

Nanotechnology in Ireland



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Workshop on Nanotechnology
Networking and International Cooperation



Outline

- Research Funding Landscape
- Nanoscience & Technology Initiatives
- Key Regional Initiatives
 - CRANN at TCD in Dublin
 - NMRC in Cork
- European Partnerships
- Conclusion

RTDI in National Development Plan (2001-2006)

- €2.5 billion (US\$2.3b) initiative on R&D

- Main components:



- €698 million for RTDI in third level sector
- €711 million for ICT/Bio focused initiatives
- €484 million for research in industry
- €267 million to promote collaboration networks



Plan accepts strong link between investment in the innovation base of the economy and sustained growth



Nanotechnology Initiatives

- Individual Agency Funding Initiatives
 - Higher Education Authority
 - Enterprise Ireland
 - Science Foundation Ireland (ICT & Bio only !)
- Irish Nanotechnology Association
 - Workshops, web-site, networking, intelligence
- Regional Initiatives

Irish Council For Science, Technology & Innovation

Sub-committee on Nanotechnology established 2003,
currently preparing strategy report for Government



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Centre on Adaptive Nanostructures and Nanodevices @ TCD

- **Funded by SFI in 2002**
- **€33m over 5 years**
- **Key investigators**
 - John Pethica (formerly, Uni. Oxford, Material Science)
 - John Boland (formerly, Uni. North Carolina, Dept. Chemistry)
 - Mike Coey
 - Suzy Jarvis (formerly, Japan AIST)
 - Igor Shevts



Centre on Adaptive Nanostructures and Nanodevices @ TCD

Nanoscale Electronics (John Boland) working on a detailed atomic-level understanding of the methods used in silicon processing and will develop new protocols for assembling, fabricating, and testing nanometer-scale device structures.

Spinel Heterojunctions for Information Storage (Igor Shvets) project is to study the fundamental properties of magnetic oxides, some of which (e.g., magnetite) are highly promising candidates for applications in spin electronics.

Conception and Implementation of Nanoscale Spin Electronics (Michael Coey) to uncover the physics of spin-dependent transport

Nanostructures and Molecule Mechanics (John Pethica) aimed at achieving improved understanding of events at the nanoscale, in particular the placing and manipulation of single atoms and molecules on surfaces and measuring their properties.

The Function of Molecules on the Nanometer Scale (Jarvis) working on understanding, manipulating and using the function of molecules on the nanometer scale as the basis of developing new applications in biocompatible materials, diagnostics and drug delivery.



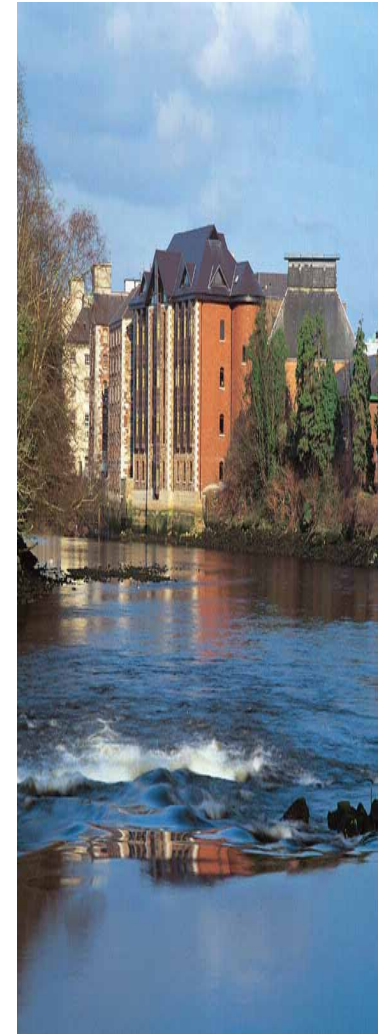
NMRC Mission

- **A World Class ICT Institute**

- Perform research programmes 3 to 10 years ahead of international industry needs
- Produce broadly trained engineers and scientists capable of building Ireland's leadership in ICT
- Support Irish universities in their ICT educational mission

- **Key Part of Irish Innovation Infrastructure**

- Provide a world-class ICT infrastructure
- Facilitate up-stream – downstream coupling to accelerate the innovation process
- Support inward investment to Ireland
- Create / support high-tech spin-off companies seeded with NMRC IP



National Nanofabrication Facility @ NMRC

The NNF provides access to:

