Welcome to fet11, the European Future Technologies Conference and Exhibition, a unique forum dedicated to future and emerging information technologies. This event brings together scientists, policy-makers, science journalists, industrialists and other stakeholders to discuss the visions, challenges and the latest breakthroughs that will form the basis for tomorrow’s most exciting information and communication technologies.

Join the keynote talks and scientific sessions covering a wide range of topics, discover the latest results of ongoing projects in the hands-on exhibition and attend the launch of the flagship pilots by Neelie Kroes, and their kick-off sessions. Debate with keynote speakers and listen to ignite talks in the science café and meet with people from all over Europe in the poster sessions. And last but not least, treat yourself to a walk through the streets of the beautiful city of Budapest.

Welcome to “Science beyond fiction”!

“I am excited to see the creativity and the energy that fet11 brings together to discuss new challenges and opportunities in science and technology. Frontier and transformative research, as supported by FET, is a key element in Europe’s 2020 strategy, as it plants the seeds for innovation and creates the knowledge workers of tomorrow which we need in order to ensure sustainable growth and jobs for the time to come. Let us discuss together how we can set Europe on the right track to be leading, strong and competitive in this fascinating and highly inspiring EU research domain.”

Neelie Kroes, Vice-President of the European Commission

“This conference is a celebration of multidisciplinary cross-fertilisation at the highest scientific level. It shows how Europe is full of new talent, full of visionary and grand ideas, and how this can benefit our society in the future. I invite you to share in the engagement and creativity that define Science beyond fiction.”

Elisabeth Giacobino, Programme Conference co-chair

“fet11 is an event in that it brings together policy makers, media, and top level science. This is unique, and I invite you to take this opportunity to discuss future and emerging technologies, the great visions of today, and how we can bring the right people together to make breakthroughs that will change our lives and will enable us to face up to the big challenges of the 21st century.”

Rolf Pfeifer, Programme Conference co-chair
Programme

09:00 - 09:45  |  Keynote
Josh Bongard, University of Vermont, USA

How Evolution Shapes the Way Roboticians Think
Room: Pátria

Roboticians, by necessity, are keen students of biology: we hope to create machines that are as agile, adaptive and intelligent as the organisms we see around us. However, we tend to copy the end products of evolution (compliant limbs, neural circuits, legged gaits) rather than evolutionary processes themselves (selection pressures, developmental programs). In this talk I will show how re-creating evolution in a computer can allow us to design robots automatically, rather than trying to build them manually.

09:45 - 10:15  |  Plenary
Political Welcome address
Room: Pátria

Neelie Kroes, Vice President of the European Commission
Zoltán Cséfalvay, Minister of State for Economic Strategy and Parliamentary Affairs, Ministry for National Economy, Hungary
József Pálinkás, President of the Hungarian Academy of Sciences

10:15 - 10:20  |  Opening of the exhibition
Neelie Kroes, Vice President of the European Commission
Zoltán Cséfalvay, Minister of State for Economic Strategy and Parliamentary Affairs, Ministry for National Economy, Hungary

10:20 - 10:45  |  Coffee break
Rooms: Mirror corridor, Aula, Bartók corridor

10:45 - 11:00  |  Plenary
Perspective on Future and Emerging Technologies
Room: Pátria

Wolfgang Boch, Head of Unit, FET Proactive, European Commission
Aleš Fiala, Head of Unit, FET Open, European Commission

11:00 - 11:45  |  Plenary
Official Launch of FET-Flagship Pilots
Room: Pátria

fet11 will mark the official launch of the FET Flagship Pilots by Neelie Kroes, Vice President of the European Commission

FET Flagships are science-driven, large-scale research partnerships pursuing a unifying goal of achieving major scientific and technological breakthroughs over a time period of approximately 10 years. In order to prepare these FET Flagships, Neelie Kroes will launch six so-called FET-Flagship Pilots. Each will deliver a FET Flagship proposal with a complete feasibility, strategic research roadmap and an implementation description by mid-2012. At that time two candidates are to be selected from the six pilots. The two fully-fledged FET Flagships are expected to start in 2013.

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Speakers
Hans Lehrach, Max Planck Institute for Molecular Genetics, Berlin, Germany (ITFoM Flagship Pilot)
Jari Kinaret, Chalmers University of Technology, Sweden (GRAPHENE Flagship Pilot)
Steven Bishop, University College London, UK (FuturICT Flagship Pilot)
Henry Markram, EPFL, Switzerland (Human Brain Project Flagship Pilot)
Paolo Dario, Scuola Superiore Sant'Anna, Pisa, Italy (RoboCom Flagship Pilot)
Adrian Ionescu, EPFL, Switzerland (Guardian Angels Flagship Pilot)

Flagship Pilot Sessions
Six sessions are dedicated to introduce the FET Flagships Pilots on Thursday, 5 May.

11:45 - 13:00  |  Plenary
Panel Discussion on the topic “Large vs. Small”
Room: Pátria

“Large vs. Small” will be the motto of the moderated high-level panel discussion. Panellists will discuss, from scientists and policy makers’ perspectives, how grand scientific challenge driven research and open research agendas complement each other, and their future roles in the common framework on research and innovation.

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Panellists
Robert Madelin, Director General for Information Society and Media, EC
Jacques Stern, Agence Nationale de la Recherche, France
Norbert Kroo, ERC and Hungarian Academy of Sciences, Hungary
Paul Verschure, University Pompeu Fabra, Spain
Maria Da Graça Carvalho, Member of the European Parliament
Paul ’t Hoen, Eindhoven Technical University, The Netherlands
Jerzy Langer, Foreign Secretary, Academia Europaea, Poland

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Moderator
Clive Cookson, Financial Times
Building Future Information Technologies with Artificial Atoms in Diamond

14:30 - 16:00 - Room: Bartók

Find out how defects in diamonds can be put to use for the development of future nano-electronic devices. The session will be accompanied by a demonstration experiment to show how the magnetic resonance of the nitrogen-vacancy colour centre can be optically detected and applied to the measurement of weak magnetic fields.

