



Launch of EU Flagship Project: IT Future of Medicine (ITFoM)

4 May 2011: The European Future Technologies (FET) Conference and Exhibition 2011 in Budapest on 4 May 2011 will mark the official launch of the futuristic FET Flagship Initiatives by Neelie Kroes, European Commissioner for the European Digital Agenda. FET Flagships are large-scale, science-driven and mission oriented initiatives that aim to achieve visionary technological goals. The scale of ambition will be over 10 years of coordinated effort, with a budget of up to one billion Euros for each of two Flagships. To prepare the launch of the FET Flagships, six Pilot Actions will be funded with 1.5 million Euros each for a 12-month period starting in May 2011; in the second half of 2012, two of the Pilots will be selected and launched as full FET Flagship Initiatives in 2013. As one of the six Pilot Actions, the Information Technology Future of Medicine (ITFoM) project brings together 26 partners and 20 associated members including academic institutes and private companies from 15 different countries. "They are like The Human Genome projects in which we participated", says Hans Lehrach, Director at the Max Planck Institute for Molecular Genetics and The Dahlem Centre for Genome Research and Medical Systems Biology in Berlin, Germany. Professor Lehrach is coordinator of the shortlisted ITFoM project, which aims to revolutionise our health care system.

ITFoM

In the past, innovation in Information and Communications Technology (ICT) and computing has been primarily driven by the requirements of "large" physics and a broad spectrum of commercial applications such as entertainment; medicine has played a relatively minor role. This, however, is set to change as the growing demands of data-rich, individualised medicine are likely to surpass those of all other ICT development fields. As data-intensive analysis and computer intensive modeling become common clinical practice, ICT capacity and organisation will become key limiting factors in medicine; this will result in a shift of resources from personnel-intensive to ICT-intensive applications. Clinical needs will be the driving force behind future ICT innovation.

Data-rich, individualised medicine poses unprecedented challenges for ICT - in terms of hardware, storage and communication. Making personalised medicine a reality will thus require fundamental advances in the computational sciences. It is with this in mind that ITFoM brings together world leading research groups from across Europe and beyond. ITFoM proposes a medicine based on computer models ('virtual patients') derived from molecular, physiological, anatomical and environmental data generated on every individual patients. These 'virtual patients' will then be used to identify individually optimised prevention/therapy schedules, minimising potential side effects of treatment regimes.

To develop this ICT-driven medicine of the future, ITFoM will prepare for the amalgamation of four major areas:

- The first is medicine itself - from specimen analysis and diagnosis provision to clinical practice and patient consent;
- The second concerns analytical techniques, covering functional genomics and imaging technology analyses on a routine basis;
- The third focuses on integration, developing tools required to incorporate the gathered clinical data, and generated analytical data into models that will inform relevant health providers;
- The fourth area involves the ICT developments required to tackle the immense computational challenges.

Professor Hans Westerhoff and members of the Manchester Centre for Integrative Systems Biology at The University of Manchester are leading the integration work package.

This is the first time that the ICT implications of worldwide-individualised patient care will be addressed in combination with genomics and medical requirements. Academic groups from a range of research backgrounds will join forces with their industry-based colleagues in making this proposal a reality. These research backgrounds include: exploring the potential of novel computing architectures; probabilistic programming languages; information processing paradigms; mathematical methods to

model the complexity of biological systems; statistical machine learning methods to predict probable patient responses to combinations of drugs; and algorithms to search for optimal combinations of complex interacting therapies.

The ultimate goals of ITFoM are twofold:

- The first goal is to give each patient's doctor the power to analyse a person's human genome at every stage of disease management – through diagnosis, treatment and follow-up. This will require a revolution in ICT technologies so that relevant computing, storage, networking and modeling technologies are developed;
- The second goal is to enable the connection of high throughput biomolecular characterization and clinical imaging technologies. Beneficiaries of this linkage will include: the patient and their doctor; drug researchers in both the discovery and development phases; epidemiologists attempting to analyse health trends; and policy- and decision-makers developing effective national and EU-wide health policy options and legislation. Enabling this connection will require a revolution in integrated information management and decision-making. This constitutes a fundamental transformation of biomedical science – from probability-based and empirical to evidence-based and knowledge-driven.

The project outcomes will enable the prediction of health, disease, therapy and its effects for individual patients and through application in the clinic will change the future of medicine.

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Editors Note:

FET11:

Within the EU Framework Programme for Research and Technological Development, Future and Emerging Technologies (FET) is funding frontier research based on radically new visions of what can be done and grounded in scientifically valid ideas.

FET acts as a pathfinder, open to new ideas and opportunities as they arise from within science or society; it increasingly relies on fresh synergies, cross-pollination and convergence with different scientific disciplines and with the arts and humanities. This transdisciplinary and high-risk research requires new attitudes and novel organisational models in research and education as the multidisciplinary creative process that is at the heart of future and emerging technologies is a constant challenge to conventional academic boundaries.

