



FET

through the keyhole

Future and Emerging Technologies in Europe
January 2011



European Commission
Information Society and Media

"There is a certain exuberance that comes from being out there, on the edge of technology, where things are not certain, where there is some risk, and where you make something work" (Joseph Gavin - 1920-2010 - Aeronautical Scientist and Engineer who took control of Apollo 11 when "Houston had a problem".)

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Welcome

Welcome to the January 2011 edition of *FET through the keyhole*. In this edition, we would like to highlight the upcoming *fet¹¹* conference, the main rendez-vous for the FET community in 2011. A great event is being planned in Budapest from 4th-6th May 2011, so mark your diaries! As usual, this newsletter also contains news from ongoing FET activities, a selection of stories and *faits divers* from ongoing projects, and an agenda of upcoming events.

We wish you pleasant reading and a very successful new year!

The FET Team

fet¹¹ – the European Future Technologies Conference & Exhibition



fet¹¹ is *the* European forum dedicated to frontier research in future and emerging information technologies. This second edition will take place from 4th-6th May 2011 in Budapest, the pearl of the Danube.

fet¹¹ follows on from the very successful *fet⁰⁹* event which premiered in April 2009 in Prague.

fet¹¹ will feature the launch of six FET Flagship Preparatory Actions by Vice President Commissioner Neelie Kroes, and also coverage of the new young explorers and high-tech SMEs tracks, implemented within the FET-Open scheme.

The original concept of the event calls for multidisciplinary in a synergistic spirit and on an international basis. Diverse communities will meet to discuss visionary, high-risk research in a broad range of scientific fields and debate on technologies which will emerge at their crossroads - and on their societal impact. So be prepared to attend not only a pure scientific event but also to get a refreshing intellectual stimulus about new paths leading to truly disruptive innovations!

An impressive set of keynote speakers, scientific sessions and futuristic exhibition booths will be featured, with special emphasis on providing networking opportunities between participants - prominent scientists, policy makers, European researchers, industry representatives and journalists.

Deadline for submitting proposals for posters

15th February 2011

So be sure to submit your proposals!

<http://www.fet11.eu>

News from FET

FET Flagships Preparatory Action Call has closed

FET Flagships (FET-F) are ambitious large-scale, science-driven, visionary research initiatives that aim to achieve a scientific breakthrough. They are expected to be launched in 2013. On 2nd December 2010 the call for Coordination Actions to prepare those FET-Fs closed.

FET received a total of 26 proposals. 23 of which addressed the setup of FET-F for a specific scientific research idea, while 3 focussed on supporting the topical FET-F preparatory actions on the coordination of common issues.

In the meantime the evaluation has taken place and FET is happy to publish the results soon. Nevertheless, what is allowed to be said already now: The scientific ideas proposed are very promising and challenging and they offer an immense potential for European science and society.

http://cordis.europa.eu/fp7/ict/programme/fet/flagship/home_en.html

FET targets High-Tech Research Intensive SME's

On 14th December last, FET-Open hosted a workshop with a number of young companies in new highly R&D intensive areas, such as those emerging from FET. The objective was to look carefully at the needs of leading young innovators and to see if there was a way to tailor the FET spirit and approach to meet them.

Although the importance of high-tech research intensive SMEs (Small and Medium-sized Enterprises) for future innovation is seldom questioned, the need for specific measures within the framework programme is often a point of debate. Macro-economic evidence presented at the workshop shows that the R&D intensity gap with the US can be explained largely by Europe underperforming in creating 'young leading innovators'; first not enough, and second not in the right R&D intensive sectors – ICT being one of them. These are not necessarily SMEs (and usually aren't), but the analysis clearly shows the importance of strengthening in-house research and absorption capacity in parallel with the growth of the young company, an explicit target of the current track 'High-Tech Research Intensive SMEs in FET research', implemented under the FET-Open scheme.