--- Speakers
Jean-Francois Roch, École Normale Supérieure de Cachan, France: Overview of the field
Daniel Twitchen, Element 6, UK: The engineering of diamond material based on CVD growth, and defect incorporation
Christian Eggeling, Max-Planck-Institut für biophysikalische Chemie, Göttingen, Germany: Recent advances in optical ‘nanoscopy’
Fedor Jelezko, Universität Ulm, Germany: How NV centers can be used for sensing magnetic and electric fields

--- Session organiser
Jean-Francois Roch, École Normale Supérieure de Cachan, France

Artificial Synapses: Memristors

14:30 - 16:00 - Room: Liszt

The memristor promises to revolutionise non-conventional neuromorphic computing.

40 years after its invention find out how these electronic nano-devices could hold the key to the future development of hardware Artificial Neural Networks (ANNs), what can be done with them and whether they are really the best opportunity for developing large scale, intelligent computing systems.

--- Speakers
Julie Grollier, Unité Mixte de Physique CNRS-Thales, Palaiseau, France
Bernabé Linares-Barranco, IMSE-CNMC-CSIC, Sevilla, Spain: How to compute with memristors: dedicated bio-inspired architectures
Themis Prodromakis, Imperial College London, UK: Titanium di-oxide memristor
Vincent Garcia, CNRS, Palaiseau, France: Ferroelectric memristor
André Chanthbouala, Thales-TRT, Palaiseau, France: Spintronic memristor
Yusuf Leblebici, EPFL, Switzerland: Silicon nanowire memristors and their applications for synaptic functions
Christian Gamrat, CEA List-Leti, Saclay, France: Memristor: the ideal Synapse

--- Session organiser
Julie Grollier, Unité Mixte de Physique CNRS-Thales, Palaiseau, France

Computational Social Choice

14:30 - 16:00 - Room: Mozart

How should we aggregate the preferences of a group of individuals so as to arrive at an adequate collective preference, which can serve as the basis for making acceptable group decisions?
This session will provide an introduction to the new field of Computational Social Choice and demonstrate how it can contribute to addressing some of the major challenges associated with realising the next generation of decision making technologies in areas such as e-governance, electronic commerce, the semantic web, school choice, or transplant organ allocation systems.

--- Speakers
Peter Biro, Institute of Economics, Hungarian Academy of Sciences
Ioannis Caragiannis, Department of Computer Engineering and Informatics, University of Patras, Greece
Britta Dorn, Faculty of Mathematics and Economics, University of Ulm, Germany
Ulle Endriss, Institute for Logic, Language and Computation, University of Amsterdam, The Netherlands
Jérôme Lang, LAMSADÉ Laboratory, CNRS and Paris-Dauphine University, France
Francesca Rossi, Department of Pure and Applied Mathematics, University of Padova, Italy

--- Session organiser
Ulle Endriss, University of Amsterdam, The Netherlands

Evolvability of Natural and Artificial Systems
14:30 - 16:00 - Room: Pátria

In what sense is natural evolution open-ended and can this be replicated in artificial evolution?

A panel of experts will attempt to answer this and other questions as part of a session on the evolvability of natural and artificial systems.

--- Speakers
Dario Floreano, Laboratory of Intelligent Systems, EPFL, Lausanne, Switzerland
Mauro Santos, Department of Genetics and Microbiology, Autonomous University of Barcelona, Spain
Chrisantha Fernando, School of Informatics, University of Sussex, Brighton, UK
George Kampis, Department of the Philosophy of Science, Eötvös University, Budapest, Hungary

--- Session organiser
Eörs Szathmáry, Collegium Budapest, Hungary

Is the age of computation yet to begin?

The theory of classical universal computation was laid down in 1936, was implemented within a decade, became commercial within another decade, and dominated the world’s economy half a century later. This success story relied on progress in technology. As computers become faster they had to become smaller. The history of computer technology has involved a sequence of changes from one type of physical realisation to another - from gears to relays to valves to transistors to integrated circuits and so on. The unavoidable step to the quantum level will be one in this sequence; but it promises something more exciting as well. For the first time since the invention of the general purpose computer, a change in underlying hardware can give computers qualitatively new functionality. Quantum theory is already important in the design of microelectronic components. Soon it will be necessary to harness quantum theory, rather than simply take it into account. I will describe our quest to understand quantum theory, our efforts to develop quantum technology to support quantum computation, and our surprise and excitement once we discovered that nature already employs coherent quantum phenomena in biological systems. There is so much potential in this fundamentally new way of harnessing nature that it appears as though the age of computation has not yet even begun!

Gábor Prószéky, MorphoLogic, Hungary

The (hopefully near) future of human language technologies

Today’s language technology applications usually rely on either human-designed rules (used sequentially by computers) or large amount of sequential data, that is, spoken or textual corpora. Today, computer modeling of human language abilities does not use parallel methods. In current natural language processing paradigms the notion of parallelism is almost totally missing. Multi-core processors are nowadays available even in commercial computers. On the other hand, results of brain research are quite far from existing language technology applications. Applying parallelism would lead us to a more realistic architecture for language understanding, with an increased processing speed.

18:00 - 19:00

Poster Session 1
Room: Pátria (see page 16)

20x20 presentations - Session 1
Science Café (see page 15)

20:00 - 22:00

Reception at the Palace of Miracles
Address: Budapest II., Fény utca 20-22.
Buses start from the Novotel hotel parking at 19:15

www.fet11.eu
Mathematical models to help understand developmental biology and cancer

Rodney Douglas, ETH Zürich, Switzerland

As the understanding of cellular regulatory networks grows, system dynamics and behaviors resulting from feedback effects of such systems have proven to be sufficiently complex so as to prevent intuitive understanding. Mathematical modeling in engineering and in physics or chemistry has traditionally sought to extrapolate from existing information and underlying principles to create complex descriptions of various systems, which could be analyzed or simulated, and from which further abstractions could be made. However, in studying biological systems, often only incomplete abstracted hypotheses exist to explain observed complex patterning and functions.

The challenge has become to show that enough of a network is understood to explain the behavior of the system. Mathematical modeling must simultaneously characterize the complex and non-intuitive behavior of a network, while revealing deficiencies in the model and suggesting new experimental directions. In this talk, we describe the process of modeling two biological networks: planar cell polarity in development, and treated regulatory networks in breast cancer. We demonstrate the use of the mathematical models, both in understanding the system behavior, and in suggesting new treatments.

