups and universities worldwide. Her expertise is in programming languages and distributed systems, with a strong practical bias and an interest in compilers and design patterns. She initiated the Software Engineering Innovation Foundation (SEIF) and is currently working on a new way of running programs in browsers (especially F#) and on promoting programming on mobile phones with TouchDevelop. Judith has authored more than 95 publications, including 15 books on programming languages that are available in six languages. She serves frequently on international editorial, program, and award committees, and has received numerous awards and distinctions, including the IFIP Outstanding Service Award in 2009 and the IFIP Silver Core Award 2006 for service to the worldwide computer science community. She is a fellow of the British Computer Society, the Royal Society of South Africa, and other prestigious bodies. Judith received her PhD from the University of Southampton under David Barron in 1977. She was a professor at the Universities of the Witwatersrand and Pretoria, as well as a Reader at Southampton before joining Microsoft in 2009. She is an Honorary Professor at the University of Cape Town.

# Keynote Addresses

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Prof Hans van Ditmarsch  
Department of Logic, University of Seville  
Spain



## *Dynamic Epistemic Logic*

Dynamic epistemic logic is the multi-agent logic of change of knowledge. It can be used to specify multi-agent systems and their dynamic behaviour on a high level of systems architecture. The language contains operations  $K\phi$  for 'knowing that  $\phi$ ', and also operators for knowledge change, such as  $[\phi]\psi$  for 'after announcing  $\phi$ ,  $\psi$  is true'. Puzzling phenomena about this logic are the consequences of announcing 'p is true and you do not know that'. After that, you know p, which seems to be contradictory. The logic exists in many variations, including operators for more complex change of information such as private actions, operators for factual instead of informational change, and operators for quantification over change. Dynamic epistemic logic cannot be said to have been applied yet, but it is moving closer to applications - we will present some opportunities and on-going developments in model checking, security protocols, and protocol synthesis.

Hans van Ditmarsch obtained a PhD at the University of Groningen in 2000. He lectured at the University of Otago from 2001-2007 and remained affiliated to that university until 2010. In 2007-2008 he was a CNRS researcher at IRIT (Institut de Recherche en Informatique de Toulouse) and in 2008 a Lorentz Fellow at NIAS (Netherlands Institute for Advanced Study in the Humanities and the Social Sciences). In 2009 he joined the University of Seville as a senior researcher on a five year (2009-2014) project on unconditionally secure protocols. From 2010-2013 he is an associated researcher at IMSc (Institute of Mathematical Sciences), Chennai. His research is on the dynamics of knowledge, information-based security protocols, modal logics for belief revision, proof tools for epistemic logics, combinatorics, and computer and information science education

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Chris Wendt  
Group Program Manager, Microsoft Research  
United States of America



## *Useful Automatic Translation – Are We There Yet?*

While automatic translation between the “big”, resource-rich languages English, French, German, Spanish, Japanese, Chinese etc. has reached pretty decent quality levels today, the same cannot be said for languages with smaller amounts of previously translated material, languages employing a richer morphology, and for languages with a wide divergence in terminology or style. We'll take a look at the techniques that allow us to grow the set of languages and domains enjoying useful automatic translation, and how human intelligence and automation can work together to get us there.

Chris Wendt graduated as Diplom-Informatiker from the University of Hamburg, Germany, and subsequently spent a decade on software internationalization for a multitude of Microsoft products, including Windows, Internet Explorer, MSN and Windows Live - bringing these products to market with equal functionality worldwide. Since 2005 he is leading the program management and planning for Microsoft's Machine Translation development, responsible for Bing Translator and Microsoft Translator services. He is based at Microsoft headquarters in Redmond, Washington, USA.

Sunday, 30 September 2012

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14:00 – 17:00	SAICSIT Council meeting
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Monday, 1 October 2012

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**Conference Workshops**

08:30 – 17:30	M & D Symposium – <i>Prof Ian Sanders</i> Track 1: Information Systems Track 2: Computer Science Track 3: ICT4D/HCI
09:00 – 16:30	The Successful Website - Search Engine and Human Requirements
10:30 – 16:00	Microsoft Machine Translation Workshop
10:30 – 16:00	An Introduction to Formal Development and Verification of Software with Event-B/RODIN

**Co-located Workshop**

08:00 – 16:30	Design Science Research Independent Workshop
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18:00 – 20:30	<p><b>Welcome dinner and official opening</b> (Dress code: Smart casual)</p> <p><b>Prof Mamokgethi Setati</b> <b>(Vice Principal: Research and Innovation, Unisa)</b></p> <p><b>Conference with a Conscience: Viewing of robotics paintings</b> <b>Introduction of sponsors</b></p>
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## Tuesday, 2 October 2012

