Integrated approach for the develoment of advanced materials and systems in H2020

Bari, 18 September 2014
Christos E. Tokamanis
DGRTD/D3
"Advanced materials and nanotechnologies"

HORIZON 2020

Integrated approach for the develoment of advanced materials and systems in H2020

Outline:

- **Role of Key Enabling Technologies**
- **Horizon 2020**
- **Advanced Materials and Nanotechnologies integration:**

  "First Horizon 2020 calls and future directions"

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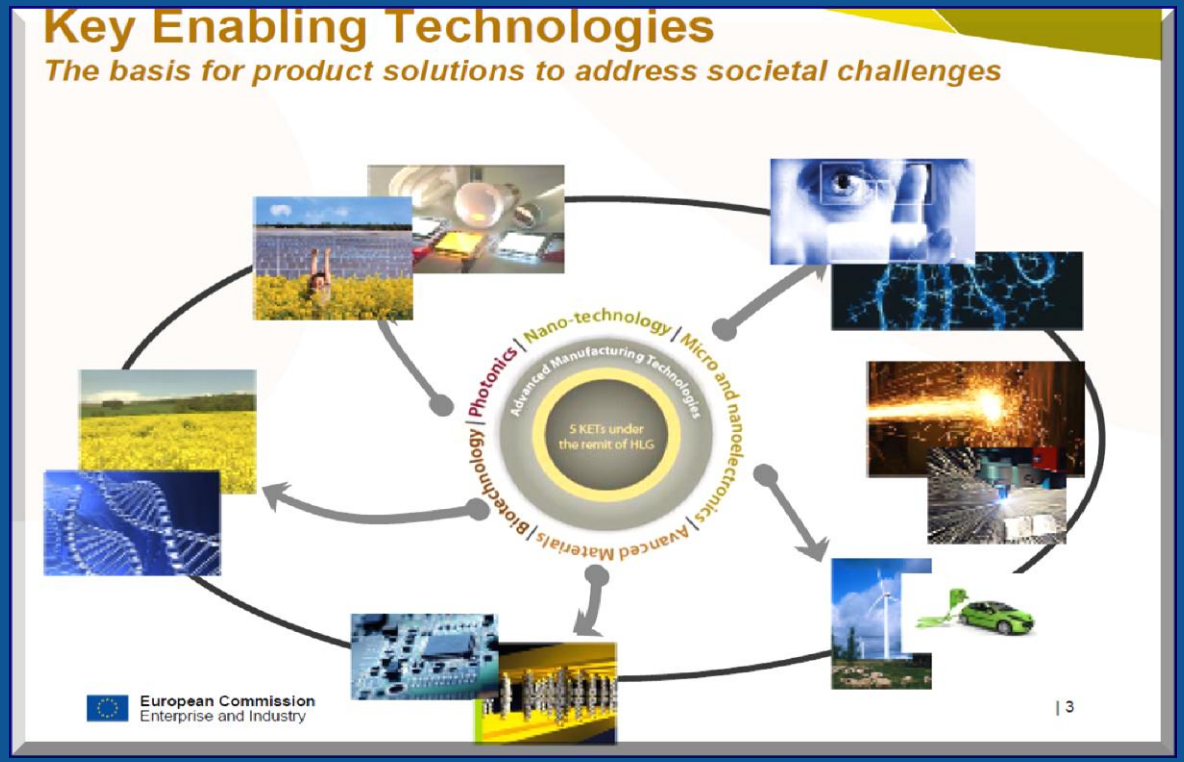
Key Enabling Technologies as a competitive tool



Mastering and industrial deployment of Key Enabling Technologies (KETs)

What are KETs?

