



A European Strategy for Key Enabling Technologies – A bridge to growth and jobs

EWI Focus – Key Enabling Technologies
14 November 2012 – Brussels

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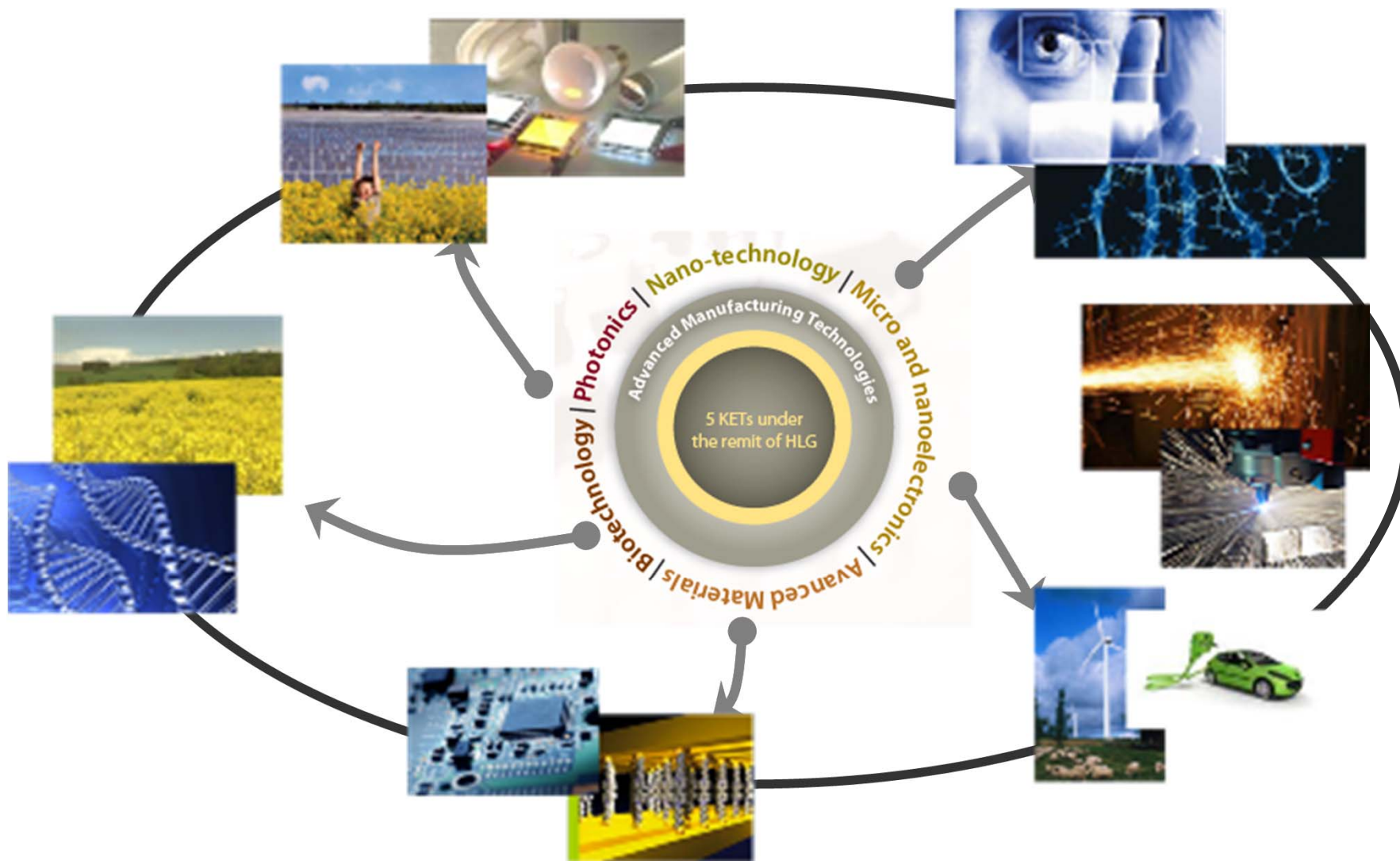
Agenda

- 1. KETs are of systemic relevance to our economies*
- 2. Europe is still in the KETs race (strengths)*
- 3. We have difficulties to exploit our know-how (challenges)*
- 4. Commission's contribution to build the bridge from knowledge to market*
- 5. Horizon 2020*
- 6. Member States and regions are invited to exploit strategies for smart specialisation (structural funds)*

1. KETs are of systemic relevance

Key Enabling Technologies *The basis for product solutions to address societal challenges*

European
Commission



KETs - Similarities

- Enable product solutions to address **societal challenges**
- **Economic potential** (Potential for employment & market potential)
- **Technology intensity** (very knowledge intensive and associated with highly-skilled employment)
- **Capital intensity** (high capital expenditure for initial investments)
- **Multi-disciplinary, cut accross many technology areas**