FET-Flagships on Facebook

Join in to follow latest developments of FET-Flagships on <http://www.facebook.com/pages/FET-Flagships/141589582520429>

Some messages from the workshop stand out.

- High-risk collaborative research in FET projects is an important tool for high-tech research intensive SMEs to broaden the eco-system in which they operate, not only for research but also – and more surprisingly – for their market.
- A coherent support scheme that takes into account different needs at different stages is missing. FET projects are effectively used by research intensive SMEs for opening up new directions in the pre-competitive phase, but later stage support (e.g. for market research and demonstration) is equally needed.
- One should not only consider what to do for SMEs, but also what they can bring to our programmes in terms of communication, sense of urgency, dynamism and potential for fast first moves in pushing out future and emerging technologies to future and emerging markets ('FET-for-FEM').

An outcome of the workshop is a number of concrete recommendations which are related to support programme and life-cycle issues, including simplification (especially speed) of evaluation and contracting, the need for smaller projects, more flexibility in project implementation (consortium composition, use of resources, mixing partnership and subcontracting) and more continuity in support (better handover among programme elements) .

http://cordis.europa.eu/fp7/ict/fet-open/events-new-directions-sme_en.html

CHIST-ERA first call

The 1st call for proposals within the FET funded ERA-Net CHIST-ERA (European Coordinated Research on Long term Challenges in Information and Communication Sciences and Technologies) closed on the 5th of November 2010. Within CHIST-ERA, European funding agencies/ministries led by ANR, France, teamed up to identify emergent scientific fields allowing European researchers to engage in high risk, high impact projects by launching each year one or two transnational calls for proposals.

For this purpose, CHIST-ERA agencies agreed on common processes with a strong European dimension; from the selection of the call topics to the selection of the projects.

In the 1st call, two completely different topics were addressed:

1. Quantum Information Foundations and Technologies (QIFT ~ 8 M€ available)
2. Beyond Autonomic Systems – the Challenge of Consciousness (BASCC ~ 4 M€ available)

A total of 31 proposals (21 for QIFT and 10 for BASCC) were received requesting funding of 39 M€ (28 M€ for QIFT and 11 M€ for BASCC). Partners (at least three from three different countries), are mostly from the academic community.

The excellence of the proposals is being assessed by international peer-reviewers in each research topic of the call, considering a balanced representation of knowledge and technical skills as well as representation of geographical diversity.

The CHIST-ERA agencies will establish the final list of projects recommended for funding in March 2011.

The success of this call in terms of number of proposals indicates the expectation of the scientific communities for such novel approaches targeting high-risk, high-impact research topics and should egg on new research funding agencies to join CHIST-ERA!

<http://www.chistera.eu>

Interplay between technology and society

On 18th November last, FET-Open hosted a first workshop on future technology and society. The aims of this workshop were to:

- Start a conversation on the role of information technology and innovation for society.
- Begin a process of anticipating the various transformational changes that technology can have on society, and vice versa, in order to better understand the dynamics by which these changes unfold. This could lead to a revised research priorities, and eventually to a smoother introduction of disruptive technologies in Europe.
- Take stock of a number of relevant activities going on within the Commission with the view to identify synergies between them and boost their potential impact.
- Identify the potential need for future actions in this domain, whether by public authorities, technology actors or civil society.

Discussions centred on the mutual interaction between technology, science and society, and how information technology and innovation influence human practices, and vice versa.

http://cordis.europa.eu/fp7/ict/fet-open/events-future-technology-and-society_en.html

FET Coordination Actions benefit from Best Practice Sharing

An increasing number of FET communities have set up a coordination action (CA) to strengthen their collaboration – between projects but also with researchers that are not currently involved in

any FET project. These CAs permit the organisation of joint events, discussion of future topics, creation of materials for dissemination and many other activities that are pertinent for researchers, but not central to regular research projects. CAs can also be a key platform for setting out a strategy for collaboration with groups outside Europe.