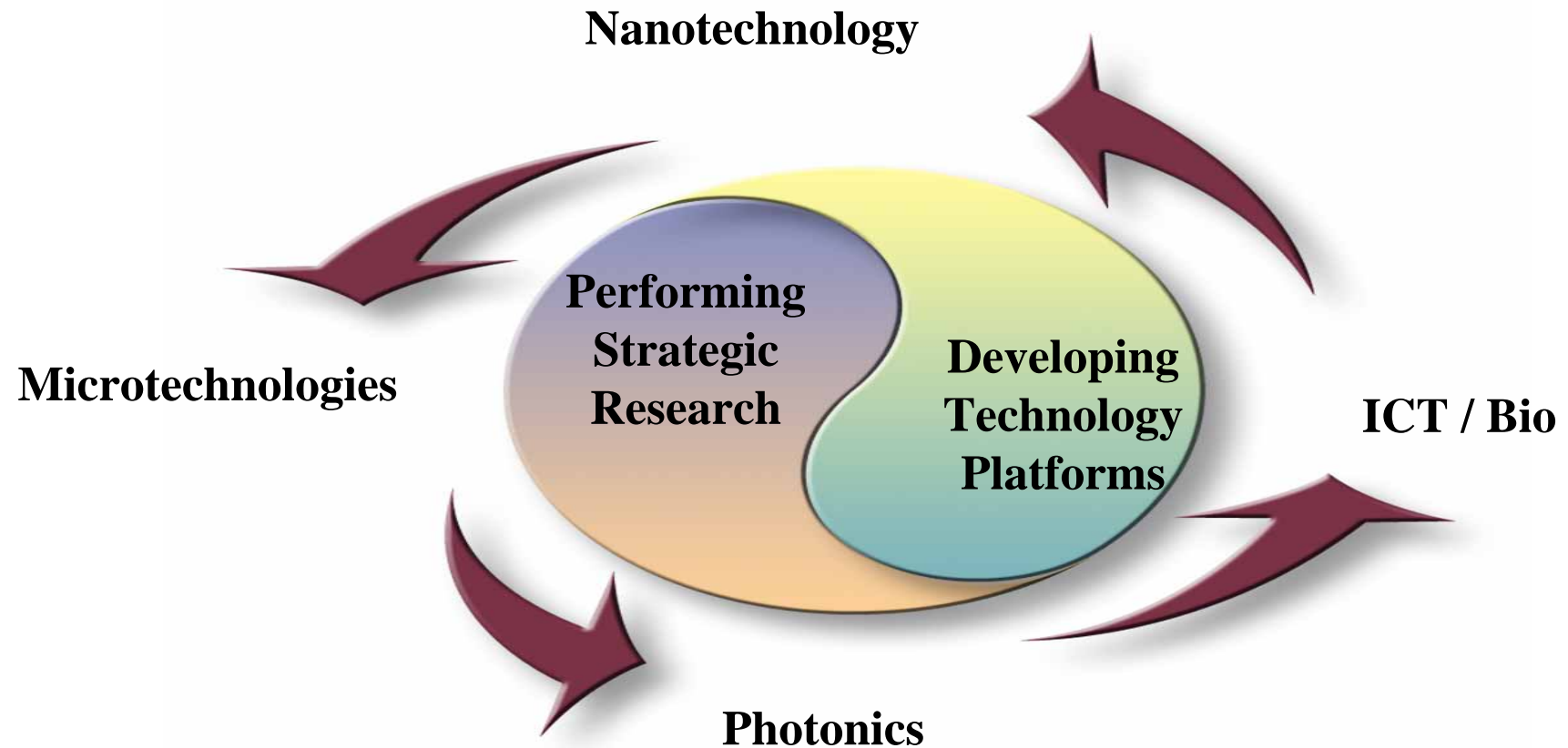
- **A world-class R&D infrastructure**
- **Critical mass of expertise**
- **Training in advanced nanotechnologies**
- **Consultancy**