KETs – generic building blocks for societal challenges applications

**Societal
Challenge**

Health

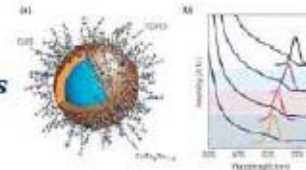


Effective timely
detection and
diagnostic systems

Real-time Avian flu test



Advanced materials



Nanolabels

Microelectronics



Biochip

Nanotechnologies



Fluidics



Optical detection

Photonics

Biotechnologies

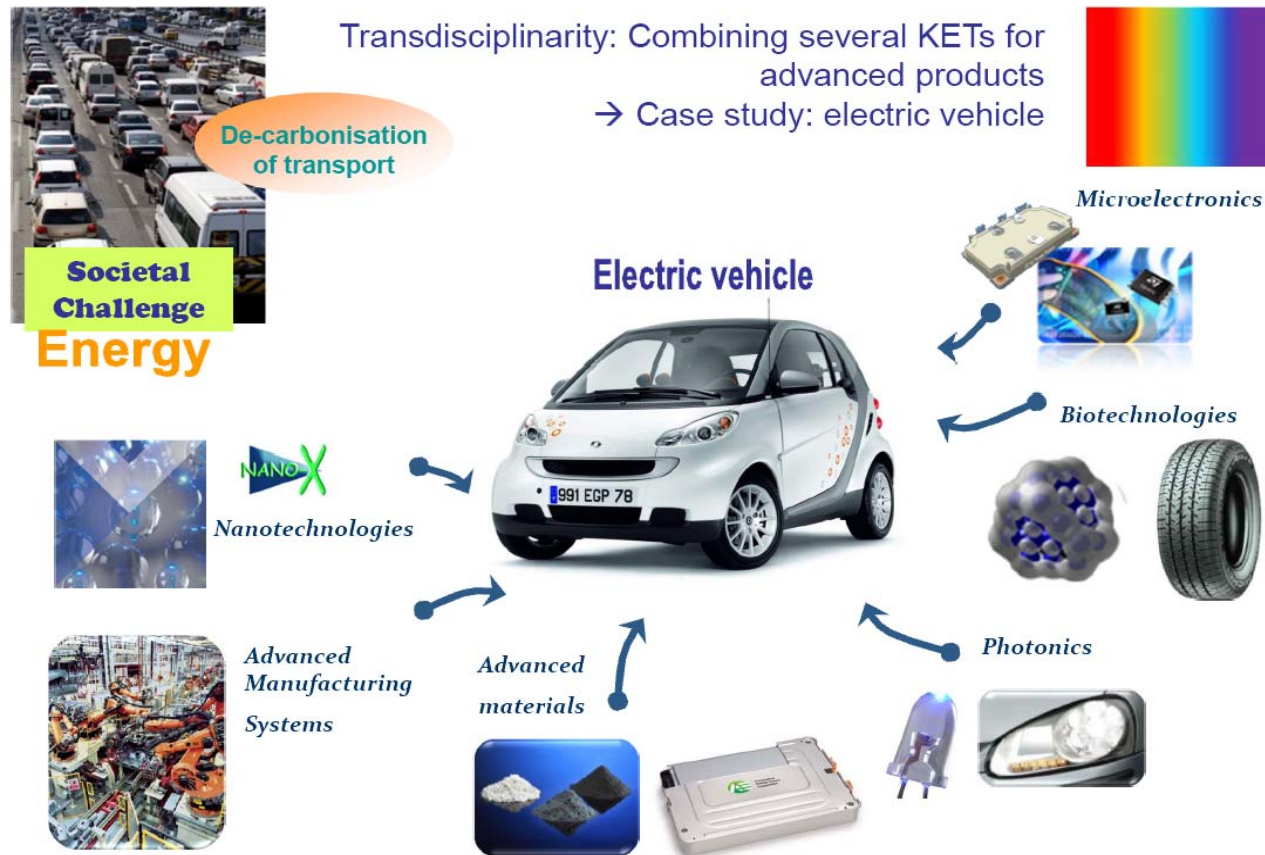


DNA

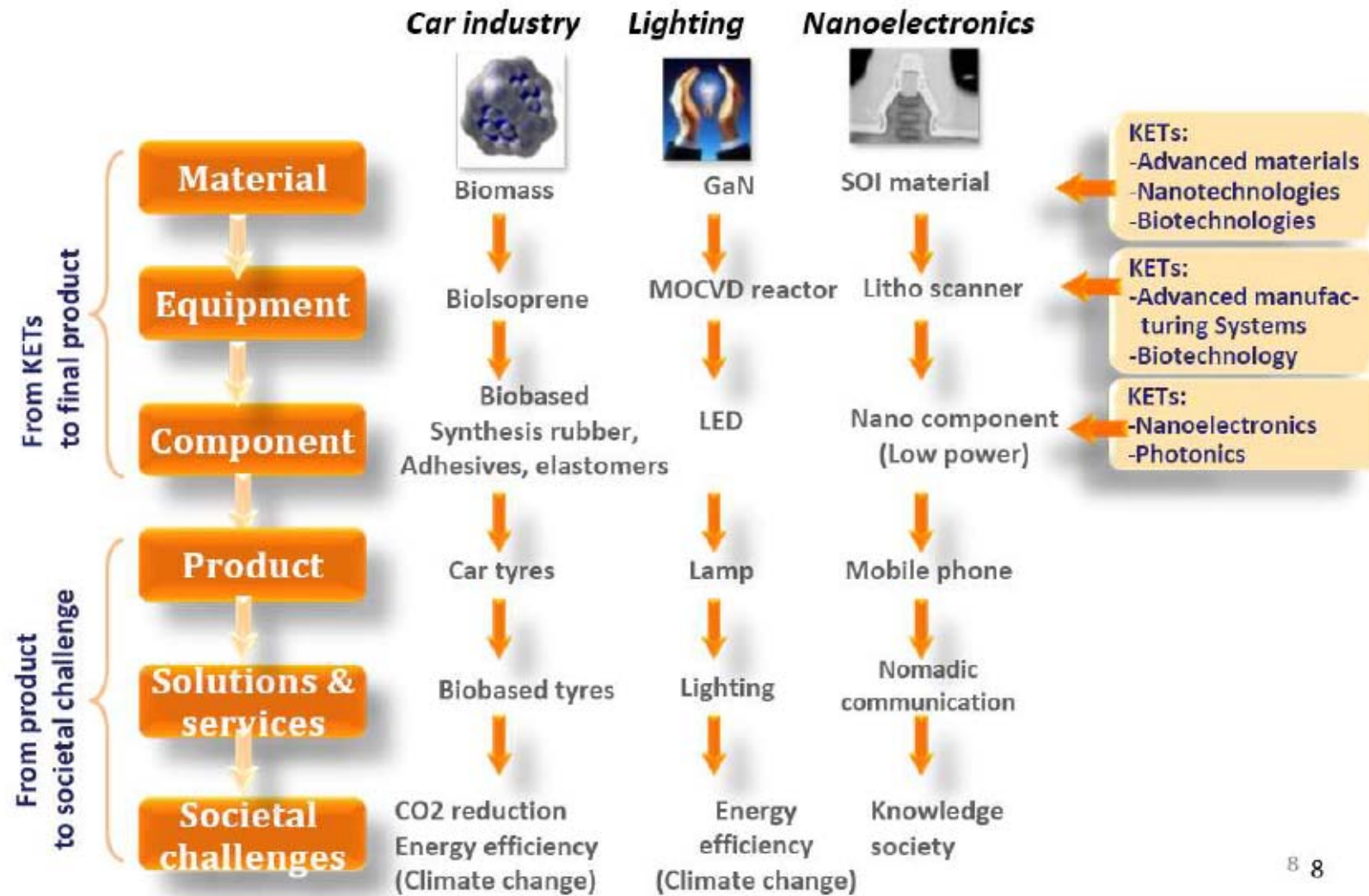


European Commission
Enterprise and Industry

Case example: the electric car



KETs are strategic along the value chain



8 8

Importance of KETs on the EU policy agenda *Europe 2020 and its flagship initiatives*

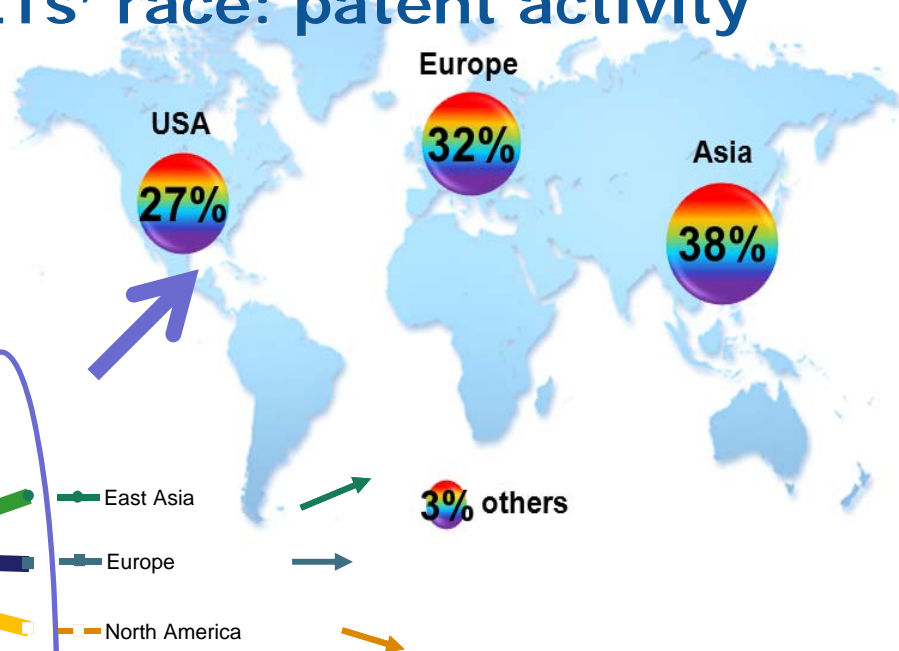
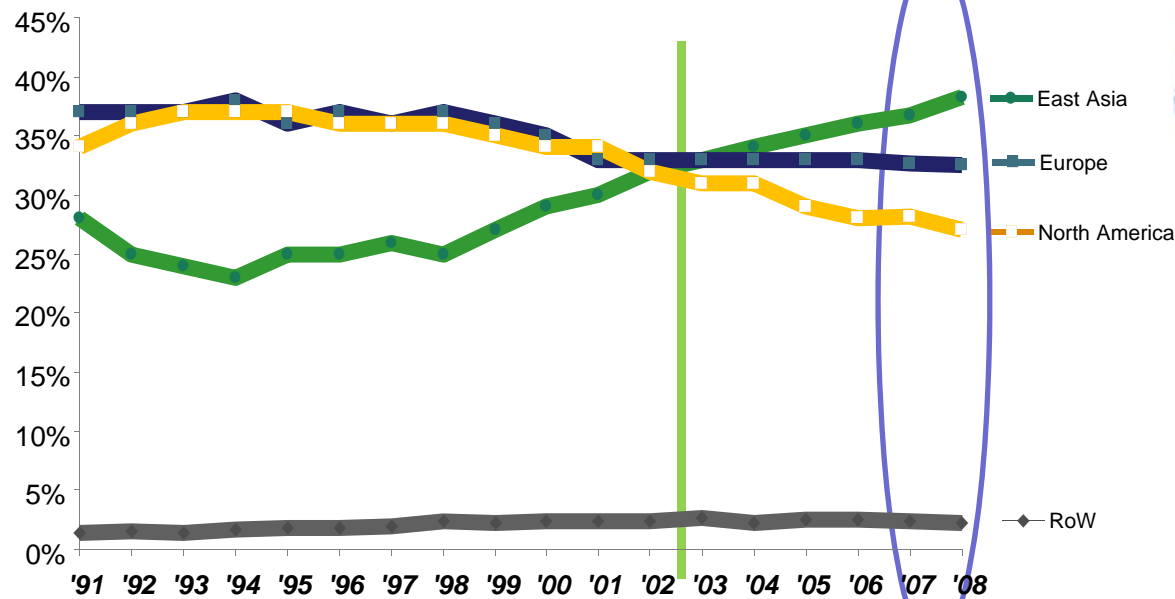


