Future and Emerging Technologies
Proactive Initiatives in FP7 call 4

Andrzej J. Galik

National Contact Point
for Research Programmes of EU
Institute of Fundamental Technological Research
Polish Academy of Sciences

Presentation Agenda

1. What is FET proactive?
2. ICT-2009.8.1 - Concurrent Tera-Device Computing,
3. ICT-2009.8.2 - Quantum Information Foundations & Technologies (QI-FT).
4. ICT-2009.8.3 - Bio-chemistry-based Information Technology

What is FET proactive?

Bringing new science into technology!

Biology & Life-sciences

Materials Sciences

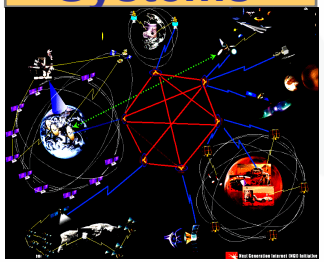
Core ICTs
Communication, IT, Interfaces

Physics, Chemistry

Cognitive sciences

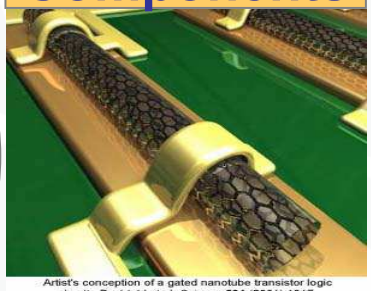
Social Sciences

Systems



Managing Complexity!

Components



Artist's conception of a gated nanotube transistor logic circuit. Bachtold et al.,*Science* **294** (2001) 1317.

Miniaturisation!

Intelligence

Bio-inspiration!

What is FET proactive?

FET Mission:

- ✓ Pathfinder and Incubator for exploring new visionary ideas
- ✓ Focusing on long term foundational research
- ✓ Focusing on high risk/high pay-off multi- and inter-disciplinary research aiming at S&T breakthroughs
- ✓ Maturing & structuring emerging research fields, research communities and research practice

Next Topic

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2. **ICT-2009.8.1 - Concurrent Tera-Device Computing,**
3. ICT-2009.8.2 - Quantum Information Foundations & Technologies (QI-FT).
4. ICT-2009.8.3 - Bio-chemistry-based Information Technology

Concurrent Tera-Device Computing

ICT-2009.8.1, a FET proactive challenge in FP7 Call 4

- ✓ Budget: **15 M€**
- ✓ Funding schemes:
  IPs and **STREPs**, minimum of 50% to IPs
- ✓ Contact: jean-marie.auger@ec.europa.eu
  wide.hogenhout@ec.europa.eu
- ✓ Background documents:

  ftp://ftp.cordis.europa.eu/pub/fp7/ict/docs/fet-proactive/massict-01_en.pdf

  …/massict-02_en.pdf

Concurrent Tera-Device Computing

ICT-2009.8.1, a FET proactive challenge in FP7 Call 4

Rationale:

- ✓ **Integrated circuits and tightly-coupled systems will integrate up to 1000 billion devices by the year 2020.**
- ✓ **This will lead to better performances if architectures and software can deal with:**
  - **Higher concurrency**
  - **Heterogeneous architectures for specific applications**
  - **Variability and failure of components**
  - **Efficient power consumption**

Objectives:

- ✓ **To develop and implement radically new methods and tools for architecture, design and programming of chips and systems beyond 2020**

Research Topics:

- ✓ Radically **new concepts**, **design paradigms**, **methods and proof of concepts** addressing design, compilation and run-time complexity of many-core (100+) heterogeneous systems,
- ✓ **Methodologies and approaches** to the design of dependable systems coping with critical levels of components, failures and variability,
- ✓ Radically **new design and programming paradigms** for effective programming (scalability, portability, dependability) of many-cores tera-scale systems,

Expected Impact:

The initiative should prepare the future (beyond 2020) challenges for industry by:

- ✓ **supporting** the design, programming and management of concurrent computing systems,
- ✓ **extending** European industry strength to future application domains,
- ✓ **facilitating** scalability and portability of applications,

Concurrent Tera-Device Computing

ICT-2009.8.1, a FET proactive challenge in FP7 Call 4

Background:

- ✓ **'Beyond-the-horizon'**
  - **Thematic Group 7: 'Tera-Device Computing and beyond', (March 06)**

    ftp://ftp.cordis.europa.eu/pub/fp7/ict/docs/fet-proactive/massict-01_en.pdf
- ✓ **Topical workshops**
  - **'Massive ICT Systems', (Nov. 07).**

    ftp://ftp.cordis.europa.eu/pub/fp7/ict/docs/fet-proactive/massict-02_en.pdf
- ✓ **Public consultation, ISTAG FET group, …**
- ✓ **Past FET proactive initiative:**
  - **Advanced Computing Architectures (ACA)**

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4. ICT-2009.8.3 - Bio-chemistry-based Information Technology

Quantum Information Foundations & Technologies

ICT-2009.8.2, a FET proactive challenge in FP7 Call 4

- ✓ Budget: **15 M€**
- ✓ Funding schemes:
  IPs only
- ✓ Contact: jean-marie.auger@ec.europa.eu
  wide.hogenhout@ec.europa.eu
- ✓ Background documents:

  ftp://ftp.cordis.europa.eu/pub/fp7/ict/docs/fet-proactive/qipcqt-01_en.pdf

Quantum Information Foundations & Technologies

ICT-2009.8.2, a FET proactive challenge in FP7 Call 4

Rationale:

- ✓ **Technologies that exploit the quantum nature of information offer novel modes of computing and communicating.**
- ✓ **They have strong potential to circumvent some of the bottlenecks associated with the extrapolation of present-day information processing and technologies**

Objectives:

- ✓ **Advance the state-of-the-art of QI-Technologies and contribute to the transition of the field from upstream research to application-oriented research**

Expected Impact:

The research should:

- ✓ **enable the scalability of QI-Technologies in the presence of environmental decoherence and facilitate their real-world deployment,**
- ✓ **develop reliable technologies for the different components of quantum architectures,**
- ✓ **identify new opportunities fostered through the transfer of entanglement technologies from laboratories to industries,**

Quantum Information Foundations & Technologies

ICT-2009.8.2, a FET proactive challenge in FP7 Call 4

Background:

- ✓ **'Shaping FET Proactive Initiatives', (Nov 07)**

  ftp://ftp.cordis.europa.eu/pub/fp7/ict/docs/fet-proactive/shapefetip-nov07-01_en.pdf

- ✓ **Topical workshops**
  - **'QIPC & entanglement enabled technologies', (Dec. 07).**

    ftp://ftp.cordis.europa.eu/pub/fp7/ict/docs/fet-proactive/qipcqt-01_en.pdf

- ✓ **Public consultation, ISTAG FET group, …**
- ✓ **Past FET proactive initiative:**
  - **Quantum Information Processing and Communication (QIPC)**

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4. **ICT-2009.8.3 - Bio-chemistry-based Information Technology**

Bio-chemistry-based Information Technology

ICT-2009.8.3, a FET proactive challenge in FP7 Call 4

- ✓ Budget: **7 M€**
- ✓ Funding schemes:
  STREPs only
- ✓ Contact: wesley.van-dessel@ec.europa.eu
  jose.fernandez-villacanas@ec.europa.eu
- ✓ Background documents:
  ftp://ftp.cordis.europa.eu/pub/fp7/ict/docs/fet-proactive/livtec-bioict-01_en.pdf

Bio-chemistry-based Information Technology

ICT-2009.8.3, a FET proactive challenge in FP7 Call 4

Rationale:

- ✓ **Biological cells are highly sophisticated, chemical information processing systems, capable of responding to changing conditions. The information processing capabilities of such systems could be exploited by future information technologies if this 'information chemistry' could be 'programmed'.**

Objectives:

