Forschungsförderung in der Europäischen Union

Europäische Kommission
Generaldirektion Forschung & Innovation
René MARTINS

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Research/
Innovation

Horizont 2020

KETs

Aktuelle Sicherheitsforschung

Research/
Innovation

EU research and innovation strategy
Horizon 2020: 3 interlinked priorities

1.) Smart growth: *developing an economy based on knowledge and innovation – Flagship initiative: Innovation Union*

2.) Sustainable growth: *promoting a more efficient, greener and more competitive economy*

3.) Inclusive growth: *fostering a high-employment economy delivering social and territorial cohesion*

Innovation Union

A cornerstone of Europe 2020 strategy

- **Globalisation of knowledge production and innovation capacities**
- **Impact of the crisis on public and private finance, survival of innovative SMEs**
- **Major challenges to address with reduced means**

→ Innovation emergency!

Key measures of Innovation Union

Getting good ideas to market

- **Access to finance**
- **Single innovation market**
- **Openness and creative potential**

Der Kommissionsvorschlag zum *Horizont 2020*:

- Nanotechnologie ist unter dem Abschnitt Industrielle Führerschaft Teil des H2020 Vorschlags;
- Nanotechnologie ist eine der sechs identifizierten Schlüsseltechnologien (Key Enabling Technologies=KETs);
- Eine umfassende Herangehensweise wurde für die KETs vorgeschlagen: Querschnittsaktivitäten, die einzelne KETs miteinander kombinieren, spielen eine wichtige Rolle.;
- Gesonderte Förderung ist für Großprojekte und Demonstrationsprojekte vorgesehen;
- Es wird eine KET-eigene Steurungsstruktur geschaffen, ebenso wie ein gemeinsames Arbeitsprogramm für Querschnittsaktivitäten (multi-KETs);
- 6630 Mio EUR wurden für KETs vorgeschlagen, von denen ein Anteil speziell für Querschnittsaktivitäten vorgesehen ist.

What are KETs

- **Six strategic technologies with economic potential, contribution to solving societal challenges and knowledge intensity**
  - **Nanotechnologies**
  - **Advanced Materials**
  - **Micro- and nano-electronics**
  - **Photonics**
  - **Biotechnology**
  - **Advanced Manufacturing**
- **Knowledge- and Capital intensive**
- **Cut across many sectors**

Elements of a European strategy for KETS

Horizon 2020

Excellent science

- *European Research Council*
- *Future and EmergingTechnologies*
- *Marie Curie actions*
- *Research infrastructures*

Industrial leadership

- *Leadership in enabling and industrial technologies*
- *Access to risk finance*
- *Innovation in SMEs*

Societal challenges

- *Health, demographic change and wellbeing*
- *Food security, sustainable agriculture, marine and maritime research & the bioeconomy*
- *Secure, clean and efficient energy*
- *Smart, green and integrated transport*
- *Climate action, resource efficiency and raw materials*
- *Inclusive, innovative and secure societies*

European Commission

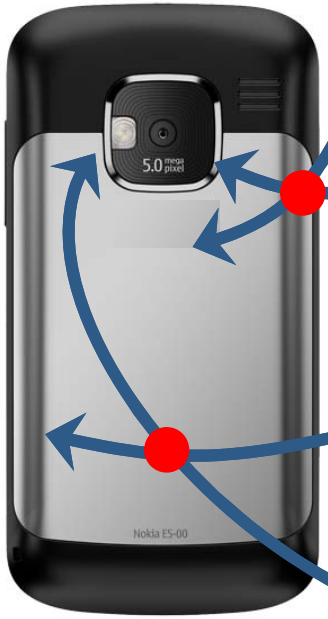
Combining several key enabling technologies for advanced products

Societal Challenge

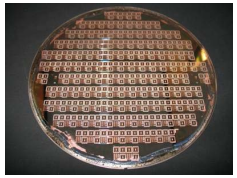
Information

Digital Society

Smartphone

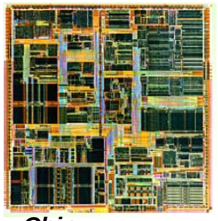


Advanced materials



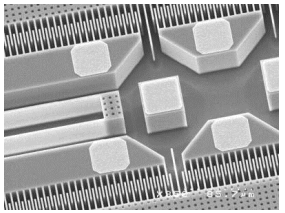
substrate

Microelectronics



Chip

Nanotechnologies



Mems

Photonics

Camera

Biotechnologies

Next ?