In October, nine of these CAs (covering a wide variety of topics) got together in Brussels to discuss their experiences and best practices. The discussions focussed in particular on the most efficient way to develop a research roadmap, the use of new media such as Twitter and new publication mechanisms such as Faculty of 1000 and Scholarpedia. The [report](#) is worth reading, especially if you are interested in submitting a CA.

http://cordis.europa.eu/fp7/ict/fet-proactive/ca-ws-oct2010_en.html

New tracks for young explorers and high-tech research intensive SMEs kick-off

In line with its revised strategy outlined at the fet09 event in Prague, FET kicked off recently two new research funding tracks aimed specifically at the needs of young scientists with high potential and high-tech research intensive SMEs, implemented through the FET-Open scheme. If you know of a high potential young researcher, or a high-tech research intensive SME which is making waves, why not let them know about the opportunities afforded by FET?

In the FET-Open spirit, these calls are continuously open. We hope to be able to announce the first funded projects later in 2011.

In addition to the new tracks, the "standard" FET-Open call, Challenging Current Thinking, remains open 24/7, 365 days per year for new research ideas.

HOT OFF THE PRESS:

YOUNG EXPLORER PROPOSAL STATISTICS

15/01/2011 - 20 Young Explorer proposals have been submitted, involving 75 young researchers (approx 20% female), 17 different countries (64 EU15, 1 New Member State, 8 Associated Countries, and 2 non-EU countries). Peak participation DE (13), IT (12) and UK (10).

HIGH TECH SME PROPOSAL STATISTICS

15/01/2011 – 13 high tech SME proposal have been submitted, involving 15 SMEs, 11 EU10, 3 new member states, 1 associated state). 85% of proposals are coordinated by an SME. Generally small projects – 7/15 have only 3 partners. Average funding requested just over 1m euros.

We hope to have details of the successful proposals in our next newsletter in July.

Do you have an idea that can change the face of ICT?

http://cordis.europa.eu/fp7/ict/fet-open/ye_en.html

http://cordis.europa.eu/fp7/ict/fet-open/high-tech-sme_en.html

http://cordis.europa.eu/fp7/ict/fet-open/challenging-current-thinking_en.html

I like it: FET-Open's growing presence on Facebook

Why not join the FET-Open community on Facebook - a first point of reference to what is going on in the world of FET-Open.

