The South African Institute for Computer Scientists and Information Technologists

ANNUAL RESEARCH AND DEVELOPMENT SYMPOSIUM

23-24 NOVEMBER 1998
CAPE TOWN
Van Riebeeck hotel in Gordons Bay

Hosted by the University of Cape Town in association with the CSSA,
Potchefstroom University for CHE and
The University of Natal

GENERAL CHAIR : PROF G. HATTINGH, PU CHE

PROGRAMME CO-CHAIRS:
PROF. L VENTER, PU CHE (Vaal Triangle), PROF. D. PETKOV, UN-PMB

LOCAL ORGANISING CHAIR: PROF. P. LICKER, UCT - IS

PROCEEDINGS

EDITED BY
D. PETKOV AND L. VENTER

SYMPOSIUM THEME:
Development of a quality academic CS/IS infrastructure in South Africa

SPONSORED BY

ABSA Group
Copyrights reside with the original authors who may be contacted directly.

Edited by Prof. D. Petkov and Prof. L. Venter
Van Reebbeck Hotel, Gordons Bay, 23-24 November 1998


Keywords: Computer Science, Information Systems, Software Engineering.

The views expressed in this book are those of the individual authors and not of the South African Institute for Computer Scientists and Information Technologists.

Office of SAICSIT: Prof. J.M.Hatting, Department of Computer Science and Information Systems, Potchefstroom University for CHE, Private Bag X6001, Potchefstroom, 2520, RSA.

Produced by the Library Copy Centre, University of Natal, Pietermaritzburg.
FOREWORD

The South African Institute for Computer Scientists and Information Technologists (SAICSIT) promotes the cooperation of academics and industry in the area of research and development in Computer Science, Information Systems and Technology and Software Engineering. The culmination of its activities throughout the year is the annual research symposium. This book is a collection of papers presented at the 1998 such event taking place on the 23rd and 24th of November in Gordons Bay, Cape Town. The Conference is hosted by the Department of Information Systems, University of Cape Town in cooperation with the Department of Computer Science, Potchefstroom University for CHE and and Department of Computer Science and Information Systems of the University of Natal, Pietermaritzburg.

There are a total of 46 papers. The speakers represent practitioners and academics from all the major Universities and Technikons in the country. The number of industry based authors has increased compared to previous years.

We would like to express our gratitude to the referees and the paper contributors for their hard work on the papers included in this volume. The Organising and Programme Committees would like to thank the keynote speaker, Prof M.C. Jackson, Dean, University of Lincolnshire and Humberside, United Kingdom, President of the International Federation for Systems Research as well as the Computer Society of South Africa and The University of Cape Town for the cooperation as well as the management and staff of the Potchefstroom University for CHE and the University of Natal for their support and for making this event a success.

Giel Hattingh, Paul Licker, Lucas Venter and Don Petkov
# Table of Contents

<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lynette Drevin: Activities of IFIP wg 11.8 (computer security education) &amp; IT related ethics education in Southern Africa</td>
<td>1</td>
</tr>
<tr>
<td>Reinhardt A. Botha and Jan H.P. Elof: exA Security Interpretation of the Workflow Reference Model</td>
<td>3</td>
</tr>
<tr>
<td>Willem Krige and Rossouw von Solms: Effective information security monitoring using data logs</td>
<td>9</td>
</tr>
<tr>
<td>Carl Papenfus and Reinhardt A. Botha: A shell-based approach to information security</td>
<td>15</td>
</tr>
<tr>
<td>Walter Smuts: A 6-Dimensional Security Classification for Information</td>
<td>20</td>
</tr>
<tr>
<td>Philip Machanick and Pierre Salverda: Implications of emerging DRAM technologies for the RAM page Memory hierarchy</td>
<td>27</td>
</tr>
<tr>
<td>Susan Brown: Practical Experience in Running a Virtual Class to Facilitate On-Campus Under Graduate Teaching</td>
<td>41</td>
</tr>
<tr>
<td>H.D. Masethe, T.A Dandadzi: Quality Academic Development of CS/IS Infrastructure in South Africa</td>
<td>49</td>
</tr>
<tr>
<td>Philip Machanick: The Skills Hierarchy and Curriculum</td>
<td>54</td>
</tr>
<tr>
<td>Theda Thomas: Handling diversity in Information Systems and Computer Science Students: A social Constructivist Perspective</td>
<td>63</td>
</tr>
<tr>
<td>Udo Averweg and G J Erwin: Critical success factors for implementation of Decision support systems</td>
<td>70</td>
</tr>
<tr>
<td>Magda Huisman: A conceptual model for the adoption and use of case technology</td>
<td>78</td>
</tr>
<tr>
<td>Paul S. Licker: A Framework for Information Systems and National Development Research</td>
<td>79</td>
</tr>
<tr>
<td>K. Niki Kunene and Don Petkov: On problem structuring in an Electronic Brainstorming (EBS) environment</td>
<td>89</td>
</tr>
</tbody>
</table>
Derek Smith: Characteristics of high-performing Information Systems Project Managers and Project Teams