Constructive Cortical Computation

Rodney Douglas, ETH Zürich, Switzerland

During the past century ever more sophisticated methods have been developed for constructing and programming computing and manufacturing machines. However, these methods are essentially forward processes that depend on intelligent human designers and programmers. They stand in stark contrast to Biology’s methods of self-construction used to evoke the flexible information processor that is the mammalian neocortex. Understanding this radically different approach that uses algorithmic self-programming and construction could have enormous consequences for future computing and manufacturing technologies. In this talk we describe progress towards understanding these principles through detailed simulation of the development of the neocortex.

11:00 - 12:30 Parallel Sessions

Guardian Angels for a Smarter Life (FET Flagship Pilot)

Discover the key concepts and technologies of Guardian Angels autonomous systems-of-systems featuring sensing, computation, and communication beyond human capabilities. Find out how Guardian Angels will provide assistance to people from infancy to old age. Foreseen are individual health support, monitoring of ambient conditions for environmental threats, and emotional man-machine interfaces. A series of selected talks will present the features of systems-of-systems and the major challenges of zero power requirements as these Guardian Angels will scavenge for energy and they will exploit ultra low power technologies. Applications scenario will be summarized by a short movie.

Speakers

Hervé Fanet, CEA-LETI, France: Technological platform: novel functionality and disruption versus reality check
Francis Balestra, SINANO, France: Fundamental scientific challenges and limits for ultra low energy computation
Christofer Hierold, ETHZ, Switzerland: Ultra low power nano sensors
Enrico Sangiorgi, IUNET, Italy: Fundamental scientific challenges and limits for energy harvesting
Kevin Sivula, EPFL, Switzerland: Energy conversion inspired by nature
Georges Gien, KUL, Belgium: Design strategies for ultra low power systems-of-systems
Daniel Bertrand, HiQScreen, Switzerland: Guardian Angels: breakthrough toward e-Health
Robert Plana, CNRS, France: Energy efficient communications
Adrian Ionescu, EPFL, Switzerland: One billion Euros for Zero Power Guardian Angels?

Robocom - The Dream of Robot Companions for Citizens (FET Flagship Pilot)

Discover how a new generation of robot technologies is working to create Robot Companions to help out at home, at work and in hospitals. With their soft bodies and new levels of perceptual, cognitive and emotive capabilities, Robot Companions will be aware of their physical and social world and respond accordingly.

The session - in form of a "live science talk-show" will feature real robots as well as video and other multi-media material to demonstrate the Robot Companions vision.

Speakers

Paolo Dario, Scuola Superiore Sant’Anna, Pisa, Italy
Barbara Mazzolai, Center of MicroBioRobotics, IIT@SSSA, Italy
Giorgio Metta, Italian Institute of Technology, Italy
Pieter Roelfsema, University of Amsterdam, Netherlands Institute for Neuroscience, The Netherlands
Rolf Pfeifer, Department of Informatics, ETH Zurich, Switzerland
Giulio Sandini, Italian Institute of Technology, Italy
Heaven and Hell: Visions for Pervasive Adaptation

11:00 - 12:30 - Room: Brahms

User heaven or user hell? Technology experts in artificial intelligence, adaptive systems, ambient environments and pervasive computing discuss the technological benefits and useful applications of pervasive adaptation, but also its potential threats.

Based on themes from the PerAda book ‘This Pervasive day’, and featuring authors from the PerAda projects, it will appeal to anyone interested in the personal, social, economic and political impacts of pervasive, ubiquitous and adaptive computing.

Speakers
Ben Paechter, Edinburgh Napier University, UK
Jeremy Pitt, Imperial College London, UK
Nikola Serbedzija, Fraunhofer FIRST, Germany
Katina Michael, University of Wollongong, Australia

The session will be chaired by Ben Paechter, Edinburgh Napier University, UK

Speakers
Ben Paechter, Edinburgh Napier University, UK
Jeremy Pitt, Imperial College London, UK
Nikola Serbedzija, Fraunhofer FIRST, Germany
Katina Michael, University of Wollongong, Australia

Complex Systems for an ICT-enabled Energy System

11:00 - 12:30 - Room: Pátria

Learn more about the ways in which Complex Systems Science has a role to play in the modelling, control, simulation, and governance of the future Energy System. This session aims to lay the foundations for the creation of a new research community able to formulate innovative approaches in the area of energy system modelling and governance, paving the way for future European-scale initiatives.

Speakers
Pablo Viejo, European Institute for Energy Research, Germany
Carlos Álvarez, The Innaxis Research Institute, Madrid, Spain
Nikos Hatzigiargyriu, National Technical University of Athens, Greece

Speakers
Luc Gentet, EPFL, Switzerland
Michele Giugliano, University of Antwerp, Belgium
Micha Spira, Hebrew University of Jerusalem, Israel
John Simeral, Brown University, USA

Speakers
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Michele Giugliano, University of Antwerp, Belgium
Micha Spira, Hebrew University of Jerusalem, Israel
John Simeral, Brown University, USA
Thursday 5 May 2011

Programme

14:00 - 15:30  Parallel Sessions

The FuturICT Knowledge Accelerator: Creating Socially Interactive Information Technologies for a Sustainable Future (FET Flagship Pilot)

14:00 - 15:30 - Room: Bartók  Parallel Session

Experts from the FuturICT flagship pilot project will discuss its aims to understand and manage complex, global, socially interactive systems, with a focus on sustainability and resilience.

Integrating ICT, Complexity Science and the Social Sciences will create a paradigm shift, facilitating a symbiotic co-evolution of ICT and society.

--- Speakers
Steven Bishop, University College London, UK
David Price, University College London, UK
Roland Siegwart, ETH Zurich, Switzerland
Dirk Helbing, ETH Zurich, Switzerland
Paul Lukowicz, University of Passau, Germany
Rosaria Conte, Institute of Cognitive Sciences and Technologies, Rome, Italy
László Barabási, University of Notre Dame, Indiana, USA

ITFoM - IT Future of Medicine (FET Flagship Pilot)

14:00 - 15:30 - Room: Lehár  Parallel Session

As data-intensive analysis and computer intensive modelling technologies become common clinical practice, IT capacity and organization will become key limiting factors in medicine. Indeed the development of a new, data-rich, individualised medicine, likely to surpass the demands of all other IT development fields.

Experts in the field will outline what is being done to develop this IT driven, data rich, individualised medicine of the future.