2. Europe is still in the KETs race (strenghts)

2008

Europe is still in the KETs' race: patent activity

*Shares of EPO/PCT patents
by regions (percent)
All KETs cumulated*



2008 priority patents published



EU actors at the top of KETs' patent¹ ranking
Global TOP 10 per KET (1/2)

**R&D
actors**

**All
actors**

**Nano-
technologies**

CEA
Univ. of California
JSTA
CNRS
MIT
US DoE
AIST
NI of Health
Univ. Texas
FhG

Samsung
HP
Univ. of California
Canon
3M
Agilent
JSTA
Hitachi
Sony
Matsushita

**Micro and
nanoelectronics**

CEA
Univ. of California
IMEC
FhG
AIST
CNRS
MIT
JSTA
IKETR
Univ. Tohoku

Infineon
Tokyo Electron
Matsushita
Samsung
Applied Materials
Fujitsu
Nikon
ST-Microelectronics
NEC
IBM

Photonics

CEA
FhG
MIT
Univ. of California
US DoE
CNRS
AIST
JSTA
US gvmt.
ETRI

Samsung
Matsushita
3M
Corning
Fuji Film
Osram
Sumitomo
Sharp
Kodak
Sony

1. EPO/PCT patents, 2000-2007
 Source: European Competitiveness Report 2010, European Competitiveness in Key Enabling Technologies (TNO/ZEW), TKM 2011

EU actors at the top of KETs' patent¹ ranking *Global TOP 10 per KET (2/2)*

Biotechnology

Advanced Materials

Advanced Manuf. systems

R&D actors

Univ. of California
CSIC
CNRS
JSTA
Univ. of Wisconsin
FhG
Noth Carolina Univ.
AIST
MPI
John Hopkins

CNRS
Univ. of California
CEA
US DoE
FhG
AIST
JSTA
MIT
US gvmt.
NI of Health

FhG
CEA
US DoE
Univ. of California
JSTA
CNRS
AIST
DLR
NI of Health
TNO

All actors

BASF
Novozymes
Evonik
Du Pont
Univ. of California
Bayer
Danisco
Matsushita
Mitsubishi
Aplera

BASF
Du Pont
Dow
3M
Evonik
Arkema
Bayer
Fuji
GE
Esso

Siemens
Bosch
Continental
Endress&Hauser
Fanuc
Honeywell
ABB
GE
Honda
Hitachi

1. EPO/PCT patents, 2000-2007

Source: European Competitiveness Report 2010, European Competitiveness in Key Enabling Technologies (TNO/ZEW), TKM 2011