- ✓ **Develop the foundations for a radically new kind of information processing technology inspired by chemical processes in living systems.**

Expected Impact:

The research should:

- ✓ **Enable** the development of **ICT systems and devices** that utilize interactions between components to assemble complex functional information processing materials.,
- ✓ **Enable a new generation** of **systems capable** of interfacing with conventional IT systems that are self-replicating, self-repairing and/or capable of rapid adaptation/evolution as well as flexible reconfiguration in response to changing conditions,

Bio-chemistry-based Information Technology

ICT-2009.8.3, a FET proactive challenge in FP7 Call 4

Research Topics:

- ✓ **Aim at exploiting information handling capabilities of bio-inspired chemical systems by developing appropriate mechanisms to direct, control and analyse their processes,**
- ✓ **Aim at exploiting their ability to adapt/evolve/flexibly reconfigure by merging information handling processes and processes that create or reconfigure the physical system,**
- ✓ **Be developed alongside a clear vision on its potential implementation and impact on 'information processing',**
- ✓ **Experimentally (physically) demonstrate major steps towards realizing advanced information processing systems**

Bio-chemistry-based Information Technology

ICT-2009.8.3, a FET proactive challenge in FP7 Call 4

Background:

- ✓ **Topical workshops**
  - **'Shaping FET Proactive Initiatives', (Nov 07)**
    ftp://ftp.cordis.europa.eu/pub/fp7/ict/docs/fet-proactive/shapefetip-nov07-01_en.pdf
  - **'Designing Alternative Bio-inspired ICTs', (Feb 08)**
    ftp://ftp.cordis.europa.eu/pub/fp7/ict/docs/fet-proactive/livtec-bioict-01_en.pdf
- ✓ **Public consultation, ISTAG FET group, …**

Additional Topics

Coordinating Communities

ICT-2009.8.9, a FET proactive challenge in FP7 Call 4

- ✓ Budget: **1,5 M€**
- ✓ Funding schemes:
  CSA
- ✓ Contact: werner.steinhoegl@ec.europa.eu
  jean-marie.auger@ec.europa.eu
- ✓ Background documents:
  "ICT Work Programme '09-'10"

Coordinating Communities

ICT-2009.8.9, a FET proactive challenge in FP7 Call 4

Expected Impact:

The activities should:

- ✓ **Reinforce coordination of research projects in proactive initiatives in current or previous calls,**
- ✓ **Prepare for ERA-NET or ERA-NET Plus schemes where appropriate,**
- ✓ **Strengthen European research excellence, including preparation of co-operation and co-ordination with international partners from outside Europe**

New Research Topics, Emerging Trends

ICT-2009.8.10, a FET proactive challenge in FP7 Call 4

- ✓ Budget: **0,5 M€**
- ✓ Funding schemes:
  CSA
- ✓ Contact: werner.steinhoegl@ec.europa.eu
  jean-marie.auger@ec.europa.eu
- ✓ Background documents:
  "ICT Work Programme '09-'10"

Expected Impact:

The activities should:

- ✓ **Consider novel research topics** as inputs for future work programmes, with an estimate of the effort required and a clear description of the expected impact,
- ✓ **Stimulate research communities** to embrace new directions of multidisciplinary exploration around ICT,
- ✓ **Early identify new trends** emerging on a global scale in support of future proactive initiatives.

Events on call 4

ICT 2008, FET proactive sessions:
25-27 November 2008 – Lyon

FET info day on call 4:
13-14 January 2009 – Brussels
(to be confirmed and announced soon)

The 'First ever' FET Conference

21-23 April 2009 - Prague

Thank you for your attention

Andrzej J. Galik

email: andrzej.galik@kpk.gov.pl

National Contact Point
for Research Programmes of EU
Institute of Fundamental Technological Research
Polish Academy of Sciences

ul. Żwirki i Wigury 81
02-091 Warszawa

phone: **+4822 828 74 83**
fax: **+4822 828 53 70**
e-mail: **kpk@kpk.gov.pl**