



FET

through the keyhole

Future and Emerging Technologies in Europe
January 2008



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FET in full swing

Wolfgang Boch, Head of Unit – FET-Proactive
Ales Fiala, Head of Unit – FET-Open

The year 2007 was a busy one for future and emerging technologies research in Europe, and for FET.

FET-Proactive concluded the implementation of three proactive initiatives from call one. A total of 23 successful projects will start work early in 2008.

- *Nano-ICT devices and systems*
Nine proposals involving nanometer-scale technology and demonstrating new concepts for switches, memory cells and chip-level interconnects and targeting new functionalities for nano-scale building blocks were selected. Several of these will focus on single molecules, atoms or ions for computational purposes like storage, transfer and manipulation of information. Others intend to develop ensembles of innovatively tailored molecules as switches, sensors and electrically conducting interconnects.
http://cordis.europa.eu/fp7/ict/fet-proactive/nanoict_en.html
- *Pervasive Adaptation*
Seven projects about evolvable pervasive systems and networked societies of artefacts, addressing adaptability and scalability issues were selected. One project is dedicated to biologically inspired societies of collaborating robots, whereas the others concentrate on adaptation in the context of pervasive computing, both at "system" and "artefact society" level. This includes the need to adapt to human behaviour and changing

environments, as well as to (the behaviour of) other co-existing artefacts. Future ICT technology is expected to benefit from the results by achieving robustness and scalability through "self"-properties and by implementing the advantages of heterogeneity.

http://cordis.europa.eu/fp7/ict/fet-proactive/perada_en.html

- *Bio-ICT Convergence*

New perspectives in ICT that exploit the understanding of information processing in biological systems have demonstrable advantages in terms of functionality, operating conditions, resilience or adaptability or lead to systems that can be naturally combined with biological systems. Seven projects targeting these perspectives were selected. Two address biomimetic artefacts and novel computing paradigms, while five others focus on the development of novel bidirectional interfaces and biomimetic artefacts or a combination of both. One project involves research on biohybrid artefacts.

http://cordis.europa.eu/fp7/ict/fet-proactive/bioict_en.html

FET-Proactive is currently consulting its constituency concerning future proactive initiatives to be included in its Work Programme for 2009-2010. We look forward to hearing your views on the challenges ahead for future and emerging information and communication technologies.

FET-Open received 214 short proposals in its first two batches of 2007. The overall success rate for batch one (104 proposals) was around 10 percent. The success rate for full STREP proposals is close to 40 percent. The portfolio of the proposals retained for negotiation comprises a broad spectrum of research domains, and high quality and mostly multi-disciplinary projects that aim at ambitious breakthroughs and bring together the medium and long-term research efforts necessary to achieve them. Topics targeted include new paradigms in scientific publication, exploration of similarity-based recognition, production of intelligent functional molecular assemblies, exploration of bisociation as a concept to connect seemingly unrelated information,

as well as new optical and photonics meta-materials, quantum processing and quantum information architectures. The retained coordination action aims to facilitate a dialog between scientists, society and policy makers building from simulation and analysis of global problems such as climate change. These projects are expected to start their work in the second quarter of 2008.

Towards the end of 2007, the world-class excellence of FET was highlighted by the award of the **Nobel Prize in Physics** to Albert Fert (Université Paris-Sud, Orsay, France) and Peter Grünberg (Forschungszentrum Jülich, Germany) for their discovery of the Giant-Magneto-Resistance effect (GMR).

Both Albert Fert and Peter Grünberg have been partners in European research projects since 1992. Albert Fert is currently a partner in the FET FP6 NANOSPIN project.

On this positive note, we wish all FET friends and colleagues a very successful 2008!

<http://nobelprize.org/index.html>

New Head of Unit for FET-Open



Ales Fiala (Czech Republic, 1963) became Head of Unit of the Future and Emerging Technologies – Open Scheme on September 1st 2007. Ales has a Doctorate in Plasma Physics from the University Paul Sabatier (FR). His career to date has spanned activities in research and research management in both academia and industry.