Research/ Innovation

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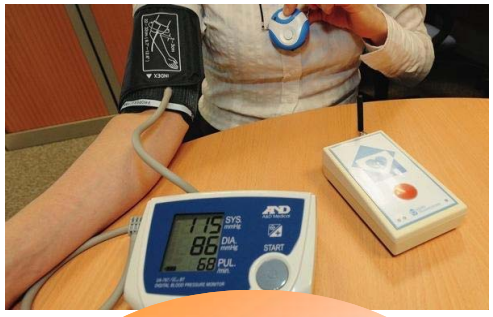
European Commission

Combining several key enabling technologies for advanced products

Societal Challenge

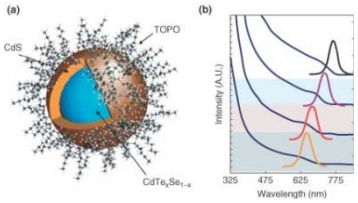
Health



Effective timely detection and diagnostic systems

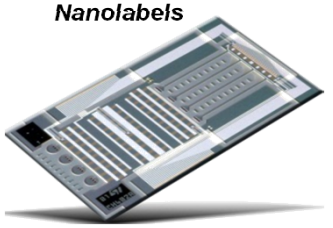
Real-time Avian flu test

Advanced materials



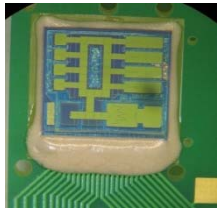
Nanolabels

Microelectronics



Biochip

Nanotechnologies



Fluidics

Optical detection

Photonics

Biotechnologies

DNA

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Combining several key enabling technologies for advanced products

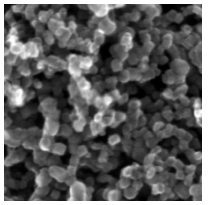
Societal Challenge

Energy

Combating climate change

Photovoltaïc cells

Advanced materials

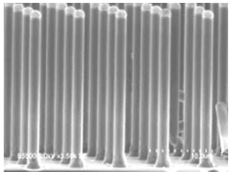


Organic product

Microelectronics

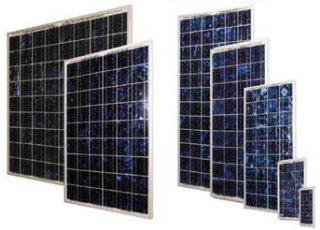
Smart meter for utility energy consumption