<http://www.facebook.com/fetopen>

La vie des projets

SECO: Self-Constructing Computing Systems

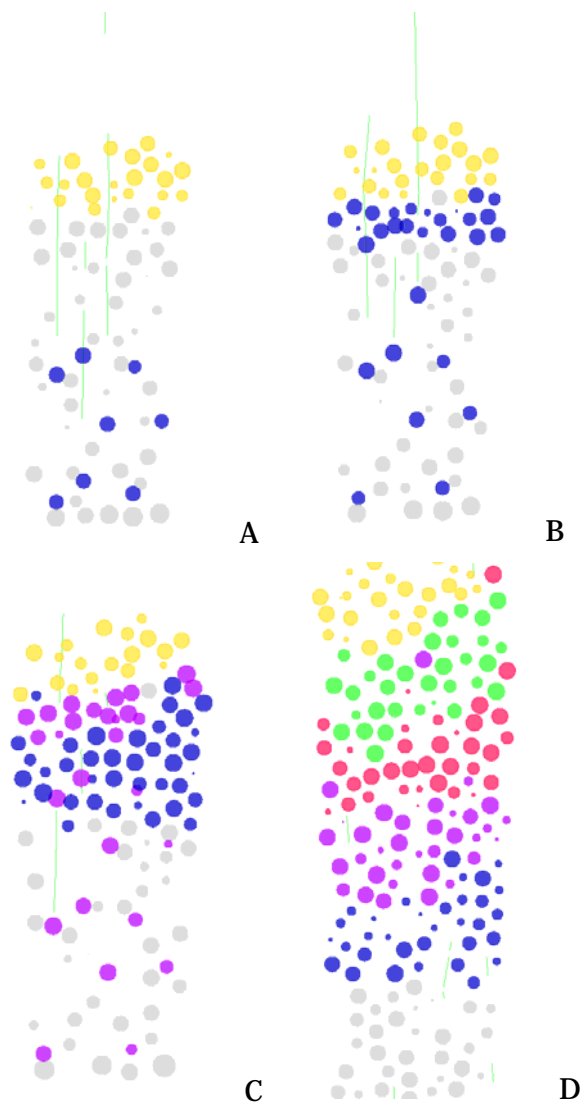


Biological systems use an entirely different concept of construction than that of man-made artifacts. They construct themselves by a process of self-organization that is a systematic spatio-temporal generation of, and interaction between, various specialized cell types. Understanding this process of living construction could provide an entirely new approach to the fabrication of human-relevant technologies, particularly self-constructing artificial computing systems aiming to emulate the brain.

The SECO consortium is exploring this problem in the context of neocortical development. The questions are what are the genome-like code and the minimal set of functions required to grow neocortical-like circuits by replication from a single precursor cell? And can these principles be applied to constructing artificial neural networks? SECO is approaching these questions by a combination of experimental investigation, modeling and simulation.

One significant contribution thus far is the development of a general framework for modeling corticogenesis (CX3D) in a 'physical' 3D environment that respects physical forces and diffusion of morphogens between cells. This framework can be used to model cell division, migration of neural precursors to form a laminated structure, extension of axonal and dendritic arbors, and the generation of synaptic connections. In addition it is possible to link the grown architecture to an electrophysiology simulator (PCSIM), to study for example the relationship between the self-construction processes and learning.

The figure shows a sliced view through a volume of developing tissue as simulated by CX3D.



- (A) Layer 6 neuron precursors (blue) are produced by asymmetrical division of the progenitor cells (larger grey, at the bottom). They migrate along radial glial processes (green fibers).
- (B) Once the neuron precursors detect a contact with the top-most L1 cells (orange), they stop their migration by getting of the radial fibers. Due to the mechanical interactions between cells, the first layer is pushed upward.
- (C) When L5 neurons are produced, they follow the same path, passing through L6 cells until they contact L1.
- (D) Similarly with L4 and L2/3.

Each generation passes through all the predecessors, to form the final layered organization of cortex. This process is determined entirely by the genome-like XML description inserted into the precursor cell, and gene regulation networks that are thereby conditionally instantiated. The initial environment is unprepared and unlabeled, meaning

that other than the code there is no external source of construction information for directing the spatio-temporal and functional organization of development. In particular, there is no global supervisor of the process. Because this self-construction is essentially an algorithmic process SECO considers that it will be applicable also to more general manufacturing methods.

SECO - <http://www.seco-project.eu/>
CX3D - <http://www.ini.uzh.ch/~amw/seco/cx3d/>
PCSIM - <http://www.lsm.tugraz.at/pcsim/>

Artificial intelligence on a learning curve (SIMBAD)

In a recent article with "Projects", a magazine devoted to the dissemination of science, technology and innovation, Marcello Pelillo of the SIMBAD project and the Computer Vision and Pattern Recognition Group at Ca' Foscari University, Venice, explains how the development of a similarity-based approach will change the machine learning and pattern recognition domains.

http://www.projectsmagazine.eu.com/randd_projects/artificial_intelligence_on_a_learning_curve

A novel approach to deal with SOC (SENSORIA)

Innovative Spin-Offs in FET

The FET project Sensoria has not only been very productive on the scientific stage (see below), but remarkably also resulted in three spin-off companies. The company ItalianaSoftware s.r.l. was born as a research spin-off from the project's work on new languages for Service-Oriented Computing architectures at the university of Bologna, winning the Imola StartCup, Itech.Off and the Ingenium awards. The 2nd spin-off is Agilogik GmbH Steingaden, origination at the Ludwig-Maximilians-Universität in Munich, which provides software for fraud detection, personal productivity enhancement, campaign planning, optimization and management. Finally, OptXware Research and Development was founded to industrialize research results of members of Budapest University of Technology and Economics. This company, which offers analysis and optimization for business processes, won Hungarian national support as an innovative start-up.