FET opportunities ahead

FET-PROACTIVE INITIATIVES

FET-Proactive Call 3 (FP7-ICT-2007-3) will close on 8 April 2008, with the first projects anticipated to start early in 2009. The call introduces three new initiatives:

- *The Science of Complex Systems for Socially Intelligent ICT (COSI-ICT)* calls for research into key concepts and tools for a data-intensive science of large scale techno-social systems - systems in which ICT is tightly entangled with human, social and business structures, resulting in mutual transformation and co-evolution.
http://cordis.europa.eu/fp7/ict/fet-proactive/cosiict_en.html
- *Embodied Intelligence (EMBODYi)* focuses on new technologies and design approaches for building physically embodied intelligent agents and artefacts, with emphasis on the relationship between shape, function and the physical and social environment.
http://cordis.europa.eu/fp7/ict/fet-proactive/embodiyi_en.html
- *ICT Forever Yours (ICT-FY)* is aimed at new built-in mechanisms for enhancing confidence in the use of pervasive and ubiquitously present digital systems in our everyday lives, to protect them from malicious intents and to preserve them from the effects of ageing, in the context of highly decentralised and incremental development and deployment practices.
http://cordis.europa.eu/fp7/ict/fet-proactive/ictfy_en.html

Announcement

FET-Proactive Information Day in Brussels

FET-Proactive will host an information day on Call 3 on 24 January 2008 in Brussels. The day will provide information on the 3 FET-Proactive initiatives in this call, as well as contractual, legal and administrative modalities. In addition, the formation of consortia and synergies will be facilitated through an open exchange 'Proposers Forum'. More information is available from:
http://cordis.europa.eu/fp7/ict/fet-proactive/ie-jan08_en.html

FET-OPEN CONTINUOUS SUBMISSIONS

Short STREP proposal ideas for long-term visionary research related to ICT are accepted continuously until 31 December 2008. Why not submit your breakthrough idea?

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

The status of the evaluation of short proposals under the FET-Open Continuous Submission Scheme is updated regularly on the FET-Open web site.

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

ERC ADVANCED INVESTIGATOR CALL

The European Research Council recently unveiled a new high-profile initiative, **the ERC Advanced Grant Scheme**. The scheme will be a flagship funding programme of the ERC, dispensing about 2/3rds of the ERC's total 7.51 B€ budget for the period 2007-2013.

The ERC operates a panel-based peer review process. A total of 25 panels have been established covering all fields of science, scholarship and engineering, and each panel assesses and selects proposals in their area. Given the multidisciplinary nature of FET projects, many ERC scientific panels may be of direct interest to the FET community, for example, PE1 - Mathematical foundations: pure and applied mathematics, theoretical computer science and mathematical physics, PE2 - Fundamental constituents of matter: high energy, particle, nuclear, plasma, atomic, molecular, gas and optical physics. PE5 - Information and communication: informatics and information systems, communication technology, computer science, intelligent systems, and others.

The ERC was launched in February 2007 with the objective to boost European excellence in frontier research. It aims to invest in the best researchers and ideas through competition at European level, on the basis of scientific excellence as the sole criterion. The ERC focuses on individual teams led by independent principal investigators. This is a good complement to the FET scheme which emphasises collaborative research.

http://erc.europa.eu/pdf/scc-press-release-adg-2007-11-21final_en.pdf

FET welcomes your input

FET-PROACTIVE

The proactive scheme is in the process of **selecting new initiatives in emerging and high-risk areas of ICT** which will form the basis of calls under the ICT Work Programme for 2009-2010.

These proactive initiatives aim to encourage efforts on foundational long-term ICT research and

technological innovation beneficial to the European Union. Recently, the European Commission launched a new series of brainstorming events with high-level scientists from relevant fields to identify suitable topics and research areas for the 2009-2010 research work programme (and beyond). Initial meetings, consulting scientific communities linked primarily to earlier FET-proactive initiatives, took place in Brussels on 20-21 September and 22-23 November 2007. The reports of these meetings will be complemented with the results from other workshops, and additional inputs and directions will be provided by a working group of the ICT Programme's Advisory Group (ICTAG) which is specifically dedicated to FET long-term research issues. The ICTAG FET working group was formally constituted in December 2007.

An on-line public consultation is also underway, accessible through our website and open to the wider scientific community. FET-proactive welcomes your comments, suggestions and ideas - your voice matters to us.

http://cordis.europa.eu/fp7/ict/fet-proactive/shapefetip_en.html

Announcement

Interlink Consultation on International Cooperation

The Interlink Project invites the international research community to participate in an online web consultation to define major challenges, promising research directions, and effective forms of international collaboration in the thematic areas of:

- Software intensive systems and new computing paradigms
- Ambient computing and communication environments
- Intelligent and cognitive systems

This consultation follows up on the work of three working groups of researchers that have produced reports presenting visions and research agendas for future collaboration at an international level in the above areas.