Nanotechnologies



Si Nanowire

Photonics



PV modules

Biotechnologies

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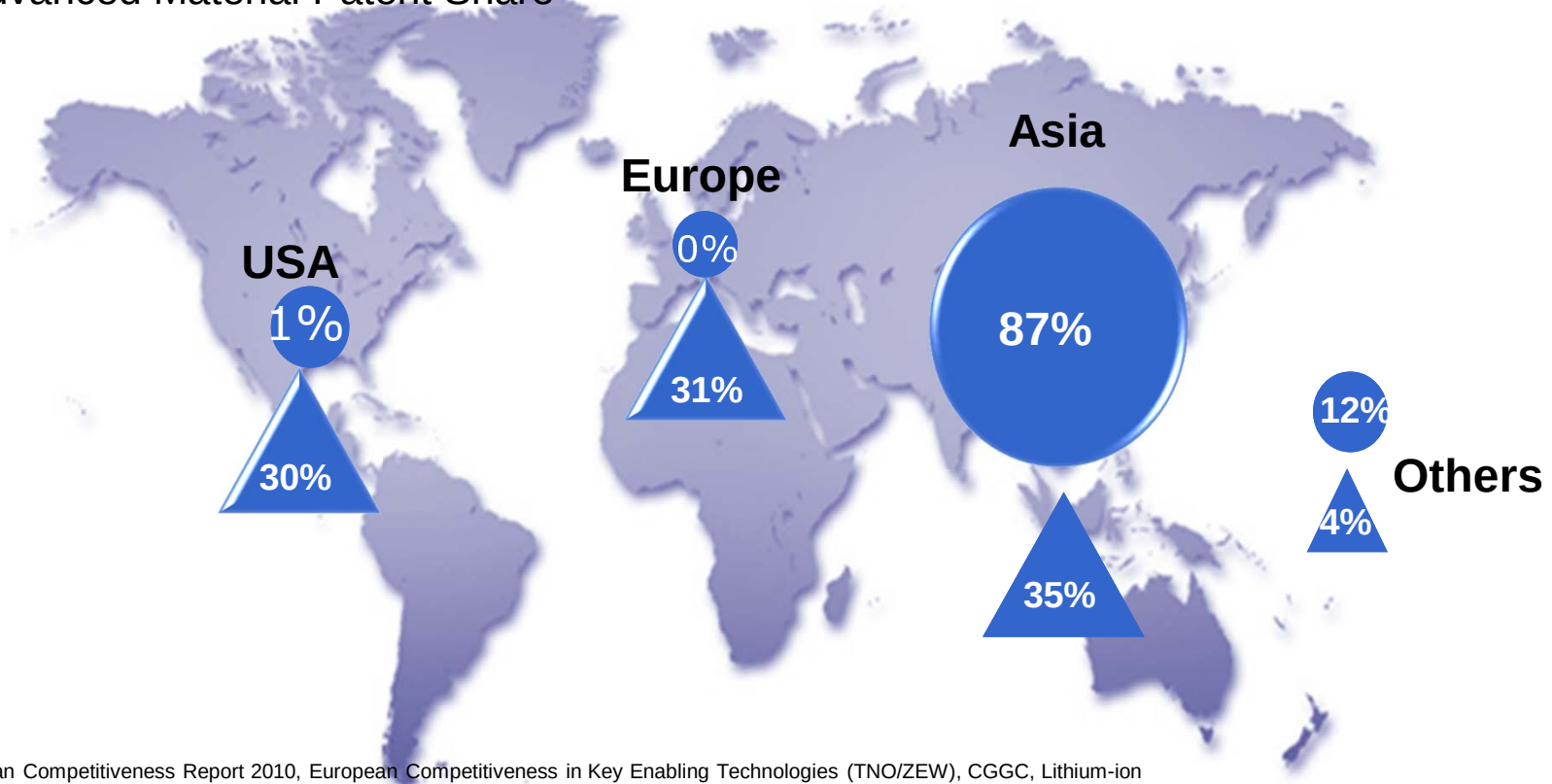
The issues regarding KETs

- **Europe has strong position in science and in patenting activity**
- **EU actors at top of patent ranking in each KET**
- **But there is a gap between the technology base and the manufacturing base**
- **We need to add product development (e.g. demonstrators) and competitive manufacturing to technology**

Disconnection between patents share and manufacturing share
Case Study: Li-ion battery production

% Li-ion battery cell production share in 2008

% Advanced Material Patent Share



Source: European Competitiveness Report 2010, European Competitiveness in Key Enabling Technologies (TNO/ZEW), CGGC, Lithium-ion Batteries for Electric Vehicles : THE U.S. VALUE CHAIN, October 2010