About SENSORIA

It has since long been suggested that computing will become a utility and software a service. Applications, it is argued, will no longer be a block of immovable software running on a computer's operating system, but a mix of web services developed on application servers.

Services are finding homes in a growing number of applications, from e-learning to manufacturing. But the IT industry's rush to meet demand for services has been ad hoc and undisciplined, according to Sensoria, leading to a number of flaws in current software development in areas such as reliability, flexibility, security and cost factors.

Service-Oriented Computing (SOC) is of enormous strategic importance for society and a key enabling technology for IT-rich areas of modern life. Several of the key concepts of SOC are directly connected to economic benefits to IT-dependent organisations. Moving to SOC saves investments, as existing software may be wrapped and thus made available in a more decoupled way.

Sensoria has developed a novel comprehensive approach to deal with SOC where foundational theories, techniques and methods are fully integrated in a pragmatic tool-supported software engineering approach, addressing for example early verification and validation, semi-automatic development and deployment of self-adaptable composite services.

While doing this, Sensoria goes to lengths in its platform to "hide" the complexity. In the front-end, service-oriented applications are designed using a standard Unified Modelling Language (UML) or domain-specific modelling languages, as needed. The back-end, performing the hard-core mathematical analysis, does the quiet job of revealing bottlenecks, errors or violations of service contracts.



To get to this point, Sensoria had to go back to the drawing board to develop new mathematic foundations, techniques and approaches to more pragmatic and reliable software engineering including a service-oriented development environment and tool integration platform. This massive undertaking needed the collective wisdom of Europe's leading universities and IT labs. The key to scalable, cost-effective SOC, according to Sensoria, is the ability to "compose" existing services so they can perform higher-level functions. These compositions – also called "orchestrations" – form new services in their own right, which can be re-orchestrated into even higher-level compositions.

More on the Project
<http://www.sensoria-ist.eu/>

Q-ESSENCE - Quantum Interfaces, Sensors and Communication based on Entanglement

The researchers involved in the Q-ESSENCE Integrated Project, launched in February 2010, have already presented a significant number of scientific results with the possible future applicability. The Q-ESSENCE consortium, coordinated by University of Warsaw, is a partnership of 23 industrial, academic and governmental institutions.

One of the aims of the project is to implement important new quantum technologies relevant to communications and simulations. ID Quantique, a partner in the consortium, together with the Siemens IT Solutions and Services B.V. has recently deployed the first commercial application of a quantum cryptography project in the Netherlands. In this qualification project, the data transfer over the Siemens network is protected by a hybrid cryptography system, combining conventional and quantum techniques. ID Quantique provides the quantum cryptography hardware and assisted Siemens in the network planning and deployment.



This innovative testbed project for information security in principle runs until the end of the year. In August Siemens IT Solutions and Services B.V. had already announced that it would bring this type of data security to the Dutch market.

ID Quantique, a privately held company headquartered in Geneva, Switzerland, and a spin-off from the University of Geneva, is a global leader shaping the evolution of network security through the development and commercialization of Quantum Key Distribution and high-speed encryption products ([press release](#)).

Recent publications from the Q-ESSENCE partners show successful stories also in other domains of the research: possibility of transferring quantum information between remote solid-state sources (the group of A. Shields at Toshiba Research Europe Limited, [1]), quantum cloning for the absolute radiometry (the group of N. Gisin at the University of Geneva, [2]), demonstrating a quantum memory for continuous variable entangled states (groups of M. Plenio at University of

Ulm and E. Polzik at University of Copenhagen, [3]), to name the few.

Prof. Christine Silberhorn, leading a group at University of Paderborn, one of the Q-ESSENCE partners, has recently been awarded the prestigious Gottfried Wilhelm Leibniz Prize.