--- Speakers
Hans Lehrach, Max Planck Institute for Molecular Genetics, Berlin, Germany
Hans Westerhoff, University of Manchester, UK
Kurt Zatoloukal, Medical University of Graz, Austria
Tim Hubbard, Wellcome Trust Sanger Institute, UK
Angela Brand, Maastricht University, The Netherlands
Peter Boyle, International Prevention Research Institute, Lyon, France

--- Session organiser Hans Lehrach
Max Planck Institute for Molecular Genetics, Berlin, Germany

Robots as Companions: What can we Learn from Servants and Companions in Litterature, Theater, and Film?

14:00 - 15:30 - Room: Brahms  Parallel Session

Truffaldino, Sancho Pansa, Figaro, Jeeves, Schwejek, and many, many more. Authors, dramatists, film makers have given us rich pictures of servants and their masters. The organisers invite all conference participants to experience and to explore their influence on and significance for the future of social robotics.

--- Speakers
Zsófia Ruttkay, University of Twente, The Netherlands
Markus Krajewski, Bauhaus-University, Weimar, Germany
Virgil Widrich, University of Applied Arts, Vienna, Austria

--- Session organiser
Robert Trappl, Austrian Research Institute for Artificial Intelligence, Vienna, Austria

Biological and Chemical Information Technology: Bottom-Up Chemistry and Synthetic Biology

14:00 - 15:30 - Room: Liszt  Parallel Session

Biological and chemical information technology (bio/chem IT) is one of the most vibrant and important emerging research domains in recent years, especially with the growth of research into systems and synthetic biology, artificial cells, chemical information processing, micro-electro-mechanical systems, nanotechnology and artificial intelligence. This session will present scientific results in the field, focusing on bottom-up chemistry and synthetic biology. Particular attention will be paid to bio/chem IT outside Europe, through the presentation of our plenary speaker.

--- Speakers
Farren Isaacs, Yale University, US
Steen Rasmussen, University of Southern Denmark, Denmark
John McCaskill, Ruhr University, Bochum, Germany
Peter Dittrich, Friedrich Schiller University, Jena, Germany

--- Session organiser
Martyn Amos, Manchester Metropolitan University, UK

Brain-Chip Interfaces: The Present And The Future

14:00 - 15:30 - Room: Mozart  Parallel Session

Brain-chip interfacing is becoming a key and powerful technology with multiple applications to investigate neuronal and brain function and to develop new devices for therapy of neurological diseases.

This session focuses on recent achievements in Brain-Chip Interfacing and provides a general overview of world-wide progress in the field.

--- Speakers
Roland Thewes, Technical University of Berlin, Germany
Rocland Huys, IMEC, Leuven, Belgium
Stefano Vassanelli, University of Padova, Italy
Paul Verschure, University Pompeu Fabra, Barcelona, Spain
Wolfgang Eberle, IMEC, Leuven, Belgium

--- Session organiser
Stefano Vassanelli, University of Padova, Italy
Quantum Effects in Biology and their Applications to Light Harvesting and Sensing
14:00 - 15:30 - Room: Pátria

What is the role that quantum effects play in biological functions, and how can this understanding help us develop novel devices, namely more efficient solar cells and finer sensing?

Leading experts in the field address the question of detecting and understanding the role of quantum effects in biological systems, including its more fundamental and theoretical aspects.

--- Speakers
Greg Engel, University of Chicago, USA
Martin Plenio, University of Ulm, Germany
Luca Turin, BSRC Fleming, Athens, Greece

--- Session organiser
Yasser Omar, CEMAPRE, ISEG, Technical University of Lisbon, Portugal

15:30 - 16:00 Coffee break
Rooms: Mirror corridor, Aula, Bartók corridor

16:00 - 17:30 Parallel Sessions

The Human Brain Project (FET Flagship Pilot)
16:00 - 17:30 - Room: Lehár

Find out how the Human Brain Project is working to create the informatics, modeling and supercomputing technologies required to build biologically detailed models of the human brain.

The HBP team will present the project’s goals, rationale and strategy and explore its potential impact, including the possibility of a new generation of brain-enabled robots.

--- Speakers
Henry Markram, EPFL, Switzerland: Introducing the HBP
Sten Grillner, Karolinska Institutet, Sweden: Brain simulation for a new kind of neuroscience
Thomas Lippert, Jülich Supercomputing Centre, Germany: Brain simulation and the future of supercomputing
Richard Frackowiak, CHUV, Switzerland: Brain simulation for the diagnosis and treatment of brain disease
Kris Verstreken, IMEC, Leuven, Belgium: New interfaces to the brain
Richard Frackowiak, CHUV, Switzerland: Brain simulation for the diagnosis and treatment of brain disease
Alois Knoll, Technical University Munich, Germany: Brain simulation and robotics

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Thomas Lippert, Jülich Supercomputing Centre, Germany: Brain simulation and the future of supercomputing
Richard Frackowiak, CHUV, Switzerland: Brain simulation for the diagnosis and treatment of brain disease
Kris Verstreken, IMEC, Leuven, Belgium: New interfaces to the brain
Alois Knoll, Technical University Munich, Germany: Brain simulation and robotics

Graphene-Driven Revolutions in ICT and Beyond (FET Flagship Pilot)
16:00 - 17:30 - Room: Bartók

Find out how graphene has the potential to make a profound impact in ICT. Integrating graphene components with silicon-based electronics, and gradually replacing silicon in some applications, allows not only substantial performance improvements, but also enables completely new applications.

The session will feature presentations on graphene science and technology and on the organization of a pilot project to develop the research agenda for the flagship initiative: Graphene-Driven Revolutions in ICT and Beyond.

--- Speakers
Andrea Ferrari, Cambridge University, UK
Jari Kinaret, Chalmers University, Sweden
Vladimir Falko, Lancaster University, UK
Jani Kivioja, NOKIA, Finland

--- Session organiser
Jari Kinaret, Chalmers University, Sweden

The City in Cinema: How Popular Culture can Influence Research Agendas
16:00 - 17:30 - Room: Brahms

Where can researchers find inspiration for the transformative applications, concepts and infrastructures that they believe will characterise the next decade?

One approach to predicting the future is to reflect on the visions of the future that have been proposed in the past, and question how these visions are actively shaping our present. This session looks at the way in which cinema’s portrayal of the future city has been a source of inspiration for scientists, technologists and commentators.