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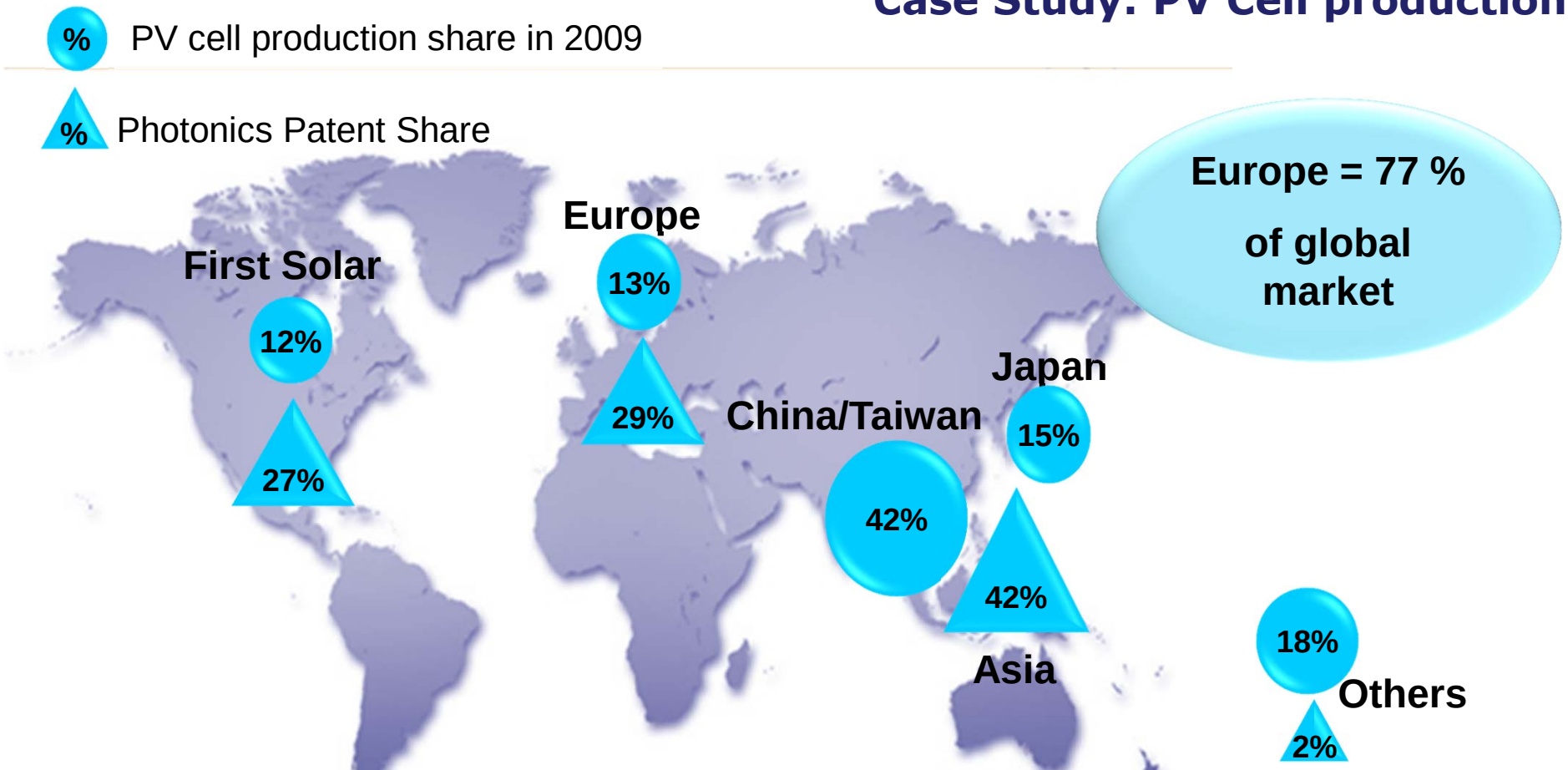
Disconnection between patents share and manufacturing share
Case Study: PV Cell production



Source: Photon International Mars 2010, European Competitiveness Report 2010, European Competitiveness in Key Enabling Technologies (TNO/ZEW)
« JP Morgan, PV News, Oliver Wyman Analysis"