More on the Project

<http://www.qessence.eu/>

[1] [doi:10.1038/nphys1780](https://doi.org/10.1038/nphys1780)

[2] [10.1103/PhysRevLett.105.080503](https://doi.org/10.1103/PhysRevLett.105.080503)

[3] [doi:10.1038/nphys1819](https://doi.org/10.1038/nphys1819)

LIQUIDPUBLICATION SURVEY ON SCIENTIFIC REPUTATION

The LIQUIDPUBLICATION project has launched a survey to gauge what is behind reputation, that is, what are the factors that lead people to believe that one person or another is an excellent researcher or scientist?

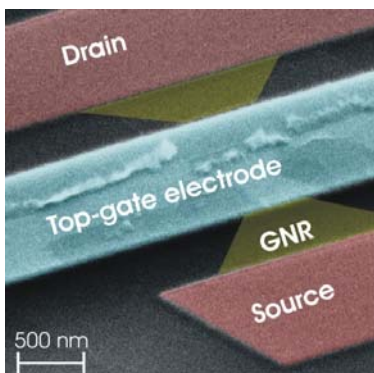
The survey is designed to elicit subjective opinions in the first instance. Based on this a number of factors may be derived, and a tentative comparison of differences of opinion between communities drawn up.

The survey is online at <http://reseval.org/survey/> for all who want to take part.

GRAND - Graphene-based Nano-electronic Devices

The project GRAND verifies and assesses whether graphene, an atomically thin plan of sp^2 bonded carbon atoms, can bring the semiconductor industry towards the beyond CMOS era. Therefore the GRAND project is acting as pathfinder for future ICT challenges. By an interdisciplinary approach different routes for using graphene as interconnect and channel material in logic devices are explored.

A major focus of research within the GRAND project is set on the opening of a sufficiently large band gap in graphene to meet the requirements of switching ratios larger than 104 given by ITRS. Different approaches have been assessed to extract and evaluate the maximum performance expectable for graphene based logic devices. Within the GRAND project it was shown that cutting graphene to nano-ribbons smaller 4 nm will deliver sufficiently large switching ratios, while keeping the carrier mobility comparable to those in silicon devices. Although this approach is not feasible with state-of-the-art top-down lithography techniques, it would allow a scaling far beyond the limits of silicon, which is expected to be the so called 11 nm node reached presumably in the year 2020. Therefore graphene is a pro-mising candidate to achieve an ultimate scaling of transistors when the lithographical challenges to fabricate nm-sized structures with atomic precision are met.



Electron micrograph of a bilayer graphene FET.

Another field of application for graphene based logic turned out to be devices for low power. Simulations performed within GRAND showed

that using bilayer graphene with a perpendicularly applied electric field allow not only the opening of a band gap, but also gives the opportunity to engineer the band gap by electrical means. This has already been demonstrated experimentally within GRAND by using a fabrication process fully compatible with conventional CMOS technology. This approach is especially promising for the realization of graphene based tunneling field effect transistors. Such transistors would not only deliver switching slopes significantly steeper than achievable with conventional field effect transistors (FETs), but also require much lower supply voltages than silicon based tunneling FETs. Hence, bilayer graphene tunneling FETs would be ideally suited in low power applications.

Although several technological challenges still have to be solved for realizing graphene based logic devices, possible fields of applications have become rather concrete. On a shorter time scale low power application will offer first entry points, while on a longer time scale the fundamental scaling limits of silicon can be eluded by moving to a graphene based logic world.

More on the Project www.grand-project.eu

Computing Architectures Workshop

The first workshop of the [TERACOMP](#) FET projects just took place in Rome on 17-18 Jan.