3. We have difficulties to exploit our know-how (challenges)

Disconnection between patents share and manufacturing share

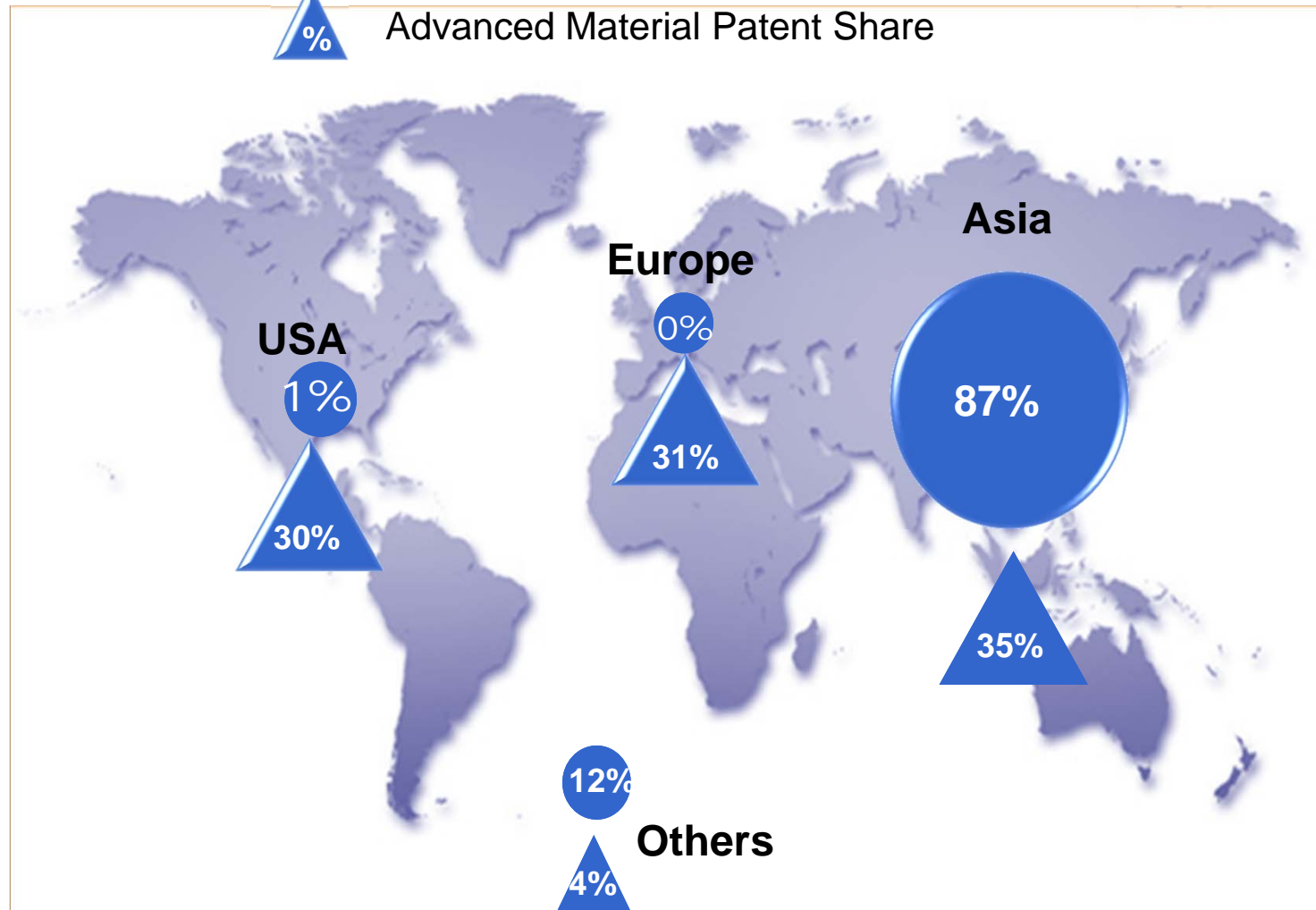
Case Study: Li-ion battery production



Li-ion battery cell production share in 2008



Advanced Material Patent Share

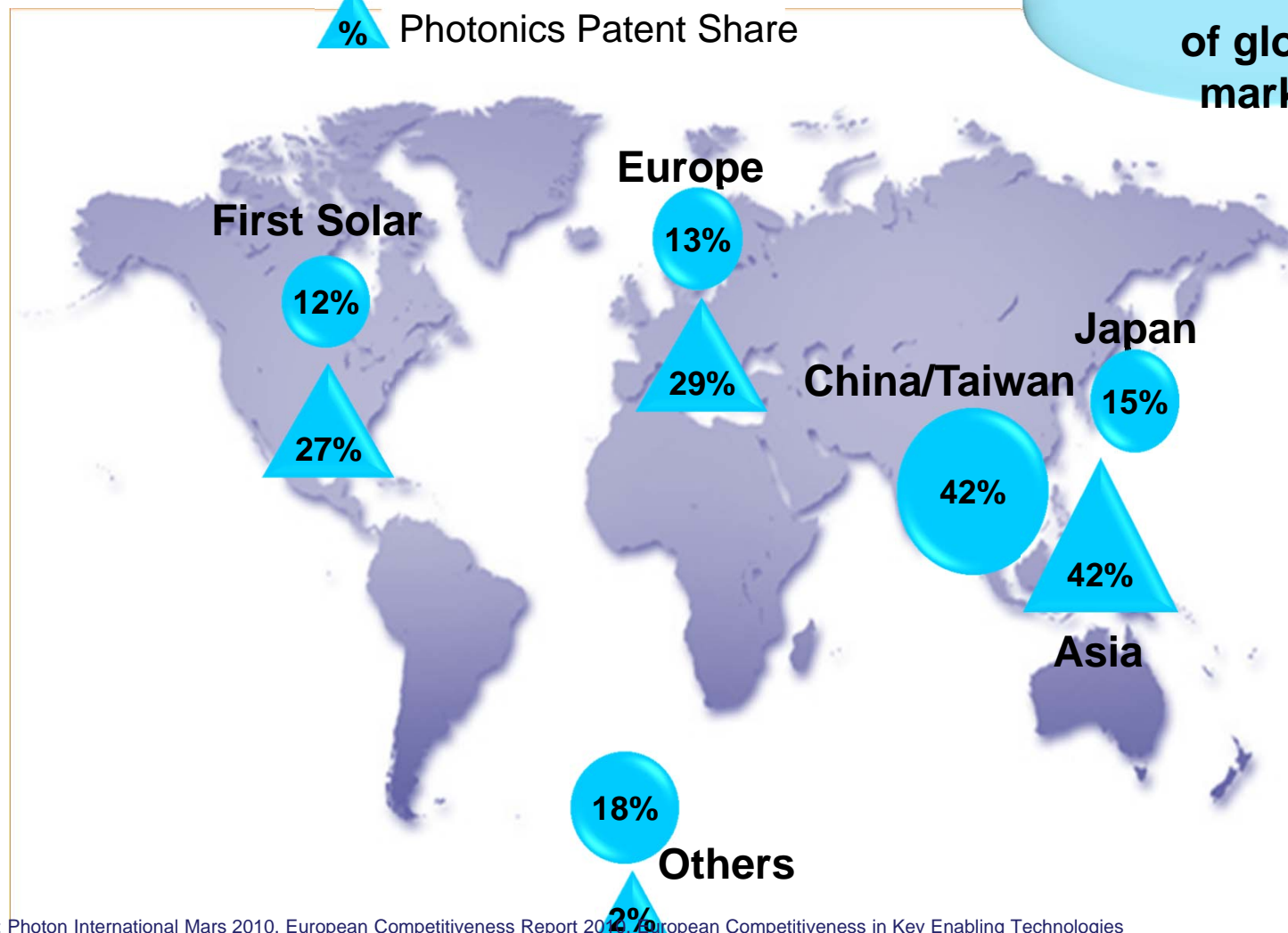




● % PV cell production share in 2009

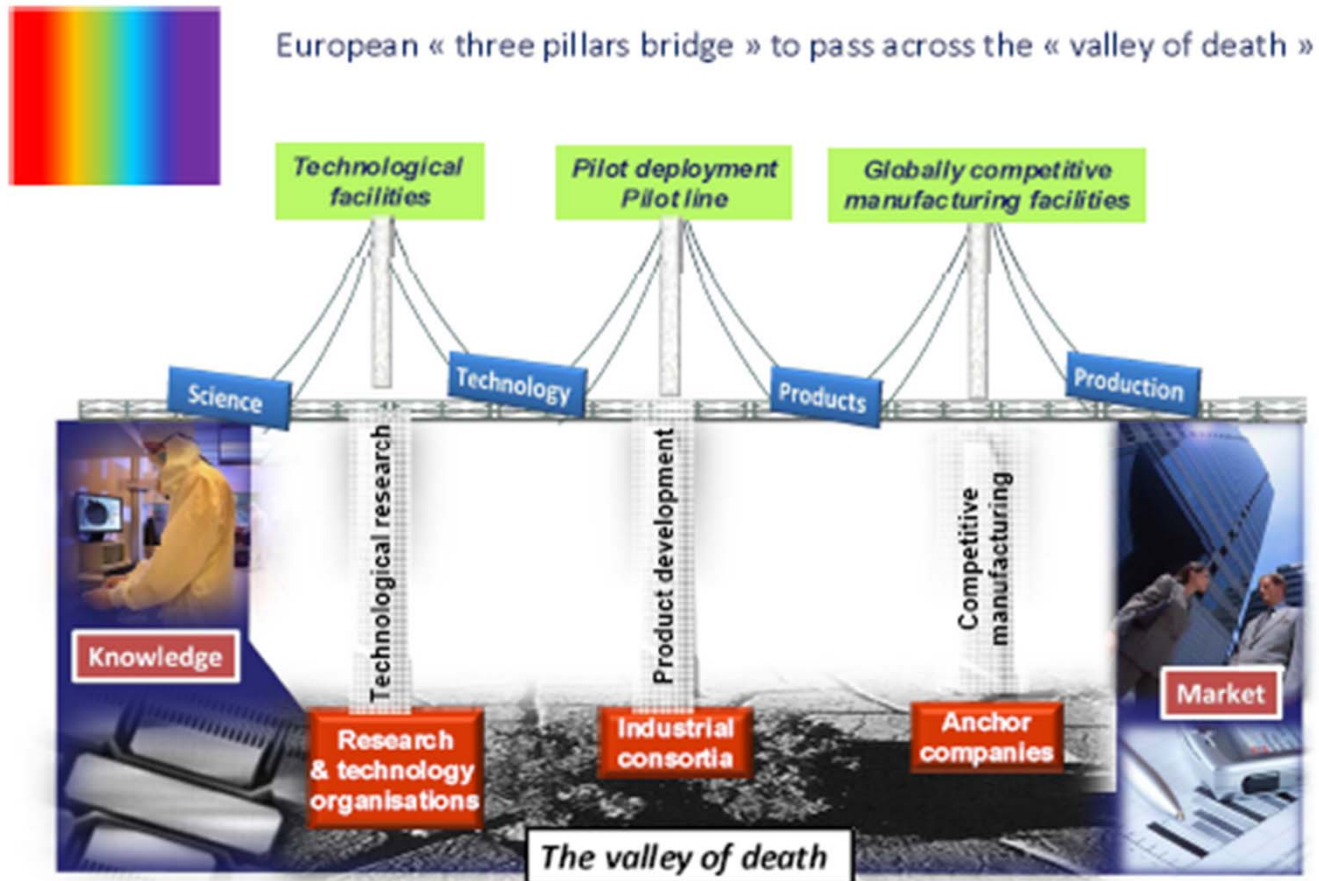
▲ % Photonics Patent Share

Europe = 77 %
of global market



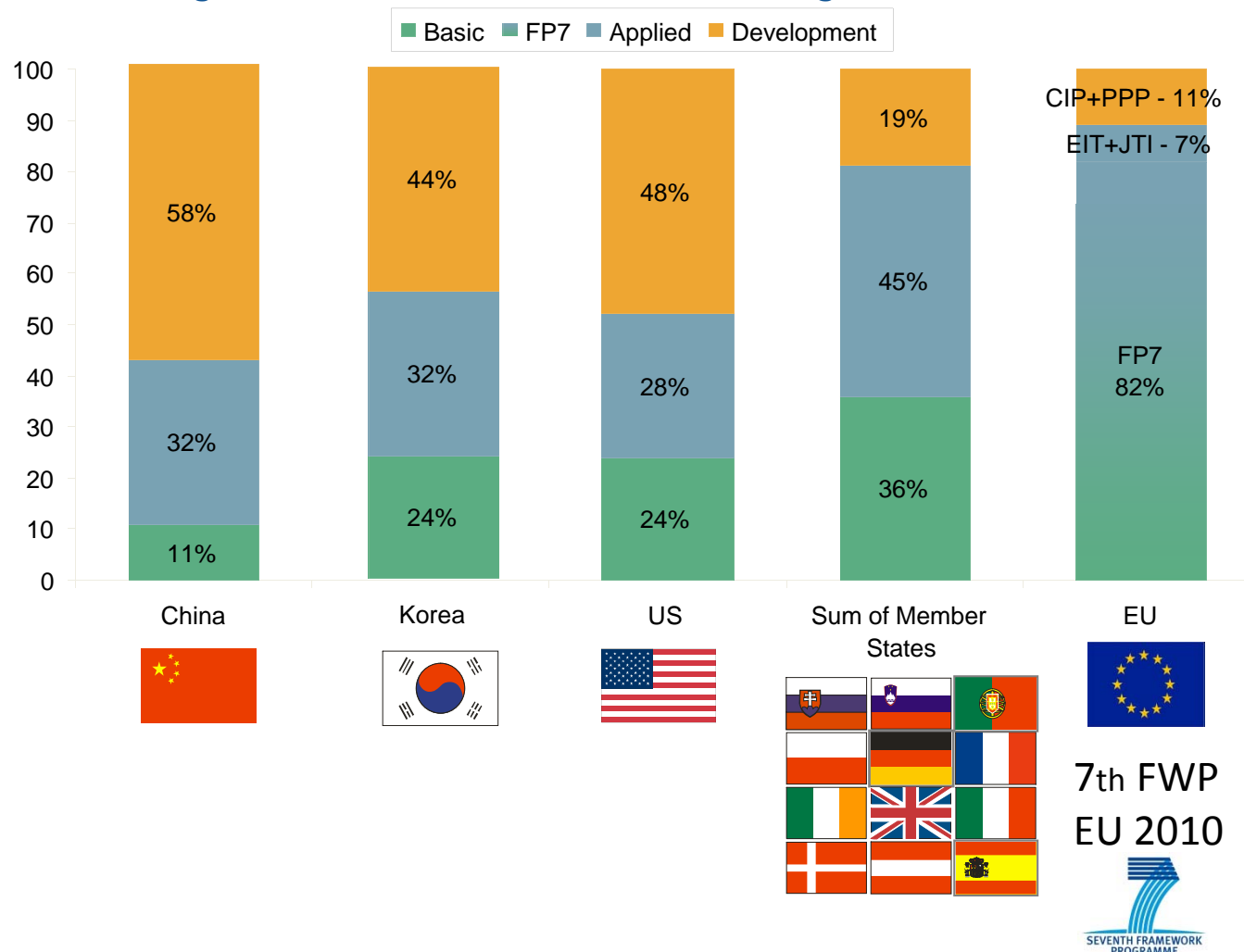