--- Speakers
Michael Smyth, Edinburgh Napier University, UK
Ingi Helgason, Edinburgh Napier University, UK
Ivica Mitrovi, Arts Academy, University of Split, Croatia
Gianluca Zaffiro, Telecom Italia, Torino, Italy

--- Session organiser
Ingi Helgason, Edinburgh Napier University, UK
Talking with Chemicals: Challenges of Biomimetic Infochemical Communication

**16:00 - 17:30 - Room: Liszt**

Find out about a new form of biomimetic chemical communication with a demonstration involving both robots and insects. Speakers will provide an overview of the biological and technological inspiration for a project that aims to demonstrate how this new class of technology could be realized. Hear the latest advances and convergence of expertise in the fields of pheromone biochemistry, molecular biology, neuroscience, microengineering and bioelectronics.

**Speakers**
- **Bill Hansson**, Max Planck Institute of Chemical Ecology, Jena, Germany
- **Paul Verschure**, University Pompeu Fabra, Barcelona, Spain
- **Shannon Olsson**, Max Planck Institute of Chemical Ecology, Germany
- **Zoltan Racz**, University of Warwick, Coventry, UK

**Session organiser**
- **Zoltan Racz**, University of Warwick, Coventry, UK

Soft Robotics: Theories and Technologies

**16:00 - 17:30 - Room: Pátria**

In contrast to the conventional robotics research, the investigations of Soft Robotics focus on the use of soft and deformable materials in the robot bodies, dynamic changes of morphology and mechanical passive dynamics for agile motor capabilities, and sensory-motor control for gentle system-environment interactions. In this session, we discuss how Soft Robotics has been developed in the last decades, what progress have been made and what stage are we at now. This session brings together leading scientists to discuss strategic research collaborations together with important theoretical and technological issues which will lead to high impact applications and innovation in the near future.

**Plenary speaker**
- **Hod Lipson**, Cornell University, USA

**Showcase of technologies**
- **Cecilia Laschi**, Scuola Superiore Sant’Anna, Italy
- **Dario Floreano**, EPFL, Switzerland
- **Fumiya Iida**, ETH Zurich, Switzerland

**Panel discussion**
- **Paolo Dario**, Scuola Superiore Sant’Anna, Italy
- **Rolf Pfeifer**, University of Zurich, Switzerland
- **Josh Bongard**, University of Vermont, USA

**Session organiser**
- **Fumiya Iida**, Bio-Inspired Robotics Lab, ETH Zurich, Switzerland

Agent Based Modeling

**16:00 - 17:30 - Room: Mozart**

What are the achievements and possibilities for Agent Based Modeling, as applied in the context of social sciences, economics and finance, and what are its weak points?

Leading exponents in the field will lead a theoretical discussion while the demands and expectations of practitioners and decision makers will be highlighted by a senior European official.

**Speakers**
- **Nigel Gilbert**, University of Surrey, UK
- **Domenico Delli Gatti**, Catholic University of Milan, Italy
- **Doyne Farmer**, Santa Fe Institute, New Mexico, USA
- **Werner Röger**, DSGE modeling unit, Directorate General for Economic and Financial Affairs, European Commission

**Session organiser**
- **Imre Kondor**, Eötvös University, Budapest, Hungary

Conference Dinner: Boat Európa

*Address: Budapest I., Szilágyi Dezső rakpart/quay*

Buses start from the Novotel hotel parking at 19:15
09:30 - 10:15  **Keynote**

**John Pendry**, Imperial College London, UK

**The Science of Invisibility**

**Room: Pátria**

Refractive materials give limited control of light: we can fashion lenses, and construct waveguides, but complete control is beyond simple refracting materials. Ideally we might wish to channel and direct light as we please just as we might divert the flow of a fluid.

Manipulation of Maxwell’s equation shows that we can achieve just that and metamaterials open the door to this new design paradigm for optics, providing the properties required to give complete control of light. One potential application would be to steer light around a hidden region, creating a cloak of invisibility.

10:15 - 10:45  **Coffee break**

**Rooms: Mirror corridor, Aula, Bartók corridor**

10:45 - 12:15  **Parallel Sessions**

**Sustainable ICT: Micro and Nanoscale Energy Management**

**10:45 - 12:15 - Room: Lehár**  **Parallel Session**

ICT energy issues form the basis of this session which brings together international experts interested in the realization of efficient low-power ICT devices.

What are the basic mechanisms behind the heat production and how can we take advantage of the fluctuations instead of avoiding them? The aim is to understand the energy management physical mechanisms at nanoscale with a view to setting the bases for a new thermodynamics of ICT devices.

--- Speakers  
Leonardo Alfonsi, European Science Events Association, Austria  
Adrian Ionescu, Ecole Politechnique Fédérale de Lausanne, Switzerland  
Fabio Marchesoni, Università di Camerino, Italy  
Bruno Michel, ETH Zurich / IBM Research, Switzerland  
Eric Pop, Univ Illinois, & Beckman Inst, Urbana, USA  
Georgios Fagas, Tyndall Institute, Ireland  
Ralph Stübner, European Commission, ICT-FET Proactive

--- Session organiser  
Luca Gammaitoni, Università di Perugia, Italy

**Pervasive Socio-Technical Fabric**

**10:45 - 12:15 - Room: Brahms**  **Parallel Session**

Leading experts in their field outline the challenges to pervasive systems research as well as looking ahead to the next grand challenge: Pervasive Socio-Technical Fabric.

The session will also include a discussion on the Pervasive Adaptation Research Agenda Book which has been compiled by collecting about 100 research issues and challenges from not only, outstanding European researchers, but also from the whole worldwide scientific community, as well as from industrial stakeholders.

The proposed networking session will take the form of a live debate, primed by short (7 minute) talks by four experts in the field who will each outline research challenges towards Socio-technical Pervasive Fabric from their own background.

--- Speakers  
Norbert Streitz, Smart Future Initiative, Germany  
Albrecht Schmidt, University of Duisburg-Essen, Germany  
Nigel Davies, University of Arizona, US and Lancaster University, UK  
Alois Ferscha, University of Linz, Austria

--- Session organiser  
Alois Ferscha, University of Linz, Austria
Vision Restoration and Vision Chip Technologies 10:45 - 12:15 - Room: Liszt

Find out how bionic vision devices could help blind people to regain some of their sight. This session will look at how retinal implants, bionic glasses and the genetic modification of retinal cells to recreate light sensitivity can all help with vision restoration.