Time	Track 1	Track 2	Track 3
08:30	Opening (announcements and exhibitors) – <i>Prof Jan Kroeze</i>		
09:00	Keynote address: <i>Chris Wendt</i> , Useful Automatic Translation – Are We There Yet?		
09:45 – 10:45	Theme: Collaboration tools Chair: Trish Alexander <ul style="list-style-type: none"> <li>• Exploring the Use of a Multi-Touch Surface to Support Collaborative Information Retrieval, <i>Janet Wesson, Dieter Vogts, and Ivan Sams</i></li> <li>• An Online Meeting Tool for Low Bandwidth Environments, <i>Trésor Mvumbi, Flora Kundaali, Zafika Manzi, Kyle Williams, and Hussein Suleman</i></li> </ul>	Theme: IS general Chair: Auroa Gerber <ul style="list-style-type: none"> <li>• A Longitudinal Analysis of ICT Project Success, <i>Carl Marnewick</i></li> <li>• Modelling Management Information Systems' Success: A Study in the Domain of Further Education and Training, <i>Mariette Visser, Judy van Biljon, and Marlien Herselman</i></li> </ul>	Theme: CS general Chair: André van der Poll <ul style="list-style-type: none"> <li>• From Visual Scripting to LUA, <i>Mwawi Msiska and Lynette van Zijl</i></li> <li>• Improving Communication for Distributed Model Checking, <i>Jean Fourie, Jaco Geldenhuys, and Cornelia Inggs</i></li> </ul>
10:45	Tea		
11:15	Keynote address: <i>Prof Ben Bedersen</i> , Social Participation: How Collective Activity Can Make Change		
12:00 – 13:00	Theme: Usability and user experience Chair: Adele Botha <ul style="list-style-type: none"> <li>• Are Mobile In-Car Communication Systems Feasible? A Usability Study, <i>Patrick Tchankue, Janet Wesson, and Dieter Vogts</i></li> <li>• How Can Usability Contribute to User Experience? A Study in the Domain of E-Commerce, <i>Izabela Moczarny, Ruth de Villiers, and Judy Van Biljon</i></li> </ul>	Theme: IS general Chair: Hugo Lotriet <ul style="list-style-type: none"> <li>• Synthesis of Green IS Frameworks for Achieving Strong Environmental Sustainability in Organisations, <i>Grant Howard and Sam Lubbe</i></li> <li>• Changing Career Choice Factors as the Economic Environment Changes, <i>Patricia M Alexander and Hossana Twinomurinzi</i></li> </ul>	Theme: Test case generation Chair: Bruce Watson <ul style="list-style-type: none"> <li>• Automated Coverage Calculation and Test Case Generation, <i>Campbell Morrison, Cornelia Inggs, and Willem Visser</i></li> <li>• Test-Case Generation and Bug-Finding Through Symbolic Execution, <i>Willem Bester, Cornelia Inggs, and Willem Visser</i></li> </ul>
13:00	Lunch		

## Tuesday, 2 October 2012 (continued)

Time	Track 1	Track 2	Track 3
14:00 – 16:00	<p>Theme: ICT4D and M4D Chair: Judy van Biljon</p> <ul style="list-style-type: none"> <li>• Audio Pacemaker: Walking, Talking Indigenous Knowledge, <i>Nicola J Bidwell and Heike Winschiers-Theophilus</i></li> <li>• An Empirical Investigation into the Use of Digital Photo Frames as Low Cost E-Book Readers, <i>Hannah Thinyane and Jean-Paul Thorne</i></li> <li>• Effects of Application Type on the Choice of Interaction Modality in IVR Systems, <i>Tembalethu Ndwe, Etienne Barnard, and Mqhele Dlodlo</i></li> <li>• Revisiting the Theory of Planned Behaviour for the Preparation of the Adoption of Municipal E-Services in Less Developed Countries, <i>Ntjatji Gosebo and Seraphin Obono</i></li> </ul>	<p>Theme: Networks and IT security Chair: Mariki Eloff</p> <ul style="list-style-type: none"> <li>• A Proposed Cyber Threat Incident Handling Framework for Schools In South Africa, <i>Naume Sonhera, Elmarie Kritzinger, and Marianne Looock</i></li> <li>• Assessing the Design of Web Interoperability Protocols, <i>Jorgina Paihama, Kyle Williams, and Hussein Suleman</i></li> <li>• CaptureFoundry: A GPU Accelerated Packet Capture Analysis Tool, <i>Alastair Nottingham, John Richter, and Barry Irwin</i></li> </ul>	<p>Theme: CS general Chair: Cornelia Inggs</p> <ul style="list-style-type: none"> <li>• Monte-Carlo Tree Search Parallelisation for Computer Go, <i>Francois van Niekerk, Steve Kroon, Gert-Jan van Rooyen, and Cornelia Inggs</i></li> <li>• Symbolic Execution of Programs with Strings, <i>Gideon Redelinghuys, Willem Visser, and Jaco Geldenhuys</i></li> <li>• Performance Optimisation of Sequential Programs on Multi-Core Processors, <i>Waide Tristram and Karen Bradshaw</i></li> <li>• A Cache-Sensitive MapReduce DGEMM Algorithm For Shared Memory Architectures, <i>Gideon Nimako, Ekow Otoo, and Daniel Ohene-Kwofie</i></li> </ul>
16:00	Tea		
16:15 – 17:15	SAICSIT AGM		