Source: Photon International Mars 2010, European Competitiveness Report 2010, European Competitiveness in Key Enabling Technologies (TNO/ZEW)
« JP Morgan, PV News, Oliver Wyman Analysis »

Problem analysis: the “valley of death”





Korean, Chinese and US federal R&D funds mainly go to applied "Development" whereas Europe has the highest share of Basic Research Funding



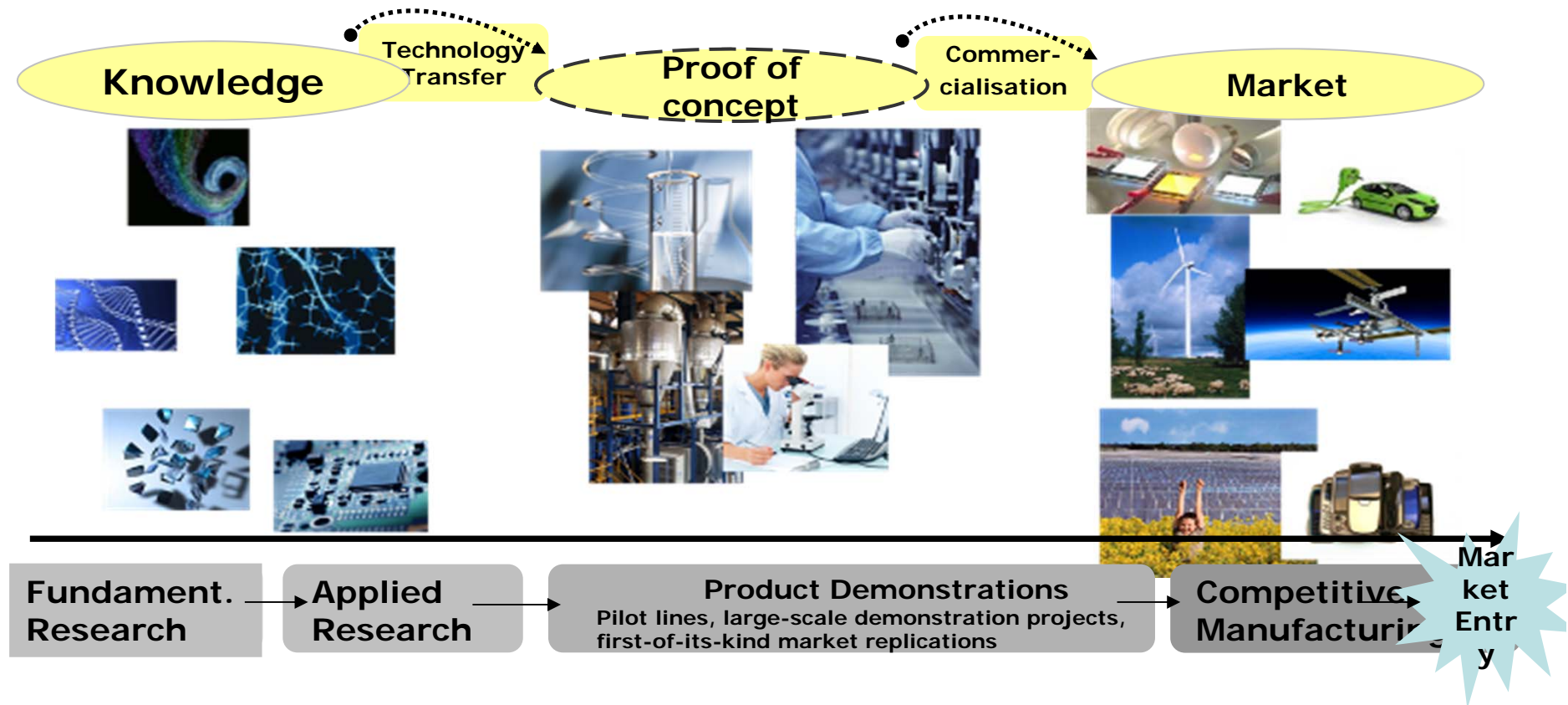
Source: Key Science and Engineering Indicators, National Science Board, 2010 Digest, NSF, <http://cordis.europa.eu/erawatch>, OECD "Research and Development Statistics", Own analysis