The session will also look at how vertically integrated vision chip technology is bringing about a revolution in the design of artificial vision systems.

The session is jointly chaired by Ákos Kusnyerik and Ákos Zarándy.

--- Speakers
Botond Roska, Friedrich Miescher Institute for Biomedical Research, Switzerland
Ákos Kusnyerik, Rózsakert Medical Center, Hungary
Angel Rodríguez-Vázquez, Instituto de Microelectronicas de Sevilla - CNM-CSIC, Spain
Kristof Karacs, MTA SZTAKI, Budapest, Hungary

--- Session organiser
Ákos Zarándy, MTA SZTAKI, Budapest, Hungary

Innovation, Sustainability and ICT
10:45 - 12:15 - Room: Mozart

Cascades of innovation can take society in directions that nobody intended beforehand and that are very hard to adjust en route. They combine force with a lack of control in a way that is unsettling even when the effects seem mostly positive, but can be disastrous when their destructive potentials dominate.

Find out what steps are being taken to consolidate a deeper understanding of the dynamics of innovation cascades and the implications of this understanding for the design of innovation policy processes that monitor them.

--- Speakers
David Lane, University of Modena and European Center for Living Technology, Italy
Sander van der Leeuw, School of Sustainability, Arizona State University and Santa Fe Institute, USA: Core ideas of INSITE on Innovation and Sustainability
Claes Andersson, Chalmers Institute of Technology, Sweden: Modeling pragmatics for innovation policy
Filippo Addarii, Euclid Network, London, UK
Alberto Massini-Zannetti, TheHub, London and Milano, Italy: Social innovation

--- Session organiser
David Lane, University of Modena, Italy

Robots Interacting with Humans – Embodied Intelligence for Better Robots
10:45 - 12:15 - Room: Pátria

Can robots move towards becoming a companion in everyday life? Experts in the field explore design and control ideas for a new generation of robots that can co-exist and co-operate with people and get much closer to the human manipulation and locomotion performance than today’s robots do.

--- Speakers
Alin Albu-Schäffer, DLR, German Aerospace Center, Germany
Dino Accoto, Campus Bio-Medico University, Roma, Italy
Antonio Bicchi, University of Pisa, Italy
Maria Chiara Carrozza, Scuola Superiore Sant’Anna, Pisa, Italy
Herman van der Kooij, Twente University, Enschede, The Netherlands
Bram Vanderborght, Vrije Universiteit Brussel, Belgium

--- Session organiser
Alin Albu-Schäffer, DLR, German Aerospace Center, Oberpfaffenhofen, Germany

Keynote
12:15 - 12:45
Jean-Philippe Bouchaud, Capital Fund Management, ESPCI Paris Tech, Ecole polytechnique, France

The endogenous dynamics of markets: price impact and feedback loops

We review the evidence that the erratic dynamics of markets is to a large extent of endogenous origin, i.e. determined by the trading activity itself and not due to the rational processing of exogenous news. In order to understand why and how prices move, the joint fluctuations of order flow and liquidity – and the way these impact prices – become the key ingredients. Impact is necessary for private information to be reflected in prices, but by the same token, random fluctuations in order flow necessarily contribute to the volatility of markets. Our thesis is that the latter contribution is in fact dominant, resulting in a decoupling between prices and fundamental values, at least on short to medium time scales. We argue that markets operate in a regime of vanishing revealed liquidity, but large latent liquidity, which would explain their hyper-sensitivity to fluctuations. More precisely, we identify a dangerous feedback loop between bid-ask spread and volatility that may lead to microliquidity crises and price jumps. We discuss several other unstable feedback loops that should be relevant to account for market crises: imitation, unwarranted quantitative models, pro-cyclical regulation, etc.
14:45 - 15:15 | Plenary

Awards ceremony

Room: Pátria

Awards will be handed over to the 3 best exhibits and posters resulting from the vote of the conference participants.

15:15 - 15:30 | Plenary

Political closing address

Room: Pátria

Zoran Stančić, Deputy Director General for Information Society and Media, European Commission
Tamás Fellegi, Minister for National Development, Hungary

15:30 - 16:00 | Plenary

Closing performance

Room: Pátria

“tanGO - Touching Music”, an artistic performance for dancers and voice, Casa Paganini – InfoMus, University of Genoa.
The Science Café is the casual meeting place for discussions at fet11. Anyone can participate, or even start their own discussion. The Science Café will be opened during the whole conference and host inspiring discussions alternating with ignite-style 20x20 presentations on Future and Emerging Technologies.

**Wednesday 4 May 2011**

14:00 - 14:45 | Discussion with
Josh Bongard, *University of Vermont, USA*

“Crowdsourcing Science(?)”
How the wisdom of the crowd can be harnessed to invigorate robotics research in particular, and 21st century science in general?

15:00 - 15:45 | Discussion with
Robert Madelin, *Director General for Information Society and Media, EC*

“What more should be done to empower Young Scientists in Europe?”

**Thursday 5 May 2011**

10:45 - 11:30 | Discussion with
Artur Ekert, *University of Oxford, UK and National University of Singapore*

“Can information technology avoid quantum revolution?”

**Friday 6 May 2011**

13:15 - 14:00 | Discussion with
Gábor Prószéky, *Morphologic, Hungary*

“Research and business: between the lab and the start-up”

The Science Café is animated with the support of László Bacsárdi and István Lám from Budapest University of Technology and Economics.
Poster Session 1

Wednesday 4 May 18:00 - 19:00

Room: Pátria

1 Model of perception by the electric sense: application for the navigation of underwater vehicles
Frédéric Boyer et al.

2 Weakly electric fish as models for underwater robots: the use of active electrolocation for the perception of 3-dimensional objects in complex environments
Katharina Behr et al.

3 From Fermat’s principle to invisibility
Janos Perczel et al.

4 Activity recognition in opportunistic sensors environments
Daniel Roggen et al.

5 Theoretical simulations on electric properties of CNT-Me and GNR-Me interconnects using effective media approach
Yuri Shunin et al.

