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Preface

This book contains the written contributions to the International Symposium on Medical Simulation (ISMS'04) held in Cambridge, Massachusetts, USA on June 17th and June 18th, 2004.

Manuscripts are organized around five thematic sections relating to the multidisciplinary field of Medical Simulation: Soft Tissue Properties and Modeling, Haptic Rendering, Real-Time Deformable Models, Anatomical Modeling, and Development Frameworks.

The objectives of the symposium are to gather researchers to present their most recent, and promising work, to highlight research trends and foster dialogue and debates among participants. Live demonstrations are also included at the meeting, but cannot be included in this volume. Finally, to address questions about areas for improvement and future directions of the field, we organized a panel of experts including technical, medical and educational representatives.

This event continues the successful symposium organized by Hervé Delingette and Nicholas Ayache, in France in June 2003. At that meeting we agreed that it would be beneficial for the community to have an annual gathering for the medical simulation community where researchers can exchange ideas and share their work in this emerging field. ISMS'04 is co-organized by CIMIT / Harvard Medical School and Rutgers University.

We received 50 submissions from 14 different countries. Each was evaluated by three members of the scientific committee. We selected 16 manuscripts for oral presentation and 16 for poster presentation. All accepted manuscripts were allowed a written contribution of equal length. These published contributions are from research institutes, universities or companies from our diverse research community, including: Germany, Russia, Netherlands, France, Switzerland, Belgium, Spain, United Kingdom, Italy, Japan, Korea, Israel, Canada and the United States of America.

The quality of the selected contributions implies that the conference will be an important milestone in the development of this new, but rapidly growing field at the convergence of several disciplines with key applications for the future of health care. We welcome all participants to this intense and stimulating scientific event

April 7, 2004 Stéphane Cotin and Dimitris Metaxas

Introduction

Medical Simulation – The Second Phase

It has been well over a decade since medical simulation began moving from the laboratory to resident and student training. Numerous simulation companies have emerged and disappeared, academic studies have begun the validation process, and opponents now have to reconsider their standpoint. It appears this initial work in simulation is leading to a second phase - a phase that will take simulators out of the laboratory and into daily training.

Many factors account for this transition. The technology has improved to a point where low cost systems can now achieve reasonably high fidelity.
Initial validation studies demonstrate unequivocally that training on a simulator improves technical skills proficiency, performance in the operating room, reduces time and variability in performance, and helps eliminate errors.

Training curricula are being developed to encompass all types of simulators, focusing the training on comprehensive curricula rather than simply upon the simulator. Current validation studies prove that high visual realism is not required to provide excellent training assessment and transfer. At times novices prefer to have a more abstract and simple simulation to correctly train in the more fundamental skills.
Program directors, medical societies and certification boards have acknowledged the importance of simulation for training and assessing competence and are now actively supporting this new field. After the recent United States federal regulation requiring residents to limit work hours to 80 per week, participants in resident training are feeling the pinch. The potential of simulation to provide some of the training that is lost with this regulation is significant.

Now is the time to incorporate simulation as an official part of both training and assessment of competency. Having made that statement, there are only a handful of simulators currently available. An enormous amount of hard labor is required to build new simulators, validate them and incorporate them into rigorous curricula for training, assessment and eventually certification. Medical simulation has finally reached the plateau which flight simulators reached in the 1950's, when the FAA officially required them for flight training and certification. Flight simulation required tens of billions of dollars and over five decades to achieve the extraordinary level of fidelity and reliability that it enjoys today - we can expect no less an investment in time, money and talent to reach the same level of excellence for medical simulation.

April 2004 Richard M. Satava, MD

Organization

The International Symposium on Medical Simulation was co-organized by the Simulation Group at CIMIT, Cambridge, Massachusetts, USA and the Center for Computational Biomedicine Imaging and Modeling at Rutgers University, New Jersey, USA.

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