FET aims to go beyond the conventional boundaries of Information and Communication Technology (ICT) and is led by the European Commission, whom has set out to coordinate a Europe-wide research effort towards visionary technological targets in the form of the FET Flagship Initiatives.

FET Flagships are large-scale, science-driven and mission oriented initiatives that aim to achieve a visionary technological goal. They are:

- Proposed to be visionary research initiatives building on areas of established European excellence and oriented towards a unifying goal via a multidisciplinary approach nucleated from ICT future and emerging technologies;
- To generate waves of technological innovation and economic exploitation, ideally in a variety of areas and sectors, and would carry an important societal impact;
- Envisioned to run for at least 10 years, on a budget in the range of 100 million Euros per year and per initiative;

- Of such magnitude that they can only be realised through a federated effort of the different EC programmes, along with Member States, funding agencies, and where appropriate, global partners and industry.

The six FET Flagship Pilot Actions to be launched are:

- FuturICT - The FuturICT Knowledge Accelerator and Crisis-Relief System: Unleashing the Power of Information for a Sustainable Future.
- Graphene - Graphene Science and technology for ICT and beyond.
- Guardian Angels - Guardian Angels for a Smarter Planet.
- HBP - The Human Brain Project.
- ITFoM - IT Future of Medicine: a revolution in healthcare.
- RoboCom - Robot Companions for Citizens.

The initiatives are coordinated between national and EU programmes and present global dimensions to foster European leadership and excellence in frontier research. To prepare the launch of the FET Flagships, the 6 Pilot Actions are funded for a 12-month period starting in May 2011. In the second half of 2012 two of the Pilots will be selected and launched as full FET Flagship Initiatives in 2013.

The FET Conference and Exhibition 2011 aims to be the European forum for facilitating international cross-disciplinary dialogue and discussion on visions and challenges for frontier research in future and emerging information technologies. It is designed to be highly interactive and engaging a broad and multi-disciplinary community. It will involve key policy makers, and features a mix of panel discussion, keynote speakers, scientific sessions, and posters sessions.

Web: <http://www.fet11.eu/>

ICT & FP7:

Information and Communication Technologies (ICT) are critical to improve the competitiveness of European industry and to meet the demands of its society and economy.

ICTs have a catalytic impact in three key areas:

- Productivity and innovation, by facilitating creativity and management;
- Modernisation of public services, such as health, education and transport;
- Advances in science and technology, by supporting cooperation and access to information.

The objective of ICT research under the EU's Seventh Framework Programme (FP7), the EU's chief tool for research funding between 2007-2013, is to improve the competitiveness of European industry – as well as to enable Europe to master and shape the future developments of these technologies so that the demands of its society and economy are met.

The EU Member States have earmarked a total of 9.1 billion Euros for funding ICT over the duration of FP7; making it the largest research theme in the Cooperation programme, which is itself the largest specific programme of FP7 (with 64% of the total budget).

FP7 research activities will strengthen Europe's scientific and technology base and ensure its global leadership in ICT, help drive and stimulate product, service innovation and creativity through ICT use and ensure that ICT progress is rapidly transformed into benefits for Europe's citizens, businesses, industry and governments.

Web: http://cordis.europa.eu/fp7/home_en.html

ITFoM Partners:

Participating Organisations:

- Max Planck Institute for Molecular Genetics
- Medical University of Graz
- University College London
- Vereniging voor Christelijk Hoger Onderwijs Wetenschappelijk Onderzoek en Patientenzorg

- University of Manchester
- European Molecular Biology Laboratory
- Wellcome Trust Sanger Institute
- Kungliga Tekniska högskolan
- Imperial College London
- Maastricht University
- Consorzio Interuniversitario Risonanze Magnetiche di Metalloproteine Paramagnetiche (CIRMMP)
- International Prevention Research Institute
- Uppsala University
- University of Luxembourg / Luxembourg Centre for Systems Biomedicine
- University of Leicester
- ISC Intelligence in Science
- University of Auckland
- Universite de Geneve
- CENTRO NACIONAL DE ANÁLISIS GENÓMICO
- Siemens Aktiengesellschaft Oesterreich
- Alacris Theranostics GmbH
- Charite Universitätsmedizin Berlin
- Illumina
- Commissariat a l'energie atomique et aux energies alternatives

Associate Partners:

- Eidgenössische Technische Hochschule Zürich
- Ontario Institute for Cancer Research
- International Foundation for Computer Assisted Radiology and Surgery
- German Cancer Research Center
- The Microsoft Research – University of Trento Centre for Computational and Systems Biology
- IBM Research
- Roche Diagnostics
- Agilent Technology
- Life Technologies/Visigene
- Bruker Daltonik
- AB SCIEX
- Intel
- Oxford Nanopore Technologies
- Bayer Schering Pharma
- Janssen Pharmaceutica
- Institute for the Digital Economy
- HARVARD Medical School
- Dahlem Centre for Genome Research and Medical Systems Biology
- Tel Aviv University
- Xerox Research Centre Europe
- Microsoft Cooperation