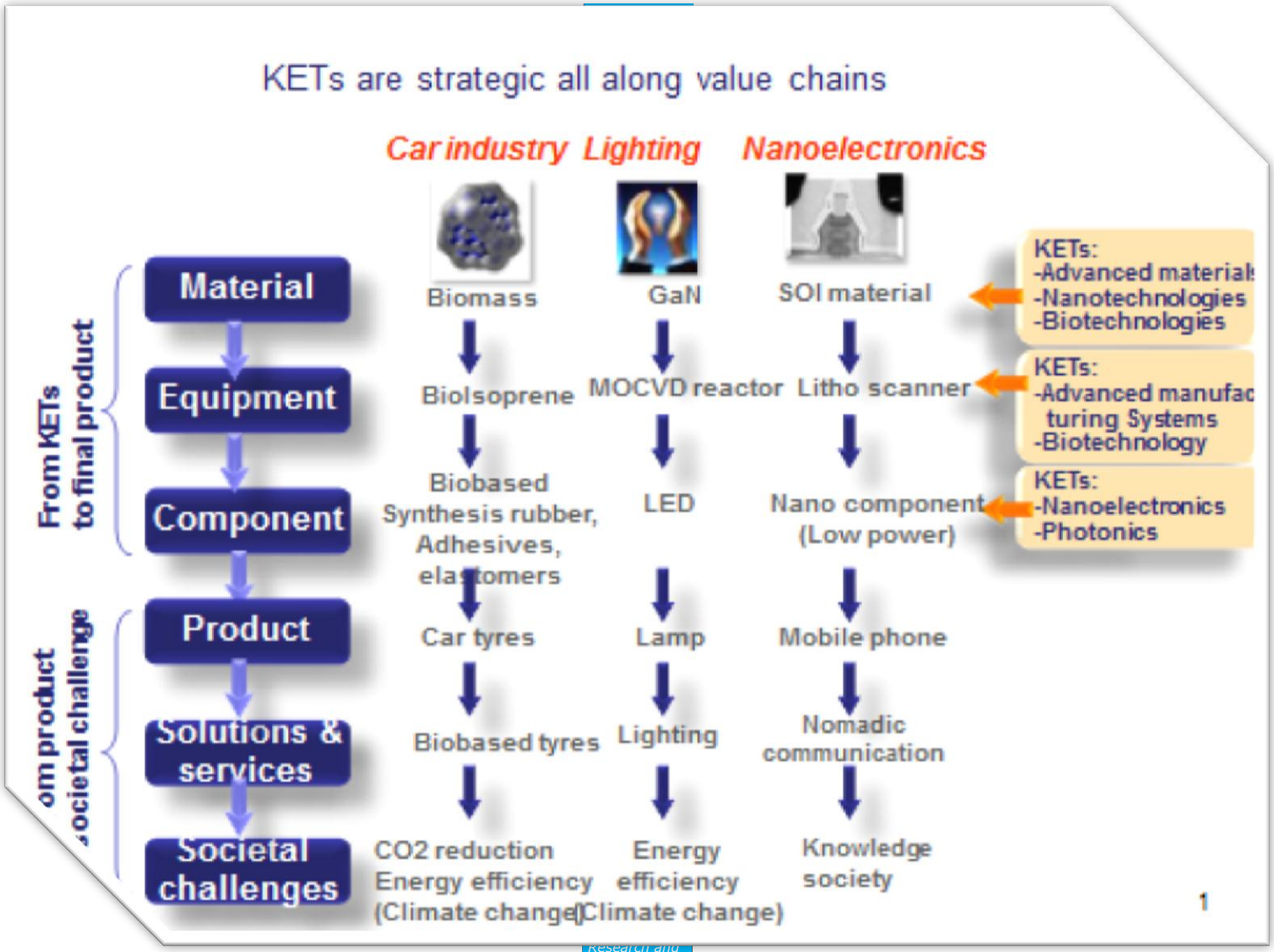
- *Six strategic technologies*
- *Driving competitiveness and growth opportunities*
- *Contributions to solving societal challenges*
- *Knowledge- and Capital-intensive*
- *Cut across many sectors*

- **Nanotechnologies**
- **Advanced Materials**
- **Micro- and nano-electronics**
- **Photonics**
- **Biotechnology**
- **Advanced Manufacturing**

European KET Strategy:

- **EC Communications** (2009)512 & (2012)341
- **KET High-level Group**

Case example: the electric vehicle


KETs are strategic all along value chains
Car industry
Lighting
Nanoelectronics
Material
Equipment
Component
Product
Solutions & services
Societal challenges
From KETs to final product
om product societal challenge
Biomass
GaN
SOI material
BioIsoprene
MOCVD reactor
Litho scanner
Biobased Synthesis rubber, Adhesives, elastomers
LED
Nano component (Low power)
Car tyres
Lamp
Mobile phone
Biobased tyres
Lighting
Nomadic communication
CO2 reduction Energy efficiency (Climate change)
Energy efficiency (Climate change)
Knowledge society
KETs: -Advanced materials -Nanotechnologies -Biotechnologies
KETs: -Advanced manufacturing Systems -Biotechnology
KETs: -Nanoelectronics -Photonics
1

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Significance of Advance Materials and Nanotechnologies

- Essential for new and existing production high added value products and their production processes
- Source of High Innovation Potential
- Important market volumes
- Cross cutting through various disciplines and various industrial applications

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The issues regarding Advance Materials and Nanotechnologies