4. Commission's response

Objective



KETs' policy concerns not only the mastering of technology but also the deployment of these technologies into KETs-based products within the EU





An Action Plan (Communication 2012)

- A - **Adaptation** of EU instruments & policies in support of KETs deployment*
- B – Ensure **coordination** of EU and national activities to achieve synergies*
- C – Dedicated **governance** structures to ensure smooth implementation of the KETs strategy*
- D – Mobilising existing **trade** instruments to ensure fair competition and an international level playing field*



An Action Plan (Communication 2012)

A - Adaptation of EU instruments & policies in support of KETs deployment

- **Horizon 2020**
 - Allocation of € 6.7 bio
 - Rebalancing towards pilot-lines / demonstrator projects
 - Cross-cutting projects
 - Selection Criteria

Implemented actions: Horizon 2020

An integrated approach to Key Enabling Technologies

A major component of 'Leadership in Enabling and Industrial Technologies' are Key Enabling Technologies (KETs), defined as micro- and nanoelectronics, photonics, nanotechnology, biotechnology, advanced materials and advanced manufacturing systems²⁰. Many innovative products incorporate several of these technologies simultaneously, as single or integrated parts. While each technology offers technological innovation, the accumulated benefit from combining a number of enabling technologies can also lead to technological leaps. Tapping into cross-cutting key enabling technologies will enhance product competitiveness and impact. The numerous interactions of these technologies will therefore be exploited. Dedicated support will be provided for larger-scale pilot line and demonstrator projects.

This will include cross-cutting activities that bring together and integrate various individual technologies, resulting in technology validation in an industrial environment to a complete and qualified system, ready for the market. Strong private sector involvement in such activities will be a prerequisite and implementation will therefore notably be through public private partnerships. To this extent and through a dedicated governance structure, a joint work programme for cross-cutting KETs activities will be developed. Taking into account market needs and the requirements of the societal challenges, it will aim at providing generic KETs building blocks for different application areas, including societal challenges.



An Action Plan (Communication 2012)

A - Adaptation of EU instruments & policies

- Horizon 2020
 - Allocation of € 6.7 bn to KETs
 - Rebalancing towards pilot-lines / demonstrator projects
 - Cross-cutting projects
 - Selection Criteria
- **European Regional Development Funds**
 - **KETs as priority investment area**
 - **Financing up till first production**
 - **Combined financing**



Implemented actions: European Regional Development Fund (ERDF)

Proposal for a

REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

on specific provisions concerning the European Regional Development Fund and the Investment for growth and jobs goal and repealing Regulation (EC) No 1080/2006

Article 5

Investment priorities

The ERDF shall support the following investment priorities within the thematic objectives set out in Article 9 of Regulation (EU) No [...] /2012 [CPR]:

- (c) supporting technological and applied research, pilot lines, early product validation actions, advanced manufacturing capabilities and first production in Key Enabling Technologies and diffusion of general purpose technologies;



Combined Financing

Proposal for a

REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

laying down common provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund, the European Agricultural Fund for Rural Development and the European Maritime and Fisheries Fund covered by the Common Strategic Framework and laying down general provisions on the European Regional Development Fund, the European Social Fund and the Cohesion Fund and repealing Regulation (EC) No 1083/2006

Eligibility of expenditure and durability

{SEC(2011) 1141 final}
{SEC(2011) 1142 final}

Article 55

Eligibility

8. An operation may receive support from one or more CSF Funds and from other Union instruments, provided that the expenditure item included in a request for payment for reimbursement by one of the CSF Funds does not receive support from another Fund or Union instrument, or support from the same Fund under another programme.



An Action Plan (Communication 2012)

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- **European Regional Development Funds**
 - KETs as priority investment area
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 - Combined financing
 - **Smart specialisation**
 - **Cluster specific actions**



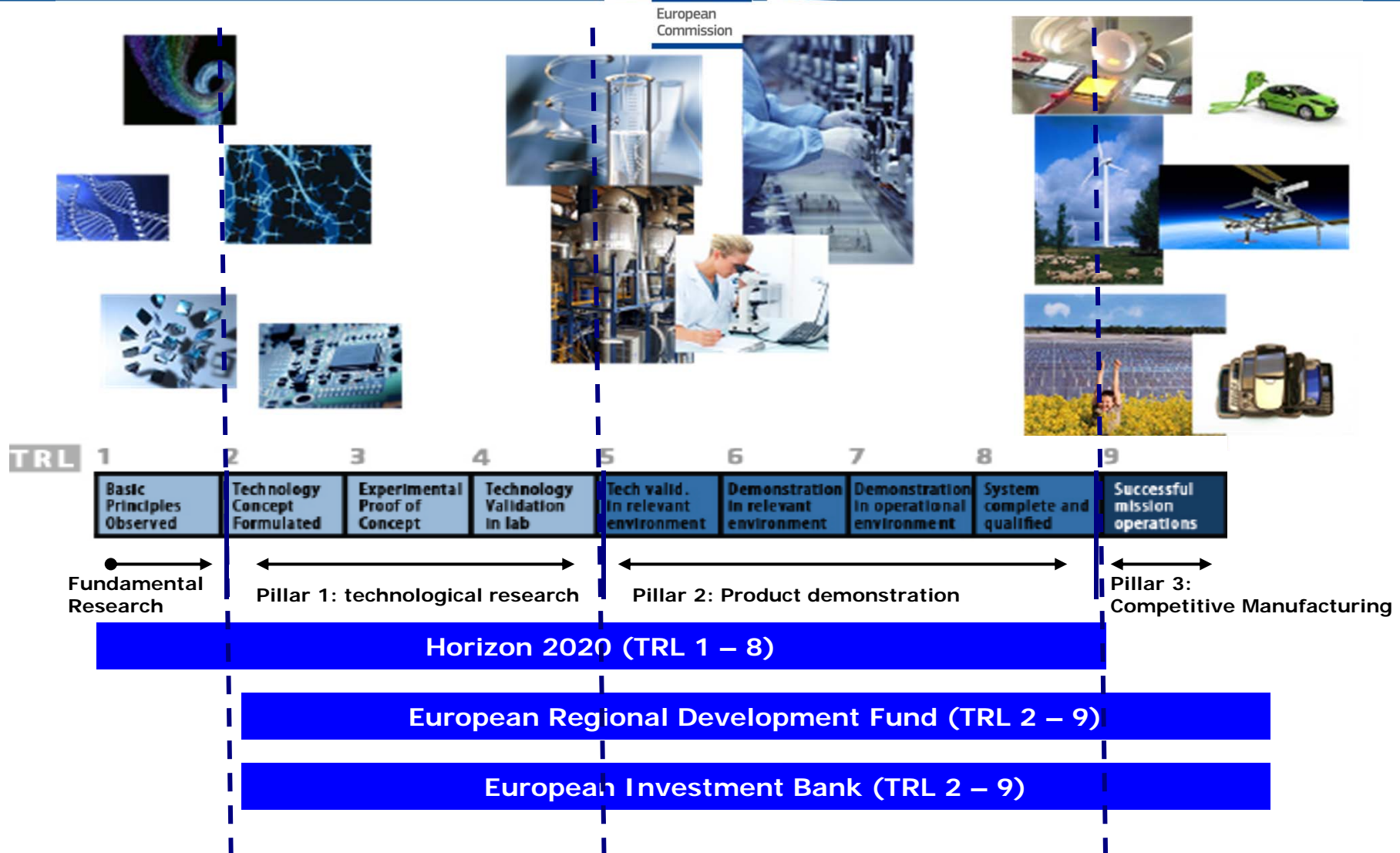
An Action Plan (Communication 2012)

