

ESF Exploratory Workshop on

European Heart Modelling and Supporting Technology

Oxford, United Kingdom, 15 - 18 May 2007

Convened by:
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The Exploratory Workshops scheme is one of the key instruments of the Science Strategy “pillar”. Each year, ESF supports approximately 50 Exploratory Workshops across all scientific domains. The focus of the scheme is on workshops aiming to explore an emerging and/or innovative field of research or research infrastructure, also of interdisciplinary character. Workshops are expected to open up new directions in research or new domains. It is expected that a workshop will conclude with plans for specific follow-up research activities and/or collaborative actions or other specific outputs either within the frame of ESF (e.g. prepare the ground to develop a [Forward Look](#), a [Research Networking Programme](#) or a [EUROCORES](#) proposal; publication of a Policy Briefing...) or for submission to the EU 7th Framework Programme or to other European or international funding organisations.

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Main Objectives of the Workshop:

The field of heart modelling dates back to 1960 when Professor Denis Noble (Oxford), still a PhD student at the time, showed that mathematical equations could model how the electrical activity of a heart cell is influenced by the movement of sodium and potassium ions in and out, transported by pumps, channels that sit in the cell's membrane. Over last 40 years and more, cardiac models have become increasingly sophisticated, mimicking different types of heart cell and taking into account more of each cell's ion transport systems. Over the years, cardiac modeling research in Oxford has recognised the benefits of collaborative science through working with research groups in Europe, New Zealand, the USA and Asia and more recently through collaborative projects such as the Integrative Biology e-science pilot project. Researchers are currently able to demonstrate computer models founded on millions of mathematical equations that describe the proteins, cells, and tissues of the heart, and this is the product of more than 40 years of research. Research across the globe covers many aspects of this science and the heart modelling community is advanced compared to the cancer modelling community. There still remains, however, many unanswered questions and through leveraging the skills and research of new groups across the globe, we may one day determine a cure for these diseases through utilising the vast compute facilities available to us. The pharmaceutical industry has a keen interest in pursuing research where they could in theory predict the behaviour of the heart when exposed to drugs to prevent a repeat of the withdrawal of the arthritis painkiller Vioxx and the disastrous drug trial in the UK in recent months where 6 volunteers were seriously affected by taking a drug as first human volunteers in a clinical trial.

The Integrative Biology project led by Prof. David Gavaghan has developed new partners in the USA and Canada in the area of in-silico heart modelling, recognising the need to work across organisational boundaries to progress science faster.

This workshop aims to bring together the European leaders in the field of Heart Modelling, to present current work and perspectives, and to explore future potential collaborations, in the context of the Seventh Framework Programme. Funding for travel and accommodation will be provided by our recently awarded European Science Foundation grant. We expect to bring to Oxford 20-30 participants, who have been selected on the basis of their scientific excellence, potential contribution and reflecting a European dimension. We believe that this workshop will be a unique opportunity to help consolidating and advancing research on Heart Modelling in Europe.

Thursday 17 May 2007

- 09:00-10:40 **Session 5**
Chair: **Sasha Panfilov**
- 09:00-09:25 **Gunnar Seemann**: "Electrophysiological heterogeneity and mutation in the human heart"
- 09:25-09:50 **Adriaan van Oosterom**: "The Lausanne atrial model; recent applications; new projects"
- 09:50-10:15 **Henggui Zhang**: "3D anatomical model of clinical electrophysiology of human atria during atrial fibrillation"
- 10:15-10:40 **Vito Starc**: "Mathematical model of global left ventricular function based on cooperativity mechanism"
- 10:40-11:00 *Coffee Break*
- 11:00-12:45 **Session 6**
Chair: **Gunnar Seemann**
- 11:00-11:25 **Vadim Biktashev**: "Critical fronts and the problem of initiation of propagating waves in ionic models of excitation."
- 11:25-11:50 **Richard Clayton**: "Computational models of reentry and fibrillation in the heart"
- 11:50-12:15 **Sasha Panfilov** and **Kirsten ten Tusscher**: "Modelling cardiac arrhythmias in an anatomically based model of the human ventricles"
- 12:15-12:40 **Gernot Plank**: "Design Challenges posed by structurally and functionally realistic Virtual Heart Simulators"
- 12:40-13:45 *Lunch*
- 13:45-15:30 **Session 7**
Chair: **Richard Clayton**
- Breakouts / Discussions on possible follow-up activities and/or collaborative actions**
- 15:30-16:00 *Tea Break*
- 16:00-17:30 **Session 8**
Chair: **David Gavaghan**
- Discussions on possible follow-up activities and/or collaborative actions/ Concluding remarks**

Friday 18 May 2007

Morning *Departure*

European Science Foundation

Objectives of the ESF Standing Committee for European Medical Research Councils (EMRC)

The ESF Standing Committee for the European Medical Research Councils ([EMRC](#)) has overall responsibility for initiating and coordinating ESF's scientific activities in medical sciences and for providing expert advice on issues of science policy. It covers a broad range of disciplines and the Committee's main objectives range from promoting interactions between the biomedical and clinical research communities, through providing policy advice, to stimulating collaboration in emerging research areas.

The EMRC covers fields such as:

- Diagnostic and therapeutic medicine
- Neurobiology
- Immunology
- Clinical studies
- Communicable diseases
- Human genetics & functional genomics
- Medicinal biotechnology
- Public Health, etc.

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