<http://interlink.ics.forth.gr/>

FET in the news

NOBEL PRIZE IN PHYSICS FOR FET RESEARCHERS

FET is proud to count the partners of its research programme among the winners of the **2007 Nobel Prize in Physics**.

Albert Fert (Université Paris-Sud, Orsay, France) and Peter Grünberg (Forschungszentrum Jülich, Germany) have been awarded the prize for their discovery of Giant-Magneto-Resistance effect (GMR). GMR is a quantum mechanical effect observed in thin film structures composed of alternating ferromagnetic and nonmagnetic metal layers that determines the electrical conductivity as a function of the magnetization state of the layers.

Its discovery is a great example of how research at a foundational level can have a huge impact on technology, economics, and society. In particular, it has boosted the storage density of computer hard disks by orders of magnitudes, reaching values of terabytes/square inch not anticipated before. For this reason, GMR can also be considered as one of the first real applications in the promising field of nanotechnology.

Both Fert (on the theoretical side) and Grünberg (the first to recognize the technological potential of GMR and patent it) have been partners in the Esprit III European project SMMMS (Study of Magnetic Multilayers for Magnetoresistive Sensors), as early as 1992 and since then have been taking part in FET Projects. Today, Fert is a partner in the FP6 project NANOSPIN aiming at the development of novel multifunctional spintronic nanoscale devices taking optimum advantage of the specific magneto-electric properties of ferromagnetic semiconductors.

Beyond the honour of the Nobel Prize awarded to European Researchers, one should note that the EC "Long-Term Research" Programme and its successor since FP5 - FET - have recognized the potential of this research by supporting several projects and enabling this topic to mature into more mainstream activities funded by the Micro-and-Nano-Systems part of the ICT programme.

http://nobelprize.org/nobel_prizes/physics/laureates/2007/

OTHER AWARDS AND PRIZES

- Mateo Valero, a key researcher in the SARC project won the prestigious **2007 Eckert-Mauchly Award** for his extraordinary leadership in building a world class computer architecture research center, for seminal contributions in the areas of vector computing and multithreading and for pioneering basic new approaches to instruction-level parallelism.
<http://www.bsc.es/media/989.pdf>
- Lukas Worschech, the coordinator of the FP6 project SUBTLE, received the prestigious **2006 EDS Paul Rappaport Award** for his paper "Cascaded Quantum Wires and Integrated Design for Complex Logic Functions: Nanoelectronic Full Adder". The US-based Electron Devices Society of IEEE selected the winning paper from among 350 manuscripts published in 2006.
<http://www.ieee.org/portal/pages/society/eds/awards/rappaport.html>
- **The inaugural Isaac Newton medal** was awarded by the Institute of Physics to QUROPE Governing Board member Anton Zeilinger.
http://www.iop.org/activity/awards/International%20Award/page_23288.html
- **The 2007 Hughes Medal** was awarded to QUROPE Governing Board member Artur Ekert by the (UK) Royal Society.
<http://www.royalsoc.ac.uk/page.asp?tip=1&id=1768>

PROJECTS IN THE NEWS

PALCOM AT TALL SHIPS RACE 2007

5-8 July 2007 - Aarhus (DK)

In collaboration with police, fire brigade and hospital staff, the PalCom project's Major Incidents Overview application prototype was successfully tested on site and in the command centre at the harbour of Aarhus during this year's Tall Ships Race event. With an estimated 500,000 visitors, 100 vessels and crews and approximately 4,000 young people from more than 30 countries, this was one of the biggest events ever hosted in Aarhus.

The prototype was designed using the new "palpable computing" concept, which strives to make

ubiquitous technologies a lot easier to understand, use and construct on-the-fly.

<http://www.ist-palcom.org/activities/tall-ships-race-aarhus/>

GOLDEN BRAIN: TIGHT NEURON-CHIP CONTACTS

Establishing a more direct and powerful communication channel between man-made electronics and biological systems by coupling living biological cells to electronic chips would open up tremendous possibilities e.g. to improve prosthetic devices.