- Europe has strong position in science and in patenting activity
- EU actors are 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 demonstrators, competitive manufacturing and product development

From Lab to Industry to Market BUT…

Case Study: Li-ion batteries

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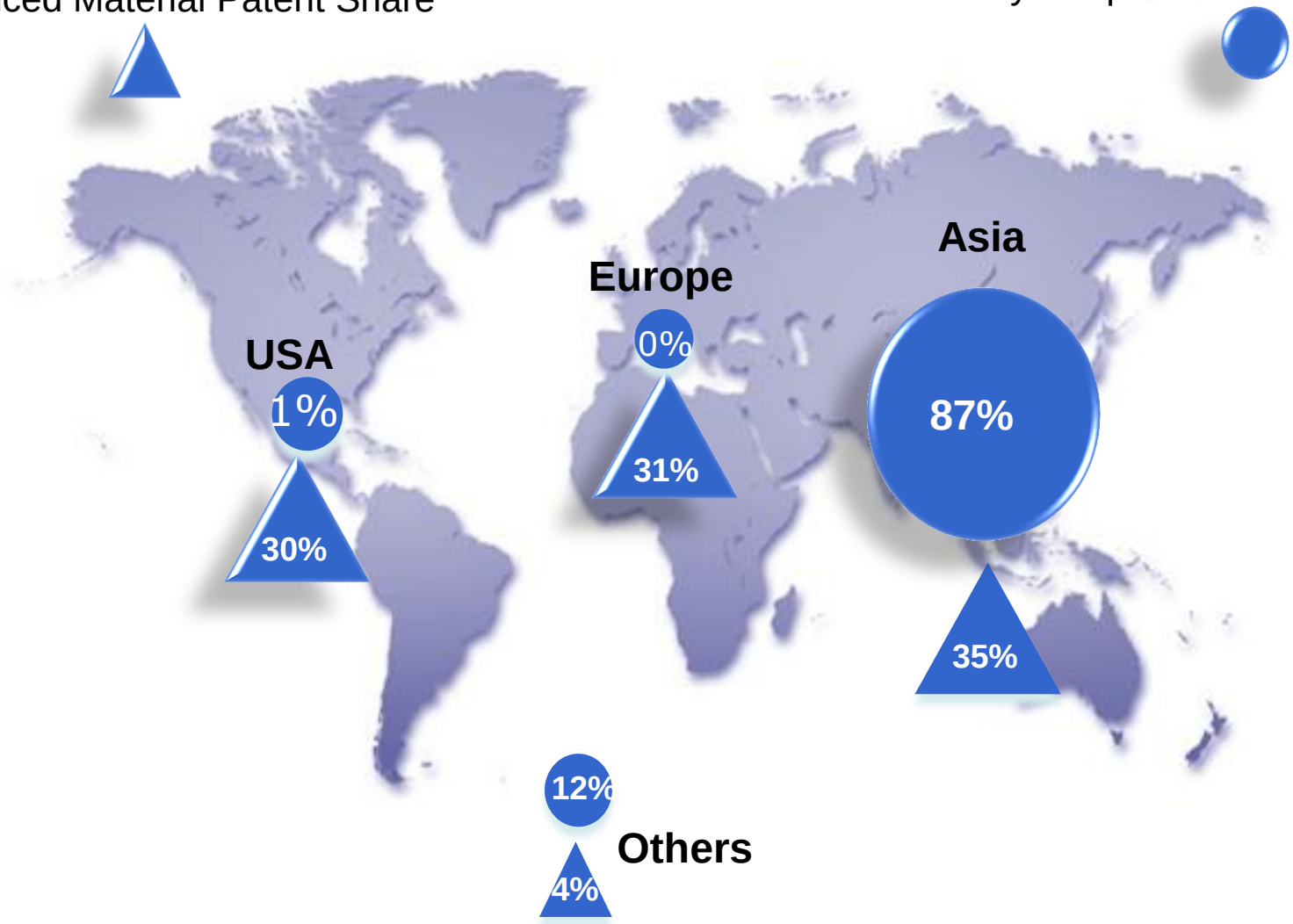
Advanced Material Patent Share

Li-ion battery cell production share in 2008



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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Horizon 2020 as an integrator

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Three converging priorities

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Horizon 2020

Total indicative budget: 77.0 billion €*

Excellent science

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

Indicative Budget: 24.4 billion €*

Industrial leadership

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

Indicative Budget: 17.0 billion €*

Societal challenges

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

Indicative Budget: 29.7 billion €*

* 2014-20, actual budget (indicative)
Includes 5.9 billion € for "widening participaton", "science with and for society", JRC and EIT – not shown in three priorities above

Industrial Leadership

- To be achieved through development of European Key Enabling Technologies (KETs) and support to industry

- Strong focus on the contribution of Key Enabling Technologies to societal challenges
  - Transport
  - Healthy aging
  - Energy
  - Environment
  - etc.