A - Adaptation of EU instruments & policies

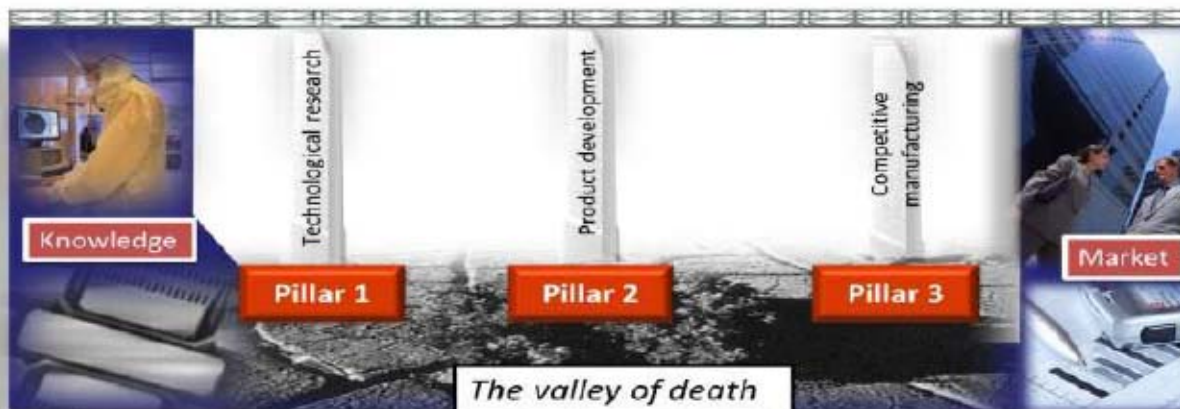
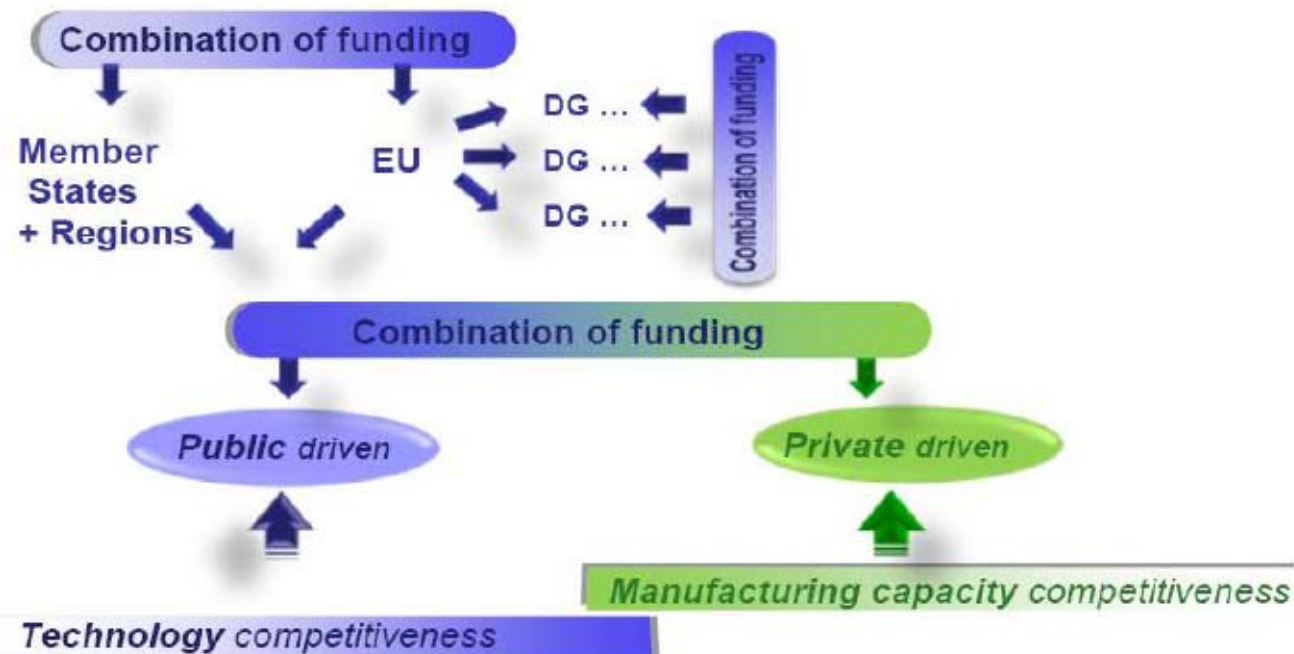
- Horizon 2020
- Structural Funds
- **An agreement with the European Investment Bank**

KETs on the EU Agenda

Horizon 2020, Structural Funds and EIB



Leveraging public & private investments





An Action Plan (Communication 2012)

A - Adaptation of EU instruments & policies

- Horizon 2020
- Structural Funds
- An agreement with the European Investment Bank
- **Modernise State aid rules**
- **Promotion of required multidisciplinary skills and training** (through KICs, Marie Curie Actions and the Knowledge Alliances)

An Action Plan

B – Coordination (to achieve synergies)

- **Synergies with national industrial innovation policies**
- **Memorandum of Understanding by industrial stakeholders**

C – Governance (to ensure smooth implementation)

- **Coordination Group on KETs within Horizon 2020**
- **An external KETs Issues Group**

D – Trade

- **Strive to ensure a global level playing field**

5. HORIZON 2020



Horizon 2020

- Commission proposal for a **80 billion euro** research and innovation funding programme (**2014-2020**) (part of proposals for next EU budget, complementing Structural Funds, education, etc)
- **A single programme** bringing together three separate programmes/initiatives:
 - The Framework Programme for Research and Technological Development (FP)
 - Innovation aspects of Competitiveness and Innovation Framework Programme (CIP)
 - EU contribution to the European Institute of Innovation and Technology (EIT)
- **Coupling research to innovation** – from research to retail, all forms of innovation
- **Simplified access**, for all companies, universities, institutes in all EU countries and beyond.