6 Self-aware pervasive service ecosystems
Franco Zambonelli et al.

7 Unipolar nitride photonic devices
Charlotte Croquet et al.

8 Automated dialogue-based ontology elicitation
Eugenio Costetchi et al.

9 A role for spiral waves in visual attention?
Nick Wilkinson et al.

10 Affordable supercomputing for data mining applications
Andras Benczur et al.

11 VIACTORS - Variable Impedance ACtuation systems embodying advanced interaction behaviors
Alessandra Parravicini et al.

12 TRAMS Project: variability and reliability of RAM memories in sub-22nm bulk-CMOS technologies
Antonio Rubio et al.

13 Terrestrial locomotion modeling bio-inspired by elongated animals
Mathieu Porez et al.

14 Artificial bivalves
Daniel Germann et al.

15 Applying simulation & computation to innovation research
Petra Ahrweiler et al.

16 Current trends for 4d space-time topology for semantic flow segmentation
Kresimir Matkovic et al.

17 Understanding Science 2.0: crowdsourcing and open innovation in the scientific method
Thierry Buecheler et al.

18 A novel multisite silicon probe for laminar neural recordings
Richárd Fiáth et al.

19 Mass production of silicon MOS-SETs: can we live with nanodevices’ variability?
Marc Sanquer et al.

20 Reflective Assistance - Pervasive Adaptation in Real Life Computing
Andreas Schroeder et al.

21 From Sensorimotor Knowledge to Abstract Symbolic Representations
Marek Rucinski et al.

22 Electrically controllable magnetoresistance switching in multifunctional organic based spin-valve devices
Mirko Prezioso et al.

23 Organic memristor based on the composite materials: conducting and ionic polymers gold nanoparticles and graphenes
Konstantin Gorshkov et al.

24 Adaptive properties of stochastic memristor networks: a computational study
Rodrigo Sigala et al.

25 Towards a THz (terahertz) room-temperature integrated parametric source
Giuseppe Leo et al.

26 Ubiquitous tracking in the medical environment
Tamas Haidegger et al.

27 BOVINOSE: pheromone-based sensor system for detecting estrus in dairy cows
Wim Wiegerinck et al.

28 Supermodeling by combining imperfect models
Ljupco Kocarev et al.

29 Quilt: interactive publications
Piotr Nowakowski et al.

30 eMorph: towards neuromorphic robotic vision
Chiara Bartolozzi et al.

31 This pervasive day: creative interactive methods for encouraging public engagement with FET research
Ingi Helgason et al.
32 THz detection by thermopile antenna
Béla Szentpáli et al.

33 Computational modeling of visual selective attention
Kleanthis Neokleous et al.

34 FOCUS: a way towards single molecule activation and computing
Donato Ramani et al.

35 High channel count electrode system to investigate thalamocortical interactions
Domonkos Horvath et al.

36 The shanghAI lectures: connecting continents in cyberspace
Nathan Labhart et al.

37 Information recording in photosensitive photonic cholesteric liquid crystals
Andro Chanishvili et al.

38 Infants and iCubs: applying developmental psychology to robot shaping
Mark Lee et al.

39 The state trajectory of cell using renyi entropy coefficients
Jan Urban et al.

40 Analyzing the quantum based satellite communications
Laszlo Bacsardi et al.

41 Apparent moving sensation recognition for prosthetic applications
Alejandro Hernandez Arieta et al.

42 Scaling laws in robotics
Konstantinos Dermitzakis et al.

43 The SCENIC project: environment-aware sound sensing and rendering
Augusto Sarti et al.

44 CURVACE - CURVed artificial compound eyes
Ramon Pericet-Camara et al.

45 Medical visual information retrieval based on multi-dimensional texture modeling
Adrien Depeursinge et al.

46 Flexible rehabilitation robots through multiple intention detection
Stefano Marco Maria De Rossi

47 Co-evolution of morphology and control of a wearable robot for locomotion
Jesse van den Kieboom et al.

48 Actuation and sensing properties of electroactive polymer whiskers
Nicolas Festin et al.

49 Adiabatic quantum computing simulations using GPGPU
Salvador Venegas-Andraca et al.

50 Expression of insect olfactory receptors for biosensing on SAW sensors
Melissa Jordan et al.

51 How to harness the dynamics of a soft body
Kohei Nakajima et al.

52 Learning a curvature dynamic model of an octopus-inspired soft robot arm using flexure sensors
Naveen Kuppuswamy et al.

53 Photonic nanoarchitectures in butterfly scales allowing species identification
Gábor Piszter et al.

54 Correlations topology and efficiency in LCHIII
Paolo Giorda et al.

55 Nonlinear kinetic energy harvesting
Flavio Travasso et al.

56 Building simple formations in large societies of tiny mobile artifacts
Bastian Degener et al.

57 Quantum Theory-Inspired Search
Massimo Melucci et al.

58 Potential of social modelling in socio-technical systems
Kashif Zia et al.

59 Physical measurement of brain perception abilities. Foundations of a working methodology for the design of “intelligent” beings
Sara Lillian Gonzalez Andino

60 Adhesion mechanisms inspired by octopus suckers
Francesca Tramacere et al.

61 Certified complexity
Dominic Mulligan et al.

62 A chemoemitter system mimicking chemical communication in insects
Angel Guerrero et al.

63 An innovative approach to diffuse optical tomography using code division multiplexing
Gianluca Berrettini et al.
64 Machine learning optimization of evolvable artificial cells
Filippo Caschera et al.

65 Models of physical intelligence
Martin Hanczyc et al.

66 Real time visual attention and its impact on the computer vision products
Vikram Tadmeri Narayan et al.

67 A bio-inspired fuzzy agent clustering algorithm for search engines
Radu Gaceanu et al.

68 First order processing of complex olfactory information in the moth brain
Linda Kuebler et al.

69 Sensitivity analysis of bacterial chemotaxis models
Judit Danis et al.

70 First steps towards artificial culture in robot societies
Alan Winfield et al.

71 Satellite- and ground-based temperature observations used in assessing the urban heat island phenomena
Enikö Lelovics et al.

72 Methodological bridges for complex systems
Emanuela Merelli et al.

73 Model-based analysis of functional connectivity during associative learning in schizophrenia
Mihály Bányai et al.

74 Biologically inspired computation for chemical sensing
Jordi Fonollosa et al.

75 iSense: a portable ultracold-atom-based gravimeter
Vincent Boyer et al.