- Emphasis on R&D and innovation with strong industrial dimension

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Industrial Leadership (in H2020)

- Activities primarily developed through relevant industrial research agendas, roadmaps and value chains (ETPs, PPPs)
- Contractual Public-Private Partnerships (cPPPs) will be used extensively for the implementation and deployment of the KETs
- They will allow industry to directly participate in the definition and implementation of research and innovation priorities
- Involvement of industrial participants and SMEs to maximise expected impact → key aspect of proposal evaluation
- Funded projects will be outcome oriented, developing key technology building blocks and bringing them closer to the market (e.g. pilots and demonstrators)

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PPPs in H2020

- cPPPs (implemented within H2020 WP)
  - Robotics
  - Photonics
  - Advanced 5G Network Infrastructures
  - Factories of the Future (FoF)
  - Energy-efficient Buildings (EeB)
  - Sustainable Process Industry (SPIRE)
  - European Green Vehicles Initiative
  - High-performance Computing

NMBP

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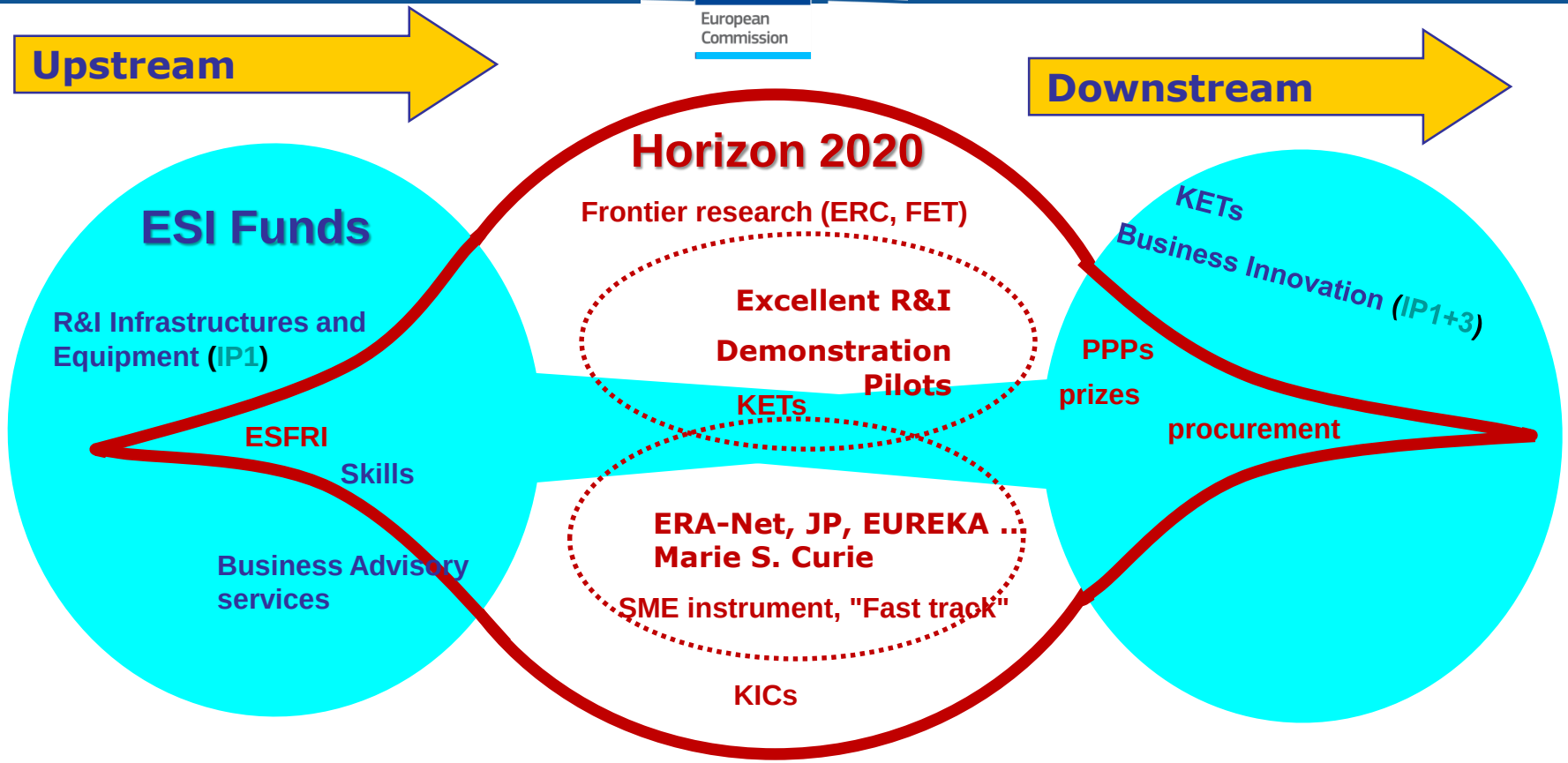
Linked Iniatives