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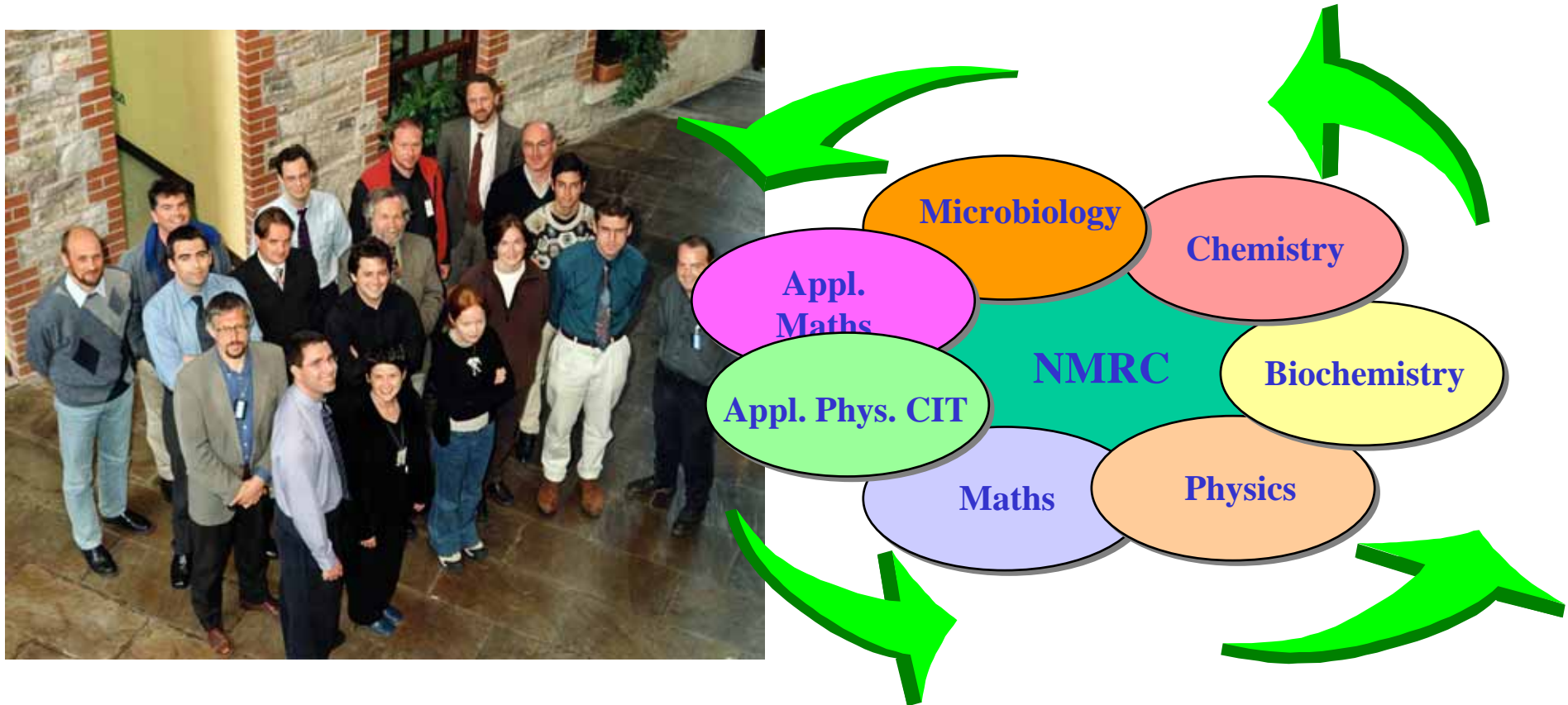


R&D Strategy



CIT-NMRC-UCC

Nanotechnology Partnership (€28m)



