



Title of special session:

RISK ANALYSIS AND PREDICTION IN CARDIOVASCULAR APPLICATIONS

Aim and objectives:

The last two decades have witnessed the development of accurate models and techniques for describing and characterising cardiovascular systems. New challenges include the exploitation of this knowledge in order to provide clinicians with tools for planning and monitoring interventional procedures and to increase safety in clinical procedures including the use of medical devices.

Leveraging the results of EU funded research, the RT3S project is organising this workshop with the objective to bring together experts in the area of cardiovascular research with the specific aim of showing how technology can improve patient treatment and safety. This is a multidisciplinary area in which engineering can have a significant impact.

Results from RT3S will be presented. In addition, presentations from other projects including work in the early stages of development are encouraged in order to foster discussion about how to accelerate progress in this evolving field.

Key targets are:

- investigation of the interaction between the device and the patient during and after a cardiovascular procedure
- definition of quantitative indicators for improving quality and safety of interventional procedures
- biomechanical and functional models for interventional procedures
- identification of ways to support clinicians to become familiarised with ICT based tools and the use of simulation platforms including the results of VPH models
- evaluation of impact from a techno-economic perspective and in terms of improved patient comfort and safety
- methods for validation and clinical assessment.

After the presentations, time will be allocated for a round table discussion.

Background: The proposers are part of RT3S Consortium. RT3S (www.rt3s.eu) is an EU-funded R&D project focused on the development of a patient-specific, probabilistic model for peripheral stent fatigue-fracture, integrated within a real time, computer-aided surgery planning application.

RT3S tools advise on stent fracture-risk and support both clinicians in the planning of interventional procedures and engineers, in medical device companies, in designing stents. RT3S is now in its third and final project year.

Short CV of the organizers:

RENATA GUARNERI is Project Manager in the Project Development - International Area at Fondazione Politecnico. Before joining Fondazione Politecnico she was Principal Technologist at CREATE-NET, responsible for the centre overall research organisation and research strategic directions, including EU funding aspects. She has been involved in EU funded research since 1990 when she joined the RACE Industrial Consortium in Brussels to represent Italtel. In 1999 Renata joined Siemens, first in the Marketing and Strategies Dept, responsible for Standard & Regulation, then in the R&D Dept. of the Mobile Radio Business Unit, responsible for EU research projects. Currently she is the coordinator of the RT3S project.

PROF FRANCESCO MIGLIAVACCA obtained a MSc in Mechanical Engineering in 1992 and a PhD in Bioengineering in 1997 both from Politecnico di Milano. In 2000 he worked as a Research Assistant at the Cardiothoracic Unit of Great Ormond Street Hospital for Children in London in 1994 and 1997-99. In 2000 and 2001 he was consultant and Research Scientist at the Pediatric Cardiac Surgery Department of the University of Michigan, Ann Arbor, MI, USA. At present he is an Associate Professor of Bioengineering in the Department of Chemistry, Materials and Chemical Engineering 'Giulio Natta' of Politecnico di Milano. Since September 2007 he is the Director of the Laboratory of Biological Structure Mechanics (LaBS) of the Politecnico di Milano. His major research activities have included the fluid dynamic optimization of pediatric cardiac surgery procedures, fluid dynamics in the living systems as well as structural analysis and material behavior of biomedical devices, in particular intravascular stents. He is involved in funded researches from the European Commission, the Foundation Leducq and public and private Italian National programs. He received the medal 'Le Scienze 2001' in Engineering and was awarded the European Society of Biomechanics Perren Award in 2004. He is Associate Editor of the peer-reviewed journals 'Cardiovascular Engineering and Technology' and 'Frontiers in Pediatric Cardiology'.

CLAUDIO SILVESTRO is a Research & Development Engineer at Medtronic Invatec, Italy. In his position, he works on the design and prototyping of next-generation endovascular devices for the treatment of peripheral arterial disease. Claudio holds an MSc degree in Biomedical Engineering from the Politecnico di Milano. His academic experience also included research activities as a visiting student at Caltech (California Institute of Technology) between 2009 and 2010. After graduating,

Claudio has briefly worked for a major international management consulting firm (Arthur D. Little) in quality of business analyst. He joined Medtronic in 2010 and has since been directly involved in the ideation and pre-marketing phases of new devices development. His skills include multiphysics numerical simulations, design for Six-Sigma, implementation of industrial optimization techniques and familiarity with industrial development processes and documentation.

Contact details of the organizers:

renata.guarneri@fondazione.polimi.it

francesco.migliavacca@polimi.it

claudio.silvestro@medtronic.com