The recently completed FP6 GOLDEN BRAIN project successfully established such a tight interface between arrays of miniaturized gold nails and living neurons. A special coating on the nails stimulated the cells to engulf the nails by triggering a biological process called phagocytosis. As a result intimate capacitive contacts between cells and nails were created at a distance of only 20 nanometers.

The research results will be taken up in the FP7 project BRAIN STORM.

<http://www.imec.be/goldenbrain/>

CANEL: SWITCHING AT NANO SCALE

How far can you go in miniaturizing mechanically active components? The answer is "Much further than you think". The recently concluded FET project CANEL fabricated a prototype of a nano-scale relay whose switching element consists of a carbon nanotube and is only several tens of nanometers wide.

CANEL (Carbon-based nano-electromechanical devices) utilizes carbon derivatives like nanotubes, fullerene molecules, or so-called peapods as mechanically active elements. It is possible to perform switching operations with these elements in the GHz range, which makes them highly attractive for IT applications such as switches, memory elements and oscillators.

The ultimate challenge is the integration of these elements into conventional silicon CMOS technology. The first steps regarding the compatibility of the materials and the placement and growth of carbon-nanotubes have been taken in CANEL.

<http://www.fy.chalmers.se/projects/canel/index.xml>

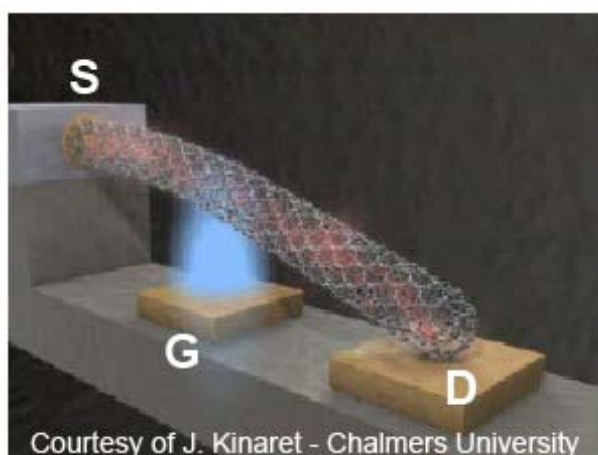


Figure 1. Sketch of an electrically conducting multi-walled Carbon-nanotube electrostatically bent to close the electric circuit between S and D electrodes. (G: gate)

MOBIUS: PROTECTING PHONES FROM FOES

The FET project MOBIUS is developing technologies to secure programs and prevent malicious applications (malware) from doing harm, by analysing code and delivering verifiable evidence of trustworthy behaviour. Recently, the project created a malware test programme wrapped up as a multiple-choice quiz game, which highlights some limitations and weaknesses in the existing security model for mobile Java applications. Web and text messaging are used throughout to fetch questions, transmit answers, and advertise high scores. This connectivity is natural for mobile phone applications, but the program has a hidden agenda: subverting legitimate Java security pop-ups, it sends text messages to premium-rate numbers and passes contact details from the user's personal address book out onto the web.

<http://mobius.inria.fr/twiki/bin/view/Mobius>

LEURRE: ROBO-ROACHES INTEGRATE IN COCKROACH SOCIETY

Researchers from the LEURRE project have managed to change cockroaches' natural social interactions in a controlled way, as they recently reported in Science Magazine.

The project, aimed at clarifying the global behaviours of mixed animal (cockroaches) and artificial agent societies, built micro-robots perfumed with cockroach pheromones ('Eau de Cafard') to make the cockroaches accept the robots as fellow insects. Four such robots were then released into a colony of twelve cockroaches in a plastic arena containing two small shelters, one darker than the other. A series of trials on the collective behaviour of the community was conducted, showing a successful change of the natural preferences of the cockroaches through the programmed action of the robots. The robots even became part of the insects' collective decision-making process.

The results of LEURRE provide for a quantitative model of the basic mechanisms of social interaction in insects, which may be used inter alia to develop systems ranging from pest control to collective decision making in distributed systems.