NMRC is coordinating the largest nanotechnology research alliance in Ireland

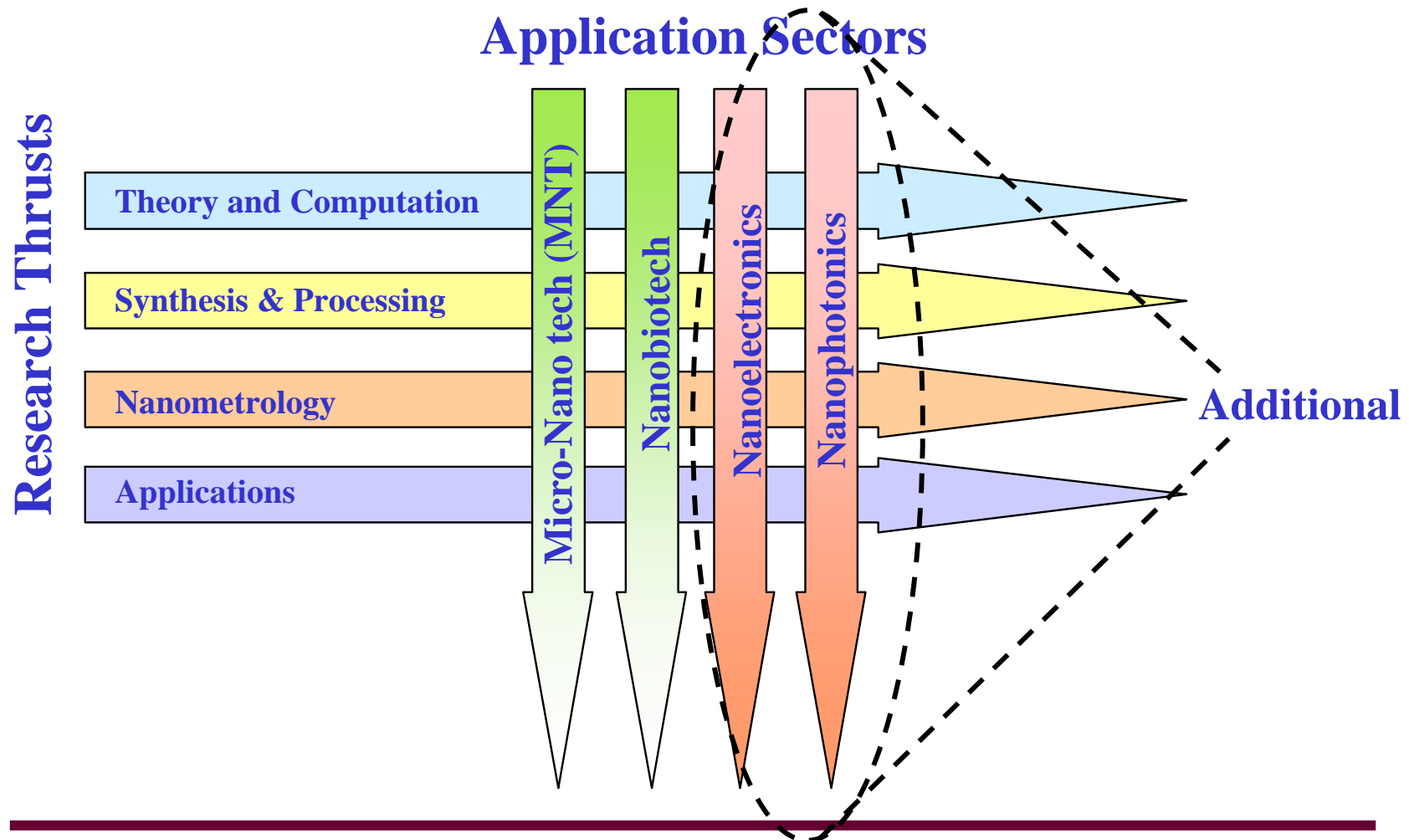


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Nanoscience Initiative 2002-2005

In December 2001, NMRC won €16.3 M further funding under the HEA Programme for Research in Third Level Institutions 3.



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Science Foundation Ireland Funding for Nanophotonics @ NMRC

- **2001/02 - €7.3 million for modelling of nano-photonic structures (Eoin O'Reilly, formerly Uni. Surrey, U.K.)**
- **2002/03 - €7.0 million for strategic nano-photonics research programmes in the following areas:**
 - **Photonic crystals (Clivia Sotomayor Torres, formerly Uni. Wuppertal, Germany)**
 - **Nanoscale photonic materials (Martyn Pemble, formerly, Salford & UMIST, UK)**
 - **Modelling of semiconductor structures for nanodevices (Jim Greer)**





6th Framework Programme: 2002 - 2006

Focussing and Integrating European Research

€13,345m

- Life sciences, genomics and biotechnology for health
- Information society technologies
- **Nanotechnologies**
- Aeronautics and space
- Food quality and safety
- Sustainable development, global change and eco-systems
- Citizens and governance in a knowledge based society
- Specific activities covering a wider field of research

2,255

3,625

1,300

1,075

685

2,120

225

1,320

Structuring the ERA

€2,605m

- Research & innovation, human resources, infrastructures, science & society

Strengthening the Foundations of ERA

€320m

- Coordination of activities, development of policies

Euratom

€1,230m

TOTAL

€17,500m



Priority 1: Life sciences, genomics and biotechnology for health (€2,255m)