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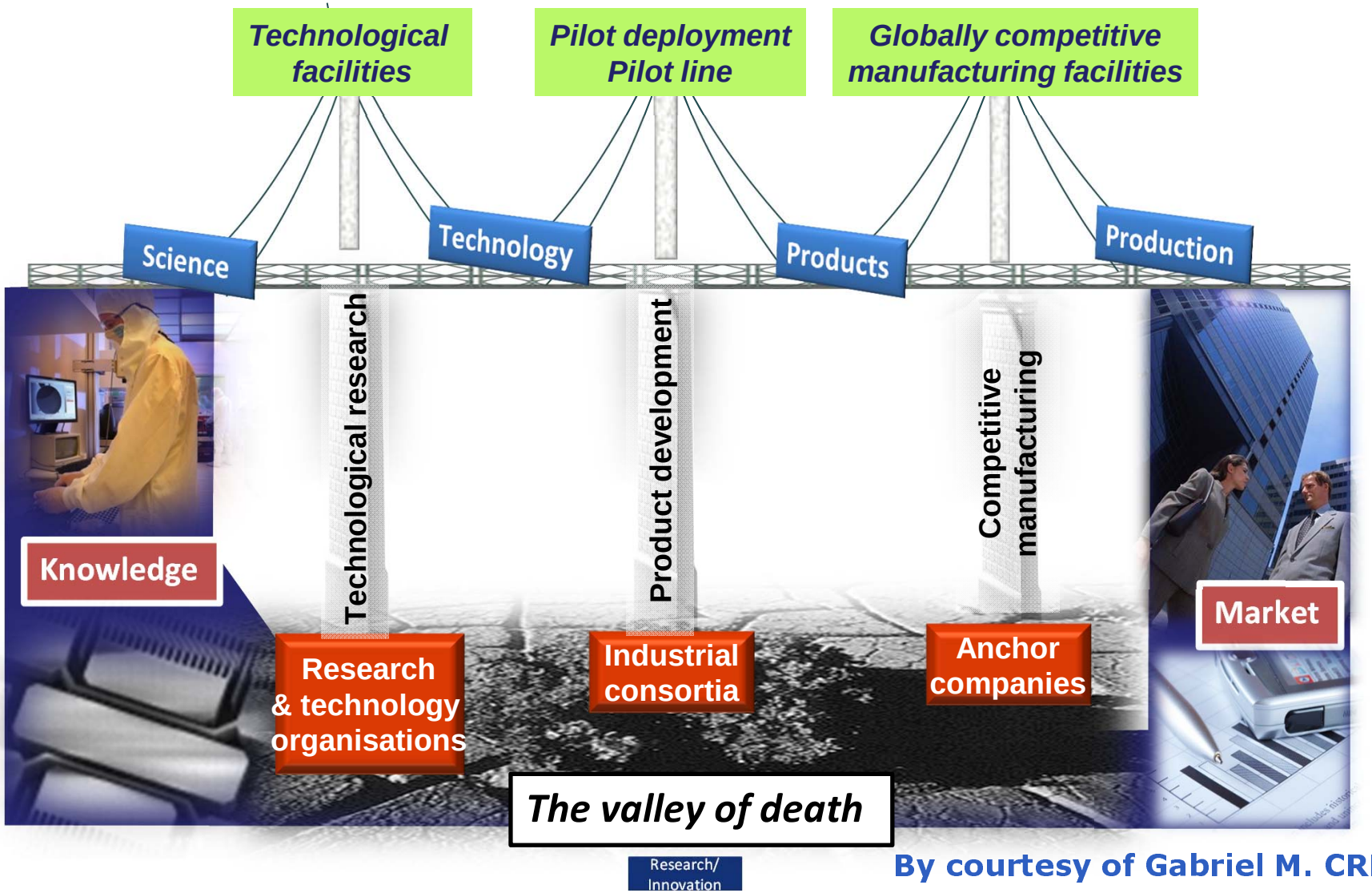
3 - The “ three pillars bridge” to pass across the “ valley of death ”