More info on the workshop [CASTNESS'11](#)

SWARMANOID - Riders on a swarm

"Proponents of so-called swarm cognition think the brain might work like a swarm of nerve cells, with no top-down co-ordination. Even complex cognitive functions, such as abstract reasoning and consciousness, they suggest, might simply emerge from local interactions of nerve cells doing their waggle dances. Those who speak of intellectual buzz, then, might be using a metaphor which is more apt than they realise."

Excerpt from a feature on swarm intelligence featuring the FET project SWARMANOID which appeared recently in The Economist magazine.

http://www.economist.com/node/16789226?story_id=16789226

Singapore's A*STAR and European Union (EU) to jointly create a processor that is the size of a molecule.

Within the FET project ATMOL, which resulted from the recent Call for Proposals on "[Molecular Scale Devices and Systems](#)", Singapore [IMRE](#) and 10 EU research organizations are working together to build and test what is essentially a single molecule processor chip. Signature of the agreement took place in Singapore last November.



The price of love? Two friends

Falling in love with a new partner can cost you two close friends, according to new research carried out by the FET project ICTeCollective. While starting a new romance can be an exciting experience, anthropologists at Oxford University have discovered it can also come at the price of shrinking your social network.

<http://www.telegraph.co.uk/science/science-news/8006638/The-price-of-love-two-friends.html>
<http://www.becs.tkk.fi/ictcollective/>

Awards and prizes

Congratulations to Professor [Christine Silberhorn](#), leading a group at University of Paderborn, and partner in the Q-ESSENCE project, and to Professor Anja Feldmann, leading a group at Technical University of Berlin (partner in the FP6 project DELIS), for the recent award of the prestigious **Gottfried Wilhelm Leibniz Prize 2011**, the highest honour awarded in German research.

Forthcoming events

GEOVIZ 2011

March 10, 2011 – Hamburg (DE)
<http://www.geomatik-hamburg.de/geoviz/>

VIZBI 2011

March 16, 2011
Cambridge-MA, USA
<http://vizbi.org/2011/>

S2S2 WORKSHOP

4-6 April 2011 – Leuven (BE)
http://www.sound2sense.eu/s2s_event/final-workshop-leuven/

IMAGINENANO

11-15 April 2011; Bilbao (ES)
<http://www.imagenenano.com/GENERAL/index.php>

MICRO-ENERGY DAY

14 April, 2011; various places in Europe
<http://www.microenergyday.eu/>

QUANTUM INFORMATION FOUNDATIONS AND TECHNOLOGIES OPEN DAY

15 April, 2011; Warsaw (PL)
<http://qift2011.fuw.edu.pl/>

CAPOCACCIA COGNITIVE NEUROMORPHIC ENGINEERING WORKSHOP

27 April – 14 May 2011, Capo Caccia (IT)
<http://capocaccia.ethz.ch/capo/wiki/2011>



FET11 – THE EUROPEAN FUTURE TECHNOLOGIES CONFERENCE & EXHIBITION

4-6 May 2011 – Budapest (HU)
<http://www.fet11.eu>

CHI 2011

May 7, 2011 – Vancouver, CA
<http://www.chi2011.org/>

EUROVIS 2011

31 May 2011 - June 3, 2011; Bergen, Norway.
http://www.vismaster.eu/event/?event_id=15

SFM-11:CONNECT

13-18 June 2011; Bertinoro, Italy
11th International School on "Formal Methods for the Design of Computer, Communication and Software Systems: Connectors for Eternal Networked Software Systems"
<http://www.sti.uniurb.it/events/sfm11connect/>

MODAP CONFERENCE ON "PRIVACY ON THE MOVE"

20-21 June – Istanbul (TU)
<http://www.modap.org/>

PDIT2011

29 June, 2011 – Lisbon (PT)
Public Displays as Interactive TV – A truly Public Communication Media
<http://pdit2011.pd-net.org/>

About this newsletter

FET through the keyhole is published periodically by the FET-Open and FET-Proactive Units at the European Commission Directorate General for Information Society and Media.

Please contact the editors below if you would like to consider any FET or project related news for publication in this newsletter.

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