18:00	<b>Conference with a Conscience: I-SET Robotics demonstration and silent auction of robotics paintings</b>
19:00 – 22:00	<p><b>Gala dinner</b> (Dress code: Smart casual)</p>



## Wednesday, 3 October 2012

Time	Venue 1	Venue 2	Venue 3
08:30 – 10:30	<p>Theme: Designing for the elderly/disabled and other social issues Chair: Heléne Gelderblom</p> <ul style="list-style-type: none"> <li>• MOSES – Method for Selecting Senior Mobile Phones: Supporting Design &amp; Choice for the Elderly, <i>Tobie van Dyk, Karen Renaud, and Judy van Biljon</i></li> <li>• WiiMS: Simulating Mouse And Keyboard For Motor-Impaired Users, <i>Sylvester Honye and Hannah Thinyane</i></li> <li>• Toward an mPolicing Solution for Namibia: Leveraging Emerging Mobile Platforms and Crime Mapping, <i>Kasper Jensen, Hedvig Iipito, Sebastian Mukumbira, and Michel Onwordi</i></li> <li>• Internet Use and Expatriate Adjustment: Understanding the Degree of Isolation Experienced in Kingdom of Saudi Arabia, <i>Marie Hattingh, Machdel Matthee, and Hugo Lotriet</i></li> </ul>	<p>Theme: IS general Chair: Jan Mentz</p> <ul style="list-style-type: none"> <li>• What is Software Architecture?, <i>Fritz Solms</i></li> <li>• Towards a Framework for Decision Making Regarding IT Adoption, <i>Osden Jokonya, Jan H Kroeze, and John A van der Poll</i></li> <li>• An Exploratory Survey of Design Science Research Among South African Computing Scholars, <i>Rennie Naidoo, Aurona Gerber, and Alta Van der Merwe</i></li> </ul>	<p>Theme: Description logics and algorithms Chair: Tertia Horne</p> <ul style="list-style-type: none"> <li>• ABox Abduction in ALC using a DI Tableau, <i>Ken Halland and Katarina Britz</i></li> <li>• A Defeasible Reasoning Approach for Description Logic Ontologies, <i>Kody Moodley, Thomas Meyer, and Ivan Varzinczak</i></li> <li>• A Note on the Translation of Conceptual Data Models into Description Logics: Disjointness and Covering Assumptions, <i>Giovanni Casini, Aurona Gerber, and Thomas Meyer</i></li> <li>• Comparing Paper Ranking Algorithms, <i>Marcel Dunaiski and Willem Visser</i></li> </ul>
10:30	Tea, announcements, and arrangements		
11:00	Keynote address: <i>Prof Hans van Ditmarsch</i> , Dynamic Epistemic Logic		
11:45 – 12:45	<p>Theme: Visualisation/games Chair: Janet Wesson</p> <ul style="list-style-type: none"> <li>• Software Visualisation Through Video Games, <i>Bradley Marques, Stephen Levitt, and Kenneth Nixon</i></li> <li>• Hardware and Software for Skateboard Trick Visualisation on a Mobile Phone, <i>Edward Reynell and Hannah Thinyane</i></li> </ul>		<p>Theme: Pattern matching Chair: Arina Britz</p> <ul style="list-style-type: none"> <li>• Performance Assessment of Dead-Zone Single Keyword Pattern Matching, <i>Melanie Mauch, Bruce Watson, Derrick Kourie, and Tinus Strauss</i></li> <li>• Local Directional Pattern Based Signature Verification using Weighted Fractional Distance Classification, <i>Yaseen Moolla, Serestina Viriri, Fulufhelo Nelwamondo, and Jules-Raymond Tapamo</i></li> </ul>
12:45	Lunch		

## Wednesday, 3 October 2012 (continued)

Time	Track 1	Track 2	Track 3
13:45	Keynote address: <i>Prof Judith Bishop</i> , Computer Societies – Past and Future		
14:30 – 15:30	Theme: E-learning and m-learning Chair: Ruth de Villiers <ul style="list-style-type: none"> <li>• The Adoption of E-Learning in Corporate Training Environments: An Activity Theory Based Overview, <i>Marius Henneke and Machdel Matthee</i></li> <li>• A Scientific Concept Animation Tool for Content Implementation in E-Learning, <i>Ekow Otoo and Damilola Osikoya</i></li> </ul>	IS session: SA AIS chapter discussion	Theme: CS general Chair: Ken Halland <ul style="list-style-type: none"> <li>• A Comparative Drivability Analysis for Autonomous Robots in Underground Mines using the Entropy and SRM Models, <i>Omowunmi Falola, Isaac Osunmakinde, and Antoine Bagula</i></li> <li>• A Framework for the Choreography of Intelligent E-Services, <i>Wonga Ntshinga, Sunday Ojo, and Ernest Ngassam</i></li> </ul>
15:30	Closing, acknowledgements, and farewell – <i>Prof Ruth de Villiers</i>		