- ERA-NETs (co-funding and networking)
- Structural Funds (support to develop smart specialisation)
- ETPs (Strategic Research Agendas considered for priority setting)
- EIT: new KIC on Added-value Manufacturing
- JTIs: Electronic components and systems, Bio-based Industries
- EIPs (Smart Cities, Raw Materials)

Synergies with Structural & Investment Funds (ESIF)

- Increased funding for research and innovation available under regional funding
- *Smart Specialisation*: strategic framework to access funding for Research and Innovation in Structural Funds 2014-2020
- National / regional authorities in charge (not the Commission)
- Policy support measures to be undertaken timely (by the end of 2013)
- Support from other EU, national or regional programmes **encouraged** (supported or not by ESIF)
- Some topics particularly suitable for additional funding (e.g. to deploy technologies)

How about synergies with Horizon2020?



"Stairway to Excellence"

National/Region alR&I systems

"Research Excellence"

Hopefully also excellence, but "Innovation Excellence"

Capacity Building → R&D → Innovation → Market

IP: Investment Priorities under the R&I thematic objective of the ERDF Regulation

Horizon 2020 is different

- A strong **challenge-based approach**, allowing applicants to have considerable freedom to come up with innovative solutions
- Increased emphasis on **innovation**, with continuing support for R&D (research and innovation actions with 100% funding; innovation actions with 70% funding)
- Less prescriptiveve topics, strong emphasis on expected impact
- A strategic approach, with two-year work programmes
- Focus areas bring together different technologies, along entire value and innovation chains
- Cross-cutting issues mainstreamed (e.g. social sciences, gender, international co-operation)

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Nanotechnologies and Advance Materials related calls 2014-15 and outlook for 2016-17

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Covering the innovation cycle "research to market"

From R&D to close-to-market activities

Use of Technology Readiness Levels (TRLs from 3-4 to 8)

Funding rates

100% (~60% of budget) and 70% (for pilots and demonstators)

Ground prepared in last two years of FP7 ('bridging')

Contractual PPPs and JTIs (Electronic components and systems, Bio-based Industries)

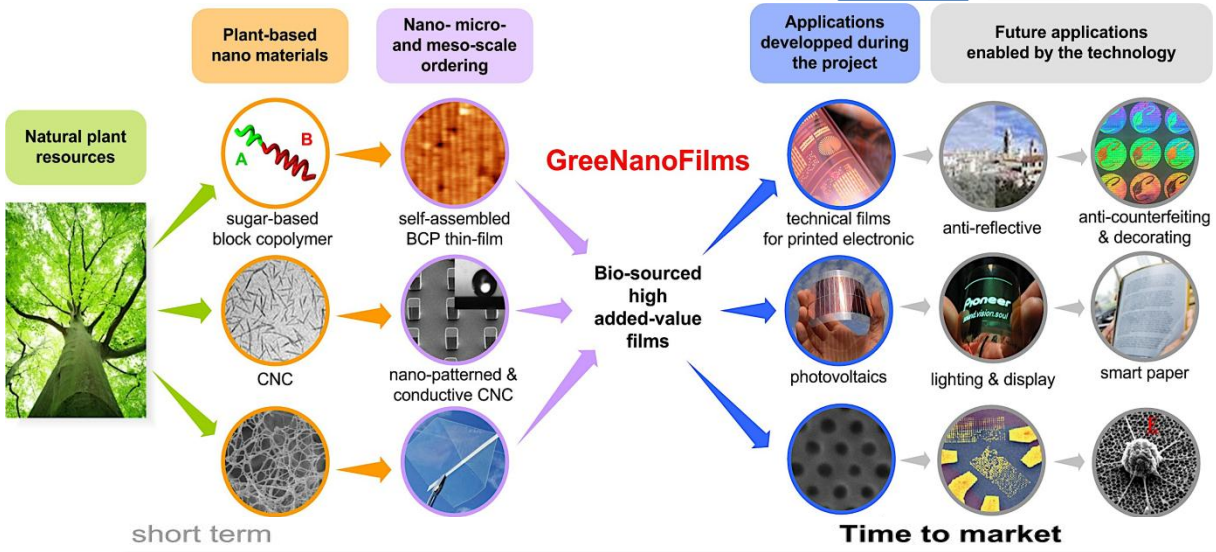
Cross-cutting KETs (combinations of KETs)