76 Impact of body parameters on dynamic movement primitives for robot control
Cristiano Alessandro et al.

77 CEEDs: unleashing the power of the subconscious
Jane Lessiter et al.

78 Sipping science in a café
Bagnoli Franco et al.

79 Influence of slow oscillating transcranial direct current stimulation (so-tDCS) on electroencephalogram and cognitive performance
Isabella von Mengden et al.

80 Theoretical study of the emission of light stimulated by phonons in indirect bandgap semiconductor
José María Escalante Fernández

81 Phonon storage of optical pulses in silicon phoXonic chips
Jean-Charles Beugnot et al.

82 HOMM. ICT for hands-on laboratories
Margherita Russo et al.

83 Detection of ligand-elicited secondary cellular responses using surface acoustic wave biosensors
Zoltan Racz et al.

84 Novel smart concepts for designing swimming soft microrobots
Lucia Beccai et al.

85 A robotic model of the human neuro-musculo-skeletal system
Nicola Vitiello et al.

86 CYBEREMOTIONS – collective emotions in cyber-space
Janusz Holyst et al.

87 Towards a next-generation multimechanics simulation environment
Nathan Quinlan et al.

88 Do-it-yourself environmental sensing
Radka Peterova et al.

89 Novel nature inspired techniques in medical data mining
Miroslav Bursa et al.

90 Freestanding functionalized nanofilms for biomedical applications
Virgilio Mattoli et al.

91 Exploiting tera-device computing challenges and possibilities
Antonio Porter et al.

92 From the virtual to the robotic: bringing emoting and appraising agents into reality
Kiril Kirayzov et al.

93 Energy efficiency of robot locomotion increases proportional to weight
Jørgen Christian Larsen et al.

94 Control architecture for generating locomotion patterns for robots with different morphologies
Soha Pouya et al.

95 Modeling and analyzing creative communication within groups of people: the artistic event at fet11
Antonio Camurri et al.

96 MicroElectricImaging: Inverse solution for localization of single neuron currents based on extracellular potential measurements
Zoltán Somogyvári et al.
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Exhibition

Stand 1: Brain-Computer Interaction
Contact: José del R. Millán

Stand 2: The future of biomimetic machines
Contact: Anna Mura

Stand 3: Non visual floor augmentations
Contact: Federico Fontana

Stand 4: Restoring vestibular functions using an implantable neuroprosthesis
Contact: Silvestro Micera

Stand 5: OCTOPUS - Novel Design Principles and Technologies for a New Generation of High Dexterity Soft-bodied Robots Inspired by the Morphology and Behaviour of the Octopus
Contact: Cecilia Laschi

Stand 6: CyberRat: High Resolution Bi-directional Brain-Chip Interface
Contact: Stefano Vassanelli

Stand 7: Single Photon Imaging: from Dream to Reality
Contact: Claudio Bruschini

Stand 8: Pd-net - Towards Future Pervasive Display Networks
Contact: Nigel Davies

Stand 9: ANGELS Reconfigurable eel like robot with electric sense
Contact: Alexis Girin

Stand 11: Swimming bio-inspired artefacts with 3D vision
Contact: Stefano Orofino

Stand 12: Synthesis Pathways to Bio-inspired Information Processing
Contact: Viktor Erokhin

Stand 13: Acroban the Humanoid: Playful and Compliant Physical Human-Robot Interaction
Contact: Olivier Ly

Stand 14: Brain-Inspired Computing - Theory, Technology and Education
Contact: Björn Kindler

Stand 15: A new kind of robot: ECCEROBOT
Contact: Owen Holland

Stand 16:
Future technologies to support collaborative solutions for grand challenges (Biological water safety, Augmented collaboration, e-Infrastructures for science)
• Fluorescence Digital Holographic Microscope for Biological Water safety Inspection System
Contact: Szabolcs Tökés
• 3D Virtual Collaboration Arena
Contact: Péter Galambos
• 21st Century Fuel for Research and Development
Contact: Robert Lovas
Stand 17: Energy harvesting for powering wireless ICT devices
Contact: Luca Gammaitoni

Stand 18: Swarmanoid
Contact: Marco Dorigo

Stand 19: Exploring the Quantum world: from Games to Diamond Qubits and Secure Quantum Communication
Contact: Kamna Pruvost

Stand 20: Frontiers of Nanoscale, Opto- and Electro-Mechanical Technologies
Contact: Markus Aspelmeyer

Stand 21: Graphene based nanoelectronic devices
Contact: Daniel Neumaier

Stand 22: BIOMimetic Technology for vibrissal ACtive Touch (BIOTACT)
Contact: Tony Prescott

Stand 23: Living Knowledge diversity-aware technologies
Contact: Vincenzo Maltese

Stand 24: The Eye, the Doctor and the Engineer
Contact: Ákos Kusnyerik

Stand 25: Browsing the digital traces of science
Contact: David Chavalarias

Stand 26: Diving into the Internet
Contact: Jorge Louça

Stand 27: Adaptive Networked Societies of Tiny Artefacts
Contact: Ioannis Chatzigiannakis

Stand 28: Pervasive Adaptation: it’s here!
Contact: Jennifer Willies

Stand 29: Interview corner
Contact: Jennifer Willies and Stephen Dunne

Stand 30: Starlab, a high-tech SME in FET
Contact: Stephen Dunne
Vote for the Best Exhibit and the Best Poster at fet¹¹!

You will find your voting cards in your registration envelope. Please return your voting cards to the European Commission Information Stand or the Registration Desk by Thursday 5th of May 19.30

The three best exhibits and posters will receive a FET trophy awarded by the European Commission

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Orientation Map

-1 Level

Bartók
Lehár
Pátria
Press Room
Brahms
EC-INFO
Speaker's Room
Mozart
Liszt
Science Café
Exhibition

0 Level

Lounge
Info Stands
Registration
Lunch

Info Stands
1 – Ideal-IST - Your Worldwide ICT support network
2 – e-ScienceTalk - Talking about e-Science
3 – CHIST-ERA : European Coordinated Research on Long term Challenges in ICST
4 – FRONTS Experiment - People Tracking
5 – ERCIM / W3C

1 Level

Lunch
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