Nano-biotechnology related to genomics, proteomics, primarily health oriented

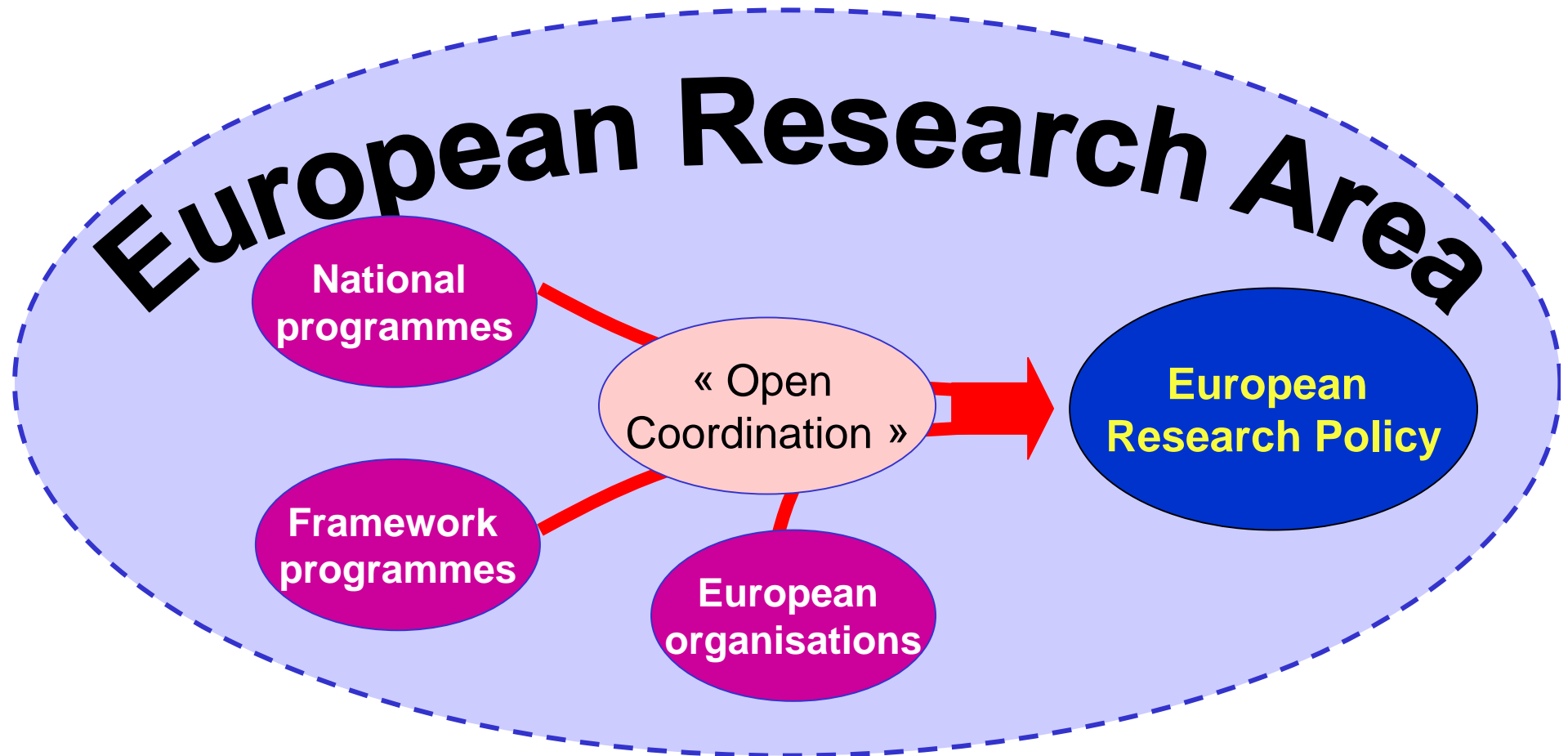
- Biochip development
- Interfaces to cells - e.g. neurons, brain research
- Diagnostics and therapeutic tools

Priority 2: Information Society Technologies (€3,625m)

- Nano-electronics
- Nano-photonics
- Micro-nano technologies and sensors

The European Research Area

- A blueprint for the future of research in Europe
- Support at the highest political, scientific and industrial levels



A New European ICT Alliance



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Summary

- Nanoscience & Nanotechnology research in all Universities
- Significant funding available from Government funding agencies (HEA, SFI, EI ...)
- Internationally competitive regional clusters (Cork, Dublin)
- National Nanofabrication Facility @ NMRC, Cork
- Irish Council for Science, Technology & Innovation sub-committee currently preparing report on National Nanotech strategy for Government.
- Significant European focus & collaborations





Thank You for Your Time