Pre-commercial procurement and prizes (to be developed further after 2015)

GreeNanoFilms

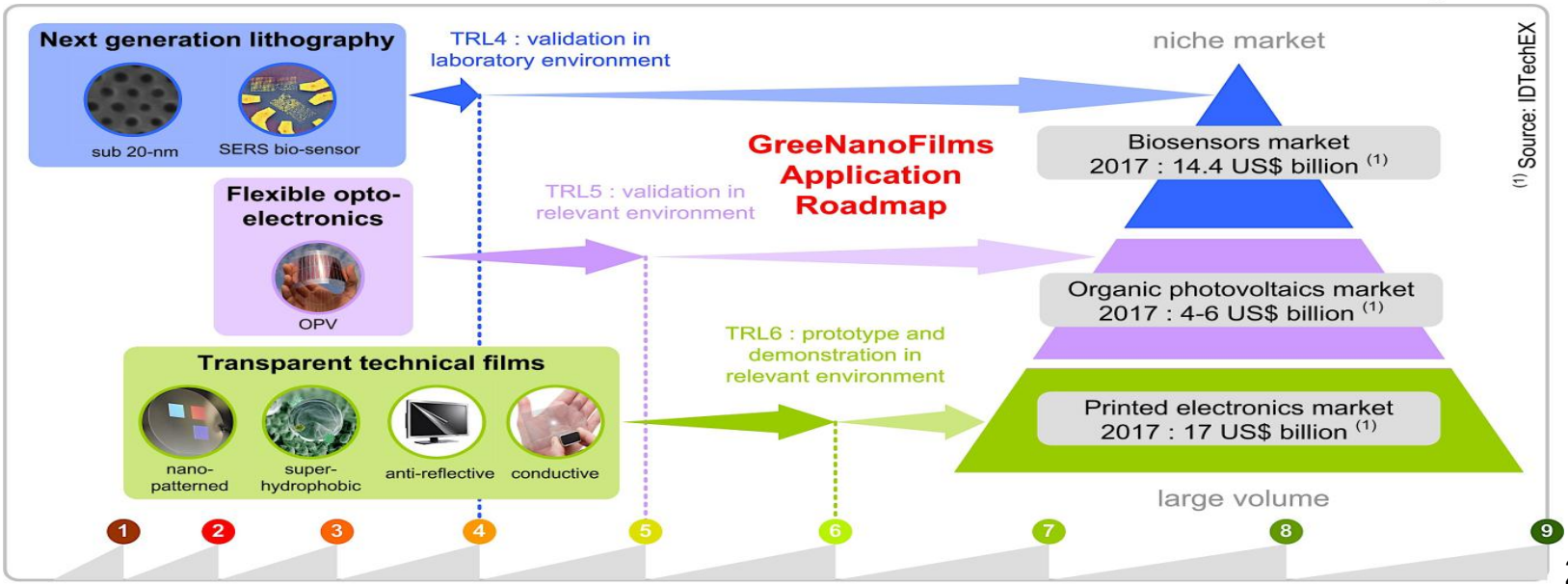
Example

LEIT



Plant-based biomaterials:

- Glycopolymers
- Cellulose nanocrystals (CNC)
- Cellulose nanofibrils (CNF)



MAIN CALL PRIORITIES

- Focus on technology development with industrial deployment of Key Enabling Technologies (KETs)
- Based on strategic research agendas, roadmaps and value chains (with applications in several sectors and societal challenges)
- Support for further innovation, through e.g. project clusters and links to other funding (e.g. smart specialisation)
- Contributions to objectives of selected focus areas, *within LEIT calls - with enabling character*: personalising health care, decarbonising energy, waste as a resource

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Setting the nanotechnology research priorities

Done

"NANO*futures*": From SOCIETAL CHALLENGES to PRODUCTS

Foresight

Societal Challenges

- ✓ *Health, demographic change and wellbeing;*
- ✓ *Food security, sustainable agriculture, marine and maritime research;*
- ✓ *Clean and efficient energy;*
- ✓ *Green transport;*
- ✓ *Climate action, resource efficiency and raw materials;*
- ✓ *Inclusive, innovative and secure societies.*