Lucas Ven
ter: INSTAP: Experiences in building a multimedia application

Scott Hazelhurst, Anton Fatti, and Andrew Henwood: Binary Decision Diagram Representations of Firewall and Router Access Lists

Andre Joubert and Annelie Jordaan: Hardware System interfacing with Delphi 3 to achieve quality academic integration between the fields of Computer Systems and Software Engineering

Borislav Roussev: Experience with Java in an Advanced Operating Systems Module

Conrad Mueller: A Static Programming Paradigm

Sipho Langa: Management Aspects of Client/Server Computing

T Nepal and T Andrew: An Integrated Research Programme in AI applied to Telecommunications at ML Sultan Technikon

Yuri Velinov: Electronic lectures for the mathematical subjects in Computer Science

Philip Machanick: Disk delay lines

D Petkov and O Petkova: One way to make better decisions related to IT Outsourcing

Jay van Zyl: Quality Learning, Learning Quality

Matthew O Adigun: A Case for Reuse Technology as a CS/IS Training Infrastructure

Andy Bytheway and Grant Hearn: Academic CS/IS Infrastructure in South Africa: An exploratory stakeholder perspective

Chantel van Niekerk: The Academic Institution and Software Vendor Partnership

Christopher Chalmers: Quality aspects of the development of a rule-based architecture

Rudi Harmse: Managing large programming classes using computer mediated communication and cognitive modelling techniques
Michael Muller: How to gain Quality when developing a Repository Driven User Interface

Elsabe Cloete and Lucas Venter: Reducing Fractal Encoding Complexities

Jean Bilbrough and Ian Sanders: Partial Edge Visibility in Linear Time

Philip Machanick: Design of a scalable Video on Demand architecture

Freddie Janssen: Quality considerations of Real Time access to Multidimensional Matrices

Machiel Kruger and Giel Hattingh: A Partitioning Scheme for Solving the Exact $k$-item 0-1 Knapsack Problem

Ian Sanders: Non-orthogonal Ray Guarding

Fanie Terblanche and Giel Hattingh: Response surface analysis as a technique for the visualization of linear models and data

Olga Petkova and Dewald Roode: A pluralist systemic framework for the evaluation of factors affecting software development productivity

Peter Warren and Marcel Viljoen: Design patterns for user interfaces

Andre de Waal and Giel Hattingh: Refuting conjectures in first order theories

Edna Randiki: Error analysis in Selected Medical Devices and Information Systems
ACADEMIC CS/IS INFRASTRUCTURE IN SOUTH AFRICA: AN EXPLORATORY STAKEHOLDER PERSPECTIVE

Andy Bytheway and Grant Hearne
University of the Western Cape
Email: abytheway@uwc.ac.za

Abstract

In considering the requirements of an academic infrastructure that might support computer science and information systems education in South Africa, it is easy to be driven solely by the opportunities that innovative information technologies provide. Where this detracts from a proper appreciation of the real-world requirement it is too easy to fail to deliver what is required.

Further, the infrastructural requirements in South Africa are not necessarily the same as they may be elsewhere, and it is too easy to assume that ideas and paradigms from elsewhere in the world will work well in the current South African context. This supposition needs to be tested against a proper understanding of the needs of students, researchers and others, who themselves will come from a wide range of backgrounds and bring with them a wide range of competencies and capabilities. Even more complexity is introduced by the current dynamic of change, that shifts the focus of our attention from one year to the next, and requires that we constantly reappraise the requirement and our ability to fulfil it. Too often time does not permit us to give this problem the critical attention that it needs.

Using an analysis approach developed for general business use, this paper examines the expectations of the different stakeholders involved in CS and IS education and derives a set of educational processes that will fulfill those expectations. It then proposes a set of measures that will indicate the extent to which stakeholder expectations are being met. These measures provide the basis of an assessment method that will allow the current and desired level of achievement to be investigated and analysed, through surveys and interviews.

The outcome of the analysis is illustrative. Whilst it is based on only a limited amount of preliminary data gathering, it shows how a wider survey would lead to a more fulsome understanding of what is needed from current and future infrastructures. It would allow a degree of prioritisation, and an ongoing periodic re-analysis that would indicate progress (or a lack of it) in providing infrastructure. The possibility to share certain resources would be made more clear. Tertiary institutions would be able to see more clearly the specialisations and viewpoints that they could adopt in order to further their particular educational mission.

Finally, the practicality of embarking on this wider analysis is examined in order that a wider debate can be initiated and brought to a conclusion.