Project website:

<http://leurre.ulb.ac.be/>

Podcast (16 November 2007)

<http://www.sciencemag.org/multimedia/podcast/>

Article in Science Magazine:

<http://www.sciencemag.org/cgi/content/abstract/318/5853/1155>

Video news sequence on ZDF (21 December 2007, in German)

<http://www.zdf.de/ZDFmediathek/content/387106>

FACETS: WAFER SCALE INTEGRATION

The FACETS integrated project, part of the Bio-I³ FET proactive initiative in FP6, brings together neuroscientists, physicists and engineers to tackle one of the grand challenges of modern science, that of discovering how the brain processes information. In order to do this, models have been developed of the various types of neurons in the brain and how they are connected. However, the brain contains a very large number of neurons (10¹¹ in the case of the human brain) and simulation of even a small fraction requires special hardware. For this, FACETS is making use of wafer scale integration as well as hybrid analog/digital techniques, and expects to

model hundreds of thousands of neurons at speeds far in excess of real-time. This is expected to lead to new insights for healthcare as well as ideas for new computing paradigms.

<http://www.facets-project.org/>

QUOTES

CINQ/IQ: THE FET SPIRIT

"The adventure of working on EU-funded IST-FET projects CINQ and IQ completely changed my professional life". Professor J.F. Boulicaut from INSA in Lyon (Fr) talking to Cordis Focus Newsletter in October 2007.

http://cordis.europa.eu/fetch?CALLER=EN_NEWS_FOCUS&ACTION=D&DOC=2&CAT=NEWS&QUERY=1194597058146&RCN=28329&QM_EN_TXT=2007-10

SWARMANOID

"A single ant or bee isn't smart, but their colonies are. The study of swarm intelligence is providing insights that can help humans manage complex systems, from truck routing to military robots." Extract from a feature on the Swarmanoid project in National Geographic Magazine, July 2007.

<http://ngm.nationalgeographic.com/ngm/0707/feature5/index.html>

EVERGROW

"The Internet is like a medusa jellyfish. It has a dense core surrounded by a highly connected body, from which tentacles dangle." Extract from an article in Science News Online featuring the Evergrow project, June 2007.

<http://www.sciencenews.org/articles/20070623/fob2.asp>



Did you know?

Cordis Wire provides a facility for direct publication of news items? Published information is accessible by a wide range of stakeholders from research and innovation.

<http://cordis.europa.eu/wire/>

Workshop reports

7TH INTERNATIONAL WORKSHOP ON FUTURE INFORMATION PROCESSING TECHNOLOGIES (IWFIPT)

4-7 September 2007 – Dresden (DE)

This FET-initiated and sponsored workshop provided an international perspective on long-term research trends in nano-electronics and its applications. Around 80 leading experts and technical executives from Asia, North America and Europe attended the event.

Six panel sessions discussed the future of information technologies, system architectures, microprocessors and memories as well as enabling devices, communication systems and bio-technology.

An important message was that the increasing trend towards mobile IT will lead to new types of devices requiring electronic circuitry with enhanced functionality and performance and at the same time low power consumption. To make this happen, a paradigm shift in the design of computer chips is necessary moving from ultra fast, power-hungry, multi-purpose and expensive micro-processors to power saving, comparatively cheap, and tailored mobile processors.

<http://www.iwfip.de/gwtonline.de>

SCIENCE OF COMPLEX SYSTEMS FOR SOCIALLY INTELLIGENT ICT

6 October 2007 - Dresden (DE)

This workshop discussed modeling, predicting and characterizing the behavior, dynamics and evolution of systems in which ICT is tightly entangled with human, social and business structures. A background paper on the Call 3 initiative on "Science of Complex Systems for Socially Intelligent ICT" as well as a number of position papers from a range of experts were presented and discussed.

http://cordis.europa.eu/fp7/ict/fet-proactive/cosiict-ws-oct07_en.html

AETHER-MORPHEUS WORKSHOP & AUTUMN SCHOOL 2007

"From reconfigurable to self-adapting computing"

8-11 October 2007 – Paris (FR)

The purpose of this workshop was to present a new area of research, aimed at making systems more adaptive and at the potential contribution of reconfigurable hardware to this.

<http://www.alari.ch/AMWAS07/>

PRESENCE 2007

25-27 October – Barcelona (ES)

The FET project PEACH opened a call for "Grand Challenges" in Presence Research at the 10th Annual International Workshop on Presence research, organized by the International Society for Presence Research (ISPR), Starlab and Peach.