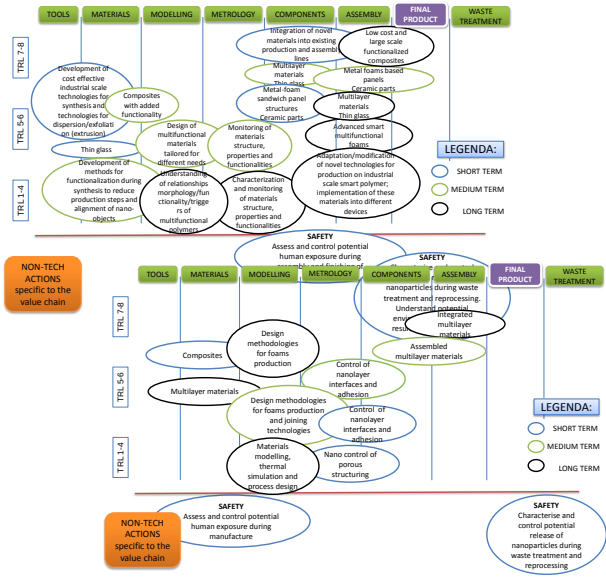
Applications & Products

- Textile and sport sector
- ICT
- Medicine &Pharma
- Construction and buildings
- Transportation
- Energy
- Packaging
- Direct manufacturing
- Consumer Products (Cosmetics & Household Cleaning)

Cross KET Value chains

- **VC1** Lightweight multifunctional mat. and sustainable composites
- **VC2** Nano-enabled surfaces for multi-sectorial applications
- **VC3** Structured Surfaces
- **VC4** - Alloys Ceramics, Intermetallics
- **VC5** Functional Fluids
- **VC6** Integration of nano
- **VC7** Infrastructure for Multiscale Modelling and Testing

Technologiocal and non-techn actions



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Setting the materials Research Priorities

- **Apart from the EAG and Materials Summit paper**

- ❑ MAT4health → relevant COM, epidemiological data (roadmap under preparation)
- ❑ MAT4ICT → consultation with DG CNECT
- ❑ MAT4energy → roadmap and consultation with DG ENR and RTG/K
- ❑ MAT4transport → cPPP GV
- ❑ MAT4environment → relevant COM, text of Horizon2020
- ❑ Cross-CuttingMATtechnologies → mostly from the Materials Summit

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Calls for Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing

New WP structure !

- **One call** for Nanotechnologies, Advanced materials and KET support actions
- **One call** for Biotechnology
- **Three cross-cutting calls** implementing Factories of the Future (FoF, Energy-efficient buildings (EeB) and Sustainable Process Industries (SPIRE))

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Call for Nanotechnology, Advanced Materials and KET support actions

Bridging the gap between nanotechnology research and markets

Topic code	Topic title	Type of Action
NMP 1 - 2014	**Open access pilot lines for cost-effective nanocomposites**	RIA
NMP 2 - 2015	**Integration of novel nano materials into existing production lines**	IA
NMP 3 - 2015	**Manufacturing and control of nanoporous materials**	IA
NMP 4 - 2014	**High-definition printing of multifunctional materials**	IA
NMP 5 - 2014	**Industrial-scale production of nanomaterials for printing**	IA
NMP 6 - 2015	**Novel nanomatrices and nanocapsules**	RIA
NMP 7 - 2015	**Additive manufacturing for table-top nanofactories**	RIA

One stage evaluation and submission !

Above topics implemented as cross-KET activities

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Take home message :

- ***From Lab to Industry to Markets***
  - •Nano-pharmaceutical production by SMEs = prerequisite for clinical testing
- ***Developing new technologies to solve societal problems***
  - •Reducing dependence on critical resources and energy;
  - •Customising healthcare; critical components of energy technologies; clean water;
  - •Waste avoidance and recovery; towards the circular economy (environment)
- ***Creating high-quality jobs***
  - •Combine research and skills development,
  - •Commit to job creation e.g. in supply industries, chemical and biotechnology industries

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Nanotechnologies and Advanced Materials future direction

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H2020 Nanotechnologies and Advanced Materials strategy will pursue further:

- *Market-Societal*
  - VERTICAL INTEGRATION
- **Targeted Time-to-market and high added value solutions for manufacturing**
- **Support Product life-cycles strategies**
- **Support Value chain responces**
- **Establish open innovation infrastructure**
- **Industrial platforms**
- **Build Strategic partnerships**

