NID Call for Proposals

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NID Objective

The roots of innovation

To develop novel devices and systems for information processing or storage with critical dimensions in the nanometer regime, that are scalable to ultra high level integration.

Motivation

The roots of innovation

1996-1999 MELARI (Microelectronics Advanced Research Initiative)

- Physical, engineering and financial limits
- CMOS showstoppers visible (Power density, interconnects, lithography, etc.)

2000-2003 NID (Nanotechnology Information Devices)

- alternative to the limits of evolutionary “shrink” technology
- support for the next wave of innovation (Quantum devices/circuits, manufacturing at the molecular scale by self-assembly, etc.)
- address also non CMOS applications

Attributes

The roots of innovation

- power consumption
- operation speed
- input/output compatibility
- robustness
- defect tolerance
- etc.

The devices and systems should have potential for

high performance,

driven either by

new applications

or by the

"post CMOS" era

Applications with new functionality, such as hybrid systems that would integrate optical devices, logic elements, radio frequency modules, etc. in a single system

Responding to the research needs as specified in ITRS for the year 2011 onwards.

Two Action Lines

The roots of innovation

1. Beyond CMOS Silicon Compatible Devices
2. Molecular Computing

Proposals for training of for shared nanofabrication facilities, or other relevant nanotechnology infrastructure are welcome in both action lines

The roots of innovation

- **Novel architectures** for information processing systems, adequate for nano-scale implementation
  - Issues: fault-tolerance, self-test, topological regularity, local power, parallelism, general purpose vs. application-specific,...
- **Novel devices** at the level of a logic gate, memory cell, or elementary processor
  - What molecules, atoms, or nano-structures?
  - Issues: scalability, RT operation, interconnects, interfaces to the macroscopic world, low power
- **Nanofabrication tools and techniques** for the fabrication of structures with critical dimensions below 10 nm
  - Combination of techniques from biology, biotechnology and chemistry with surface patterning and SPM
  - Issue: cost!

FOCUS A: Beyond CMOS, silicon compatible devices

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- **Aim:** Proposed devices and circuits should be expected to be superior to "ultimate CMOS"

- **Implementation:** Devices might be either
  - implemented through concepts such as interband tunnelling devices, single electronics, 3D approaches, sub-20nm gate ballistic devices, etc
  - or of hybrid nature integrating magnetic, superconducting or other effect with a Si-interface

FOCUS B: Molecular Computing

The roots of innovation

- **Aim:** Novel devices and systems operating at the atomic or molecular scale. Hardware implementations of predefined architectures using molecular scalable devices at the level of a logic gate or memory cell.

- **Implementation:** can be based upon chemical, electronic, photonic, biological and/or mechanical principles.

Attributes of an information processing system

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- Integration / manufacturability
- power consumption
- speed / throughput
- I/O compatibility
- scalability

To be discussed in Focus A & B

- software compatibility
- system compatibility
- reliability
- robustness
- manufacturing cost

To be discussed in Focus A

The way ahead

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- 27 January 2001:
  - Publication of the NID call for proposals
  - Option to submit “pre-proposal” with short description of the proposed work
- 1 March 2001:
  - Deadline for receiving “pre-proposal”
  - response to “pre-proposal” two weeks later.
- 25 April 2001:
  - Deadline for submitting full Proposals

Information

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WEB www.cordis.lu/ist/fetnid.htm

- how to submit a pre-proposal
- how to submit a full proposal
- where to find forms for a full proposal
- links to other Nanotech related funding opportunities
- FAQ
- Slides

Information

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General Info on Commissions research programme	**www.cordis.lu**
IST programme	**www.cordis.lu/ist/**
« Future and Emerging Technologies »	**www.cordis.lu/ist/fethome.htm**
Nanotechnology Information Devices	**www.cordis.lu/ist/fetnid.htm**