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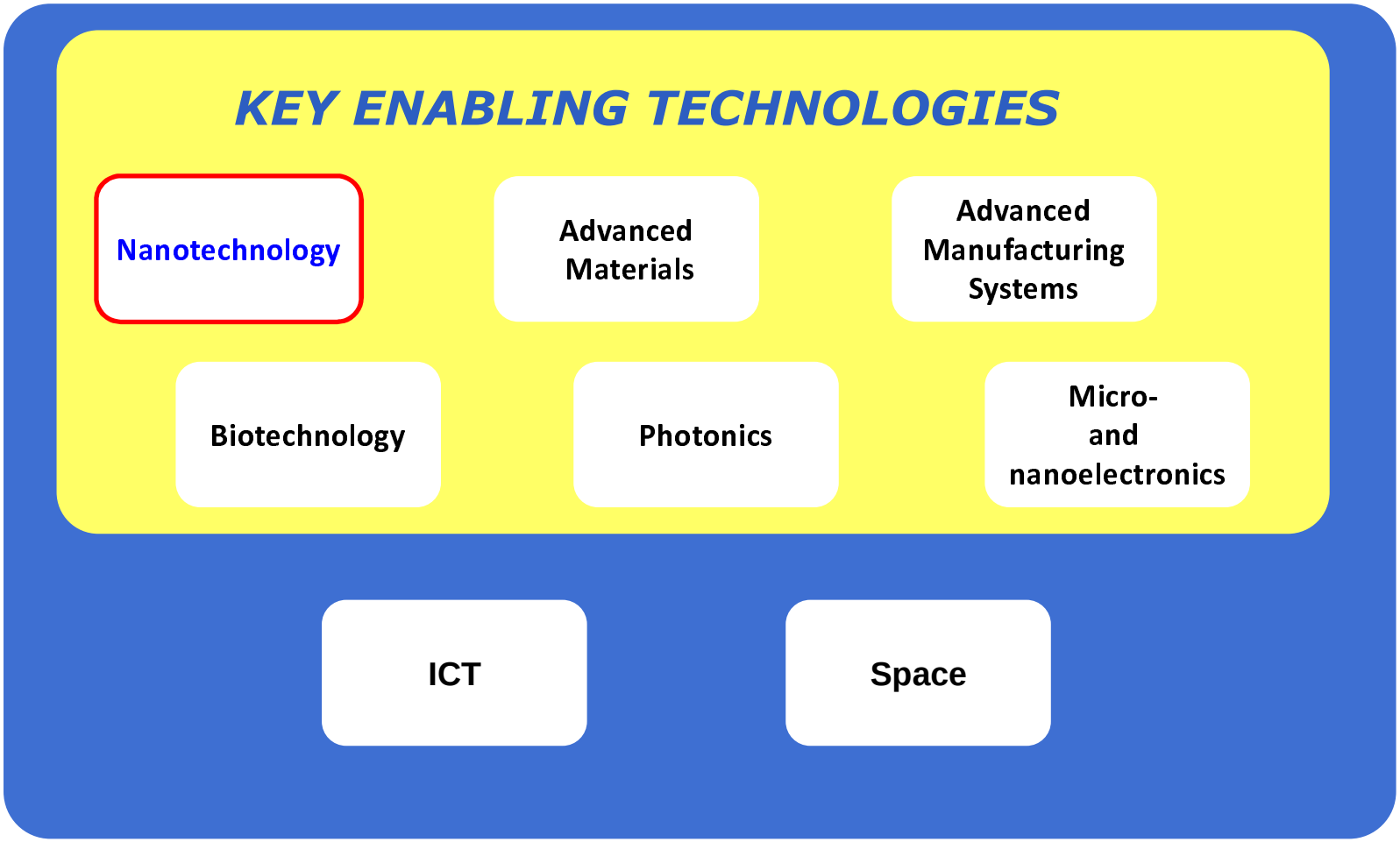
LEADERSHIP IN ENABLING AND INDUSTRIAL TECHNOLOGIES



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NANOTECHNOLOGY – The five Enabling Programme Components

Next generation nanomaterials,-devices and-systems: Development and integration of knowledge at the cross-roads of different scientific disciplines, aiming at fundamentally new products enabling sustainable solutions in a wide range of sectors.