- *POLICY RELATED*
  - *HORIZONTAL INTEGRATION*
- **Risk governance**
- **Growth schemes balancing benefits and risks**
- **Smart regulation**
- **Networked centres of excellence (Infrastructure)**
- **Openess and transparency**
- **Societal understanding, engagement and trust**
- **Re-define Education basis and skilling**
- **Targeted investment**

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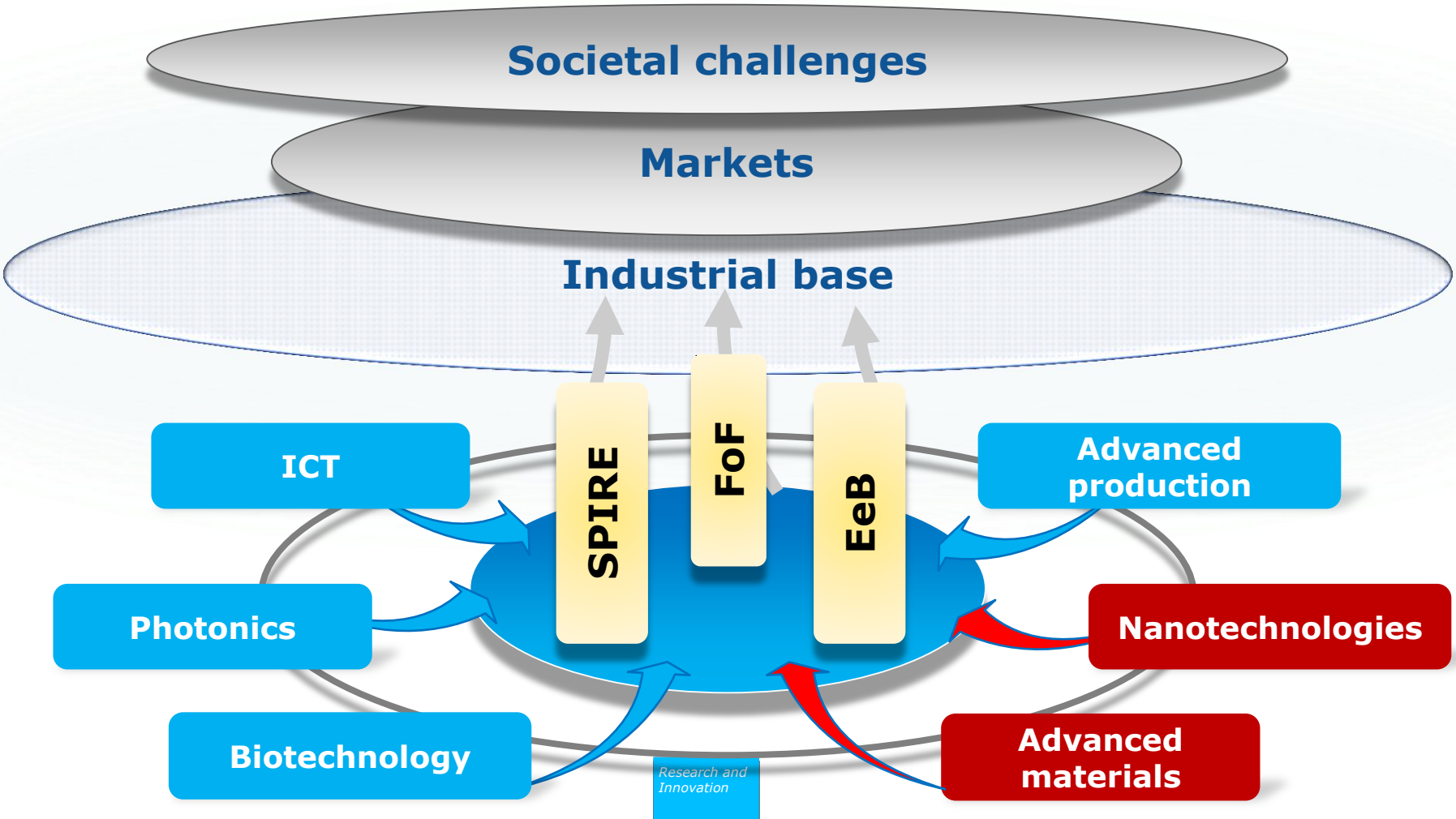
DELIVER: A Enabling-technologies value system for high-added value Manufacturing



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Find out more on Horizon 2020:

http://www.ec.europa.eu/research/horizon2020

Participant Portal:

https://ec.europa.eu/research/participants/portal/page/home

Please use the information given in the OJ and on the Participant Portal to prepare proposals.

Thank you for your attention

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Chance favors only the prepared mind !!!

Louis Pasteur