Three priorities:

1. Excellent science
2. Industrial leadership
3. Societal challenges



Priority 1: Excellent Science

Proposed funding (million euro, 2014-2020)

European Research Council Frontier research by the best individual teams	13 268
Future and Emerging Technologies Collaborative research to open new fields of innovation	3 100
Marie Curie actions Opportunities for training and career development	5 572
Research infrastructures (including e-infrastructure) Ensuring access to world-class facilities	2 478

Priority 2: Industrial Leadership

Proposed funding (million euro, 2014-2020)

Leadership in enabling and industrial technologies (i) ICT <i>including micro- and nano-electronics and photonics</i> (ii) Nanotechnologies (iii) Advanced Materials (iv) Biotechnology (v) Advanced Manufacturing and Processing (vi) Space	13 781
Access to risk finance Leveraging private finance and venture capital for R&I	6 663
Innovation in SMEs Fostering all forms of innovation in all types of SMEs	3 538
	619

~ 30% to cross-cutting KETs



Priority 3: Societal Challenges

Proposed funding (million euro, 2014-2020)

Health, demographic change and wellbeing	8 033
Food security, sustainable agriculture, marine and maritime research & the bio-economy	4 152
Secure, clean and efficient energy*	5 782
Smart, green and integrated transport	6 802
Climate action, resource efficiency and raw materials	3 160
Inclusive, innovative and secure societies	3 819

**Additional €1 788m for nuclear safety and security from the Euratom Treaty activities (2014-2018). Does not include ITER.*





Horizon 2020 time line

Ongoing: Parliament and Council negotiations on EU budget 2014-20 (including overall budget for Horizon 2020)

By end 2013: Adoption of legislative acts by Parliament and Council on Horizon 2020

1/1/2014: Horizon 2020 starts; launch of first calls





Links to COSME

Horizon 2020 and COSME are complementary programmes to generate growth and jobs

Different focus:

- Horizon 2020 = innovation driven growth
- COSME (*) = support to create favourable business environment and competitiveness

(*) new Programme for the Competitiveness of Enterprises and Small and Medium-sized Enterprises (COSME) will run from 2014 to 2020, with a planned budget of €2.5bn



6. Smart specialisation

Concept

- KETs are pervasive and not sector-specific
- Any region can find its particular niche
- Building upon existing assets & linking into European value chains
- Analysing the whole value chain – upstream and downstream including all its actors
- Enhancing regional eco-systems (clusters)

Study - Exchange of good policy practices promoting the industrial uptake and deployment of KETs (June 2012)

Performance profile Belgium

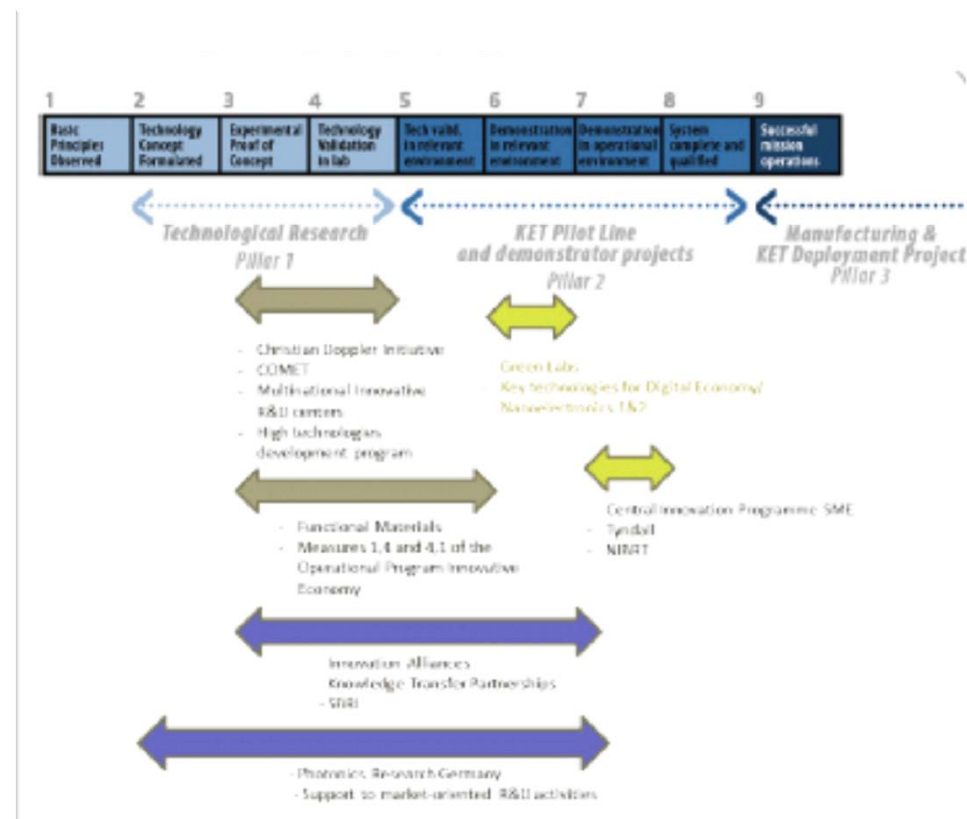
Patent and trade performance: Belgium performs well (strong patent and trade performance) in nanotechnology, industrial biotechnology and advanced materials

Important actors Belgium

2) IMPORTANT ACTORS					
Photonics	Nanotechnology	Industrial Biotechnology	Advanced Materials	Micro-/Nanoelectronics	Advanced Manufacturing
Largest Patent Applicants: Ten largest patent applicants (excluding private individuals)					
Tyco Electronics Raychem BVBA IMEC SOLVAY (SOCIETE ANONYME) AGC Flat Glass Europe SA BARCO NV GLAVERBEL INTERUNIVERSITAIR MICROELEKTRONIK Universität Libre de Bruxelles NV BEKAERT SA Universiteit Gent	IMEC KATHOLIEKE UNIVERSITEIT LEUVEN SOLVAY (SOCIETE ANONYME) INTERUNIVERSITAIR MICROELEKTRONIK	AGFA GRAPHICS NV SOLVAY (SOCIETE ANONYME) Janssen Pharmaceutica N.V. CYTEC SURFACE SPECIALTIES, S.A. Universiteit Gent	TOTAL PETROCHEMICALS RESEARCH FEL Solvay (Societe Anonyme) IMEC INEOS MANUFACTURING BELGIUM NV Cytec Surface Specialties S.A./N.V. GLAVERBEL AGC Flat Glass Europe SA Agfa Graphics N.V. KATHOLIEKE UNIVERSITEIT LEUVEN, K.U. NV BEKAERT SA	IMEC KATHOLIEKE UNIVERSITEIT LEUVEN SOLVAY (SOCIETE ANONYME) Universität Libre de Bruxelles Melexis NV SARNOFF EUROPE BVBA AGC FLAT GLASS EUROPE SA	ELECTROLUX HOME PRODUCTS CORPOR INERGY AUTOMOTIVE SYSTEMS RESEAR TOTAL PETROCHEMICALS RESEARCH FEL THE EUROPEAN ATOMIC ENERGY COMM HERAEUS ELECTRO-NITE INTERNATIONA Visys NV Agfa HealthCare NV Techspace Aero SA Janssen Pharmaceutica N.V. LayerWise N.V.

Source: EPO: PATSTAT / ZEW calculation.

Mapping of good policy practice cases on TRL scale





How to develop « Smart Specialisation Strategies » S3



- Designed to assist regions and Member States in developing S3 strategies
- Managed by a team established at JRC-IPTS in Seville
- Input from a Mirror Group of European high-level experts and network representatives
- First product will be a methodological and practical guide on “Innovation Strategies for Smart Specialisation”
- Regions should register at :

<http://ipts.jrc.ec.europa.eu/activities/research-and-innovation/s3platform.cfm>





Thank you!



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Website:

http://ec.europa.eu/enterprise/sectors/ict/key_technologies/index_en.htm

HLG website:

http://ec.europa.eu/enterprise/hlg_kets.htm