Safe development and application: Advancing scientific knowledge of their potential impact on health or on the environment for pro-active, science-based governance of nanotechnologies, and providing validated scientific tools and platforms for hazard, exposure and risk assessment and management along the entire life cycle of nanomaterials and nanosystems.

Societal dimension: Addressing the human and physical infrastructure needs of nanotechnology deployment and focussing on governance of nanotechnology for societal benefit.

Synthesis and manufacturing: Focusing on new flexible, scalable and repeatable unit operations, smart integration of new and existing processes, as well as up-scaling to achieve mass production of products and multi-purpose plants that ensures the efficient transfer of knowledge into industrial innovation.

Capacity enhancing techniques: Focusing on the underpinning technologies, supporting the development and market introduction of complex nanomaterials and nanosystems, including characterising and manipulating matter at the nano-scale, modelling, computational design and advanced engineering at the atomic level.

NANOTECHNOLOGY – the three main axes

Enabling Programme Components: non application specific

R&D, TRLs 1-4

- Next generation nanomaterials, -devices and -systems
- Safe development and application
- Societal dimension
- Synthesis and manufacturing
- Capacity enhancing techniques

Cross KET application focus areas: Application specific R&D&I

with important nanotechnology contribution, TRLs 5-8

- Nanoenabled surfaces
- Nanostructures and composites

Nanotechnology innovation showcases: Applications

uniquely enabled by nanotechnology, TRLs 5-8

- Nanomedicine
- Environmental technologies

EU RTD investment in nanosafety research

FP 6:

About 31 M (13 projects completed)

FP 7:

2007: € 25 M

2008: € 14 M

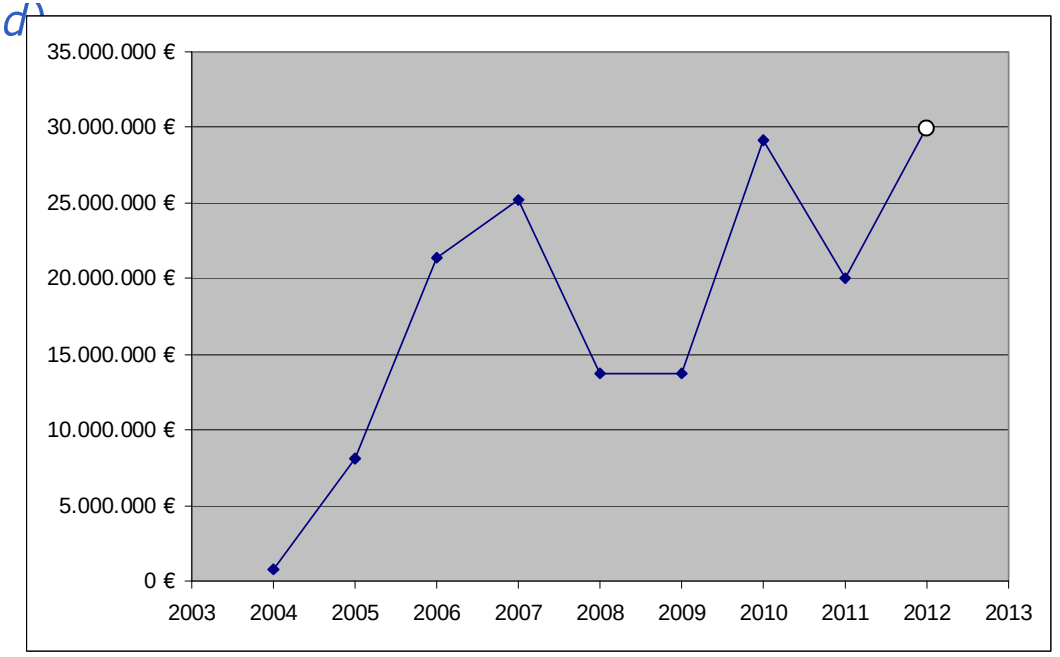
2009: € 14 M

2010: € 29 M

2011: € 20 M

2012: € 30 M (estimated)

Total FP7: € 106M€ EU funding (>30 projects completed or ongoing)



Member States efforts to add

*See also **Compendium of Projects in the European NanoSafety Cluster***

A snapshot on RTD level

Materials characterisation well advanced for most common nanomaterials; difficulties with variations, stability, changing environment, ageing

Hazards mostly understood; difficulties with quantification, combination, long term, special cases

Eco-toxicity has taken some delay.

