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Preface

Information and communication technology plays an increasingly important enabling role in addressing the global challenges of healthcare, both in the developed and the developing world. Health care challenges are of concern for the United Nations, its peoples and member states. The use of software in medical devices has already raised issues in relation to safety and efficacy, both for manufacturers and regulators. One only has to look at the experience with infusion pumps in the USA, where thousands of serious incidents have been recorded. Health information systems raise issues of privacy, confidentiality, and even patient safety. The trend toward higher levels of interconnection between devices and with hospital information systems is leading to increased complexity and concomitant safety issues as evidenced by recent fatalities due to interconnection of radiation machines with hospital billing systems in the USA. Therefore, to capitalize on the potential of this technology to reshape healthcare services, and at the same time avoid harm to patients, will require focused research on sound and safe development techniques from software engineering, electronic engineering, computing science, information science, mathematics, and industrial engineering. The purpose of the new symposium series on Foundations of Health Information Engineering and Systems (FHIES) is to promote a nascent research area that aims to develop and apply theories and techniques in computing science and software engineering to modelling, building, and certifying software-based systems in the application domain of healthcare. Many of these systems are already regulated in various jurisdictions and many more of them will become regulated in the future. This symposium has created a forum for discussion of ideas and presentations in the following two areas:

1. Research results on how computational models, techniques, and tools of analysis and verification (including modelling notations, semantics, logics, techniques of model checking, runtime monitoring, and simulation) can be applied to problems of medical informatics
2. Application of foundational methods from software engineering in health informatics

The call for submissions attracted 23 submissions from around the world in a number of the areas mentioned in the call for papers. After the normal and thorough peer review process (papers were reviewed by three or four members of the Program Committee), 14 papers were accepted for presentation in the proceedings of the workshop. These papers were published as joint technical reports of the *United Nations University – International Institute for Software Technology* and the *McMaster Centre for Software Certification*. The symposium took place in South Africa in August 2011, was co-located with the International Colloquium on Theoretical Aspects of Computing, and succeeded beyond our expectation. The format we chose for the symposium included significant time

for discussion, and this was highly appreciated by the participants. Authors had been informed of our intention to publish a post-proceedings volume, and after the completion of the symposium most authors decided to submit revised papers for these proceedings. These 13 papers were revised according to comments received at the symposium, and then went through an additional, rigorous review process. The papers cover a range of relevant and interesting topics in health informatics. There are several papers on workflow modelling and analysis, including formal modelling and analysis of medical protocols and workflows, applying model checking to analyze safety of workflows, and modelling of collaborative workflows. There are several papers on electronic medical records (EMRs) and medical information systems, including safety issues for EMRs, interoperability of health information systems and open architectures for health information systems in developing countries. There are papers on security and privacy in health information systems and even a paper on the application of model-driven development techniques to systematically develop software to support clinical trials in healthcare!

It is our hope and intention that this symposium will engender a long and productive series of meetings on foundational techniques in health informatics and experience of using these techniques in practice. Planning for the next meeting is well under way, and the second instantiation of FHIES will be co-located with Formal Methods 2012, to take place in August 2012 in Paris. We would like to thank our sponsors for their support throughout this venture: The United Nations University International Institute for Software Technology, The University of the Witwatersrand, and the McMaster Centre for Software Certification. We would also like to acknowledge the invaluable support of Tom Maibaum and Peter Haddawy, the General Co-chairs of FHIES 2011, the superb Program Committee, and Chris George and Johannes Faber for checking the final versions of the papers and compiling this volume.

February 2012

Zhiming Liu
Alan Wassyng

Organization

FHIES was organized jointly by the International Institute for Software Technology of the United Nations University (UNU-IIST) and the Centre for Software Certification of McMaster University (McSCert).

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