<http://www.peachbit.org/>

New books

MOBILITY, DATA MINING AND PRIVACY – GEOGRAPHIC KNOWLEDGE DISCOVERY

Fosca Giannotti, Dino Pedreschi (Eds.)

Hardcover, ca 430 pp, Springer, December 2007, ISBN 978-3-540-75716-2



This book assesses, from a computer science perspective, the research frontier at the crossroads of mobility, data mining and privacy, and investigates the various scientific and technological issues, open problems and roadmap. It integrates the findings of 40 researchers from 7 countries, involved in the FET-Open GeoPKDD project, including the concepts of knowledge discovery from movement data, privacy-aware geographic knowledge discovery, wireless networks and next-generation mobile technologies, trajectory data models, systems and warehouses, privacy and security aspects of technologies and related regulations, querying, mining and reasoning on spatiotemporal data, and visual analytics methods for movement data.

<http://www.springer.com/dal/home?SGWID=1-102-22-173764238-0>

Forthcoming events

Forthcoming FET-Proactive Cluster Reviews

Presence II – Barcelona (ES) – 25-29 February

QIPC – Paris (FR) – 3-7 March

Advanced Computing Architectures – Rome (IT) – 25-28 March

COGNIRON WINTER SCHOOL ON HUMAN ROBOT INTERACTION (CWSHRI'08)

21-25 January – Lausanne (CH)

<http://www.cogniron.org/cwshri.php>

FET-PROACTIVE INFODAY CALL 3

24 January 2008 – Brussels (BE)

Info day: FET opportunities in call FP7-ICT-2007-3

http://cordis.europa.eu/fp7/ict/fet-proactive/ie-jan08_en.html

FIRST INTERDISCIPLINARY WORKSHOP ON MOBILITY, DATA MINING AND PRIVACY

14 February 2008 – Rome (IT)

This workshop, organised by the GeoPKDD project, focuses on preserving anonymity in geographically referenced data. It aims at fostering interdisciplinary dialogue among researchers and professionals in computer science, law, geography, social sciences, statistics, telecommunication and transportation engineering.

<http://wiki.kdubiq.org/mobileDMprivacyWorkshop/>

RAVE-08

27-28 February 2008 - Barcelona (ES)

This is the first in a series of workshops focusing on the hows and whys of realistic action in virtual environments

<http://rave08.peachbit.org/>

EUROPEAN JOINT CONFERENCES ON THEORY AND PRACTICE OF SOFTWARE (ETAPS)

29 March - 6 April 2008 – Budapest (HU)

ETAPS is the primary European forum for academic and industrial researchers working on topics relating to Software Science.

<http://etaps08.mit.bme.hu/>

1ST CILIA SUMMER SCHOOL ON MECHANOSENSORS: FROM BIOLOGICAL TO BIONIC SYSTEMS

30 March – 3 April 2008 – Girona (ES)

http://www.cilia-bionics.org/summer_school_details

THE FOURTH INTERNATIONAL NANOTECHNOLOGY CONFERENCE ON COMMUNICATION AND COOPERATION (INC4)

14-17 April – Tokyo (JP)

Meeting with key European, Japanese and US policy makers and technologists to discuss future research priorities and trends in nano-electronics.

NANOSPAIN 2008

14-18 April – Braga (PT)

<http://www.nanospainconf.org/2008/index.php?conf=08>

NANO-BIO-EUROPE 2008

9-13 June – Barcelona (ES)

<http://www.nanobio-europe2008.com/>

35TH INTERNATIONAL COLLOQUIUM ON AUTOMATA, LANGUAGES AND PROGRAMMING (ICALP 2008)

6-13 July 2008 – Reykjavik (IS)

<http://www.ru.is/icalp08/>

2ND PEACH SUMMER SCHOOL ON PRESENCE: TECHNOLOGIES AND APPLICATIONS

9-11 July – Dubrovnik (HR)

<http://peach.tel.fer.hr/>

TRENDS IN NANOTECHNOLOGY (TNT) 2008

1-5 September – Oviedo (ES)

<http://www.tntconf.org/2008/index.php?conf=08>

About this newsletter

FET through the keyhole is published periodically by the FET-Proactive and FET-Open units at the **European Commission, Directorate General Information Society and Media** in Brussels (BE).

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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ftp://ftp.cordis.europa.eu/pub/fp7/ict/docs/fet/fet-nl-02_en.pdf

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