Exposure monitoring advances fast to cover lost field. Unclear metrics (number, mass, surface), release from matrix, fate

Life-Cycle Analysis progresses well.

Faster progress needed for risk evaluation and risk communication

Some progress marked for risk reduction

A snapshot on innovation and regulatory level

-Materials characterisation data insufficient to underpin Risk Assessment

-Hazards quantification not standardised, combined hazards unclear

-Exposure monitoring and metrics reliability is low.

-In-situ characterisation technologies needed

-Life-Cycle Analysis data inadequate

-Criteria for Risk evaluation/acceptance needed

-Costs-Benefits Analysis just starting and for very few applications

-Risk communication not really up to challenges

-Few best practice guides published

-International cooperation (Communities of Research)

Regulatory testing

Background

- Fast development of the market of manufactured nanomaterials
- Need to evaluate their environmental and health impacts
- Significant breakthrough research is being funded from FP7 resources but results are often inadequate for uptake by regulatory bodies.
- OECD WPMN sponsorship programme. Additional nanotoxicity data for risk assessment are needed.
- Safety concerns about some nanomaterials undermine the whole range of nanotechnology applications.
- Removing this barrier will encourage innovation.

Regulatory testing of nanomaterials (large)

Building on on-going work

Necessary to secure innovation on nanotechnologies

Aiming at providing the necessary mass of data on materials and their behaviour

Input to the OECD-WPMN

A joint action supported by public funding from EU (€10M)

Public funding or contribution of resources from MS and FP7-associated states

Private funding or contribution of resources from industry or other stakeholders

Total project size 3-5 times the EU funding

Laboratories working in network

Consortium agreement on results communication compulsory

International cooperation to be encouraged

A snapshot on market level

-Laboratories networks and certification?
-Benchmarking performances and practices?
-Regulation and implementation mechanism?
-Skills of experts and standardisation?
-Safety management services market?
-Mitigation measures assessment?
-Risk perception and transparency?

A 2013-2020 Research Strategy

- **Done the last three years:**
  - Fast development of a 3-year workplan (until end of FP7) by the cluster
  - Building up the projects portfolio and scientists community
  - Building up international cooperation
- **Now on-going:**
  - A vision document – EU leadership in nanosafety
  - Strategy preparation launched; Official presentation in April 2012.
  - A nanosafety research pillar
- **Implementation of the strategy:**
  - A cluster work
  - Integration of national efforts
- **Preparation for risk management**

A 2013-2020 Research Strategy

- **The strategy must be** global **and** comprehensive**.**

  Vision, purpose (Long term vision ! Move away from today's obstacles !)

  Goals

  State of the Art (Progress and risks)

  Roadmap

  Evaluation (milestones)

  Review (when, criteria)

  Resources

  Mechanisms

  Accountability

Which nano-EHS strategy for Europe?

A European Technology platform is the policy instrument

Nanosafetycluster is the safety pillar of nanoFUTURES

Complemented by national platforms

A vision document sets the goals to reach (what will be the safety requirements in 10 years?)

A strategic research agenda, updated every 4-5 years, provides the strategy

Implementation plan to follow

Attention is due to the European situation

International cooperation

Standardisation and education are key elements

Useful links

- Innovation Union
ec.europa.eu/research/innovation-union

- Horizon 2020
ec.europa.eu/research/horizon2020

- Industrial technologies
ec.europa.eu/research/industrial_technologies

- FP7 calls
ec.europa.eu/research/participants/portal/page/fp7_calls