European Commission

R&D+I in Industrial Technology
The last FP7 call and the way to Horizon 2020

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Research and Innovation

FP7-NMP is still alive… and well budgeted !

The following slides present a non-binding orientation towards the last call.

Information published already in April on

http://ec.europa.eu/research/industrial_technologies/policy-publications-reviews_en.html

These slides do not engage the European Commission in any manner. Please refer to official documents (publication is expected by mid July).

- More emphasis to LARGE projects
- Innovation-specific elements in majority of topics (up-scaling, demonstration, validation, standardisation etc.)
- International cooperation in interests of EU industry
- "Bridge" to Horizon 2020 (enabling and industrial technologies)
  - Demonstrators, higher TRLs, further innovation elements
  - Links to societal challenges

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Non-binding orientation!

Activity 4.1 Nanosciences and Nanotechnologies
11 topics

Activity 4.2 Materials
7 topics

Activity 4.3 New Production Technologies
2 topics

Activity 4.4 Integration
9+3+2 topics (incl. Raw Materials and Ocean)

Recovery Package: Public Private Partnerships
11+6+1 topics (FoF, EeB, GC)

Non-binding orientation!

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Activity 4.1 Nanosciences and Nanotechnologies

1.1-1 Exploration, optimisation and control of nano-catalytic processes for energy applications

1.1-2 Self-assembly of naturally occurring nanosystems

1.2-1 Nanotechnology-based sensors for environmental monitoring

1.2-2 Nanotherapeutics to treat bacterial infectious diseases

1.3-1 Safety in nanoscale production and products

1.3-2 Nanomaterials safety assessment: Ontology, database(s) for modelling and risk assessment

1.3-3 Development of a systematic framework for naming and assessing safety of the next generations of nanomaterials being developed for industrial applications

Non-binding orientation!

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Activity 4.1 Nanosciences and Nanotechnologies

1.4-1 Development of an integrated multi-scale modelling environment for nanomaterials and systems by design

1.4-2 Metrology research for the development and validation of design rules for engineering of nanostructured and nano-enabled materials and devices

1.4-3 Development of methods and standards supporting the implementation of the Commission recommendation for a definition of nanomaterial

1.4-4 Developing innovative outreach and dialogue on responsible nanotechnologies in EU civil society

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Activity 4.2 Materials

2.1-1 Developing new precursors, functionalisations and processing routes for carbon fibres

2.2-1 Biomaterials for Advanced Therapies and Medical Devices in the neurological/neuromuscular or cardiovascular fields

2.2-2 Biomaterials: Imaging and rapid precise prototyping technology for custom made scaffolds – with China

2.2-3 Wide band gap semiconductor materials and structures for power electronics in energy technologies

2.2-4 Materials solutions for durable energy-harvesters

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Activity 4.2 Materials

2.3-1 Advanced materials – our allies for a sustainable future

2.3-2 Rational design of functional materials: networking and sharing of best practises

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Activity 4.3 New Production

3.0-1 Tools for Monitoring and Assessing Resource-efficiency in the Value Chain of process Industries

3.0-2 Integrated processing and Control Systems for Sustainable Production in Farms and Forests

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Activity 4.4 Integration

4.0-1 Graphene production technologies

4.0-2 Innovative materials for efficient, stable and cheap organic photovoltaic cells

4.0-3 From research to innovation: substantial steps forward in the industrial use of European intellectual assets, stimulating the use of newly developed materials and materials technologies by the industry

4.0-4 Support for cluster activities of projects in the main application fields of NMP Theme

4.0-5 Deployment of societally beneficial nano- and/or materials technologies in ICP countries

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Activity 4.4 Integration

4.0-6 Safe Life Extension management of aged transport infrastructures networks and industrial plants

4.0-7 ERA-NET to support Innovation in the NMP thematic area

4.0-8 The impact of the integration of key enabling technologies on industrial production and societal goals

4.0-9 Organisation of events related to the Presidencies of the European Union

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Activity 4.4 Integration – Raw Materials

4.1-1 Development of new materials with a reduced critical metal content – with Japan

4.1-2 Breakthrough Solutions for Mineral Extraction and Processing in Extreme Environments

4.1-3 European Intelligence Network on the Supply of Raw Materials

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Activity 4.4 Integration – Ocean of Tomorrow

OCEAN.2013-1 Biosensors for real time monitoring of biohazard and man made chemical contaminants in the marine environment

OCEAN.2013-3 Innovative antifouling materials for maritime applications

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5.1 Factories of the Future (FoF) – Cross thematic Call NMP & ICT

FoF-1 Improved use of renewable resources at factory level

FoF-2 Innovative re-use of modular equipment based on integrated factory design

FoF-3 Workplaces of the future: the new people-centred production site

FoF-4 Innovative methodologies addressing social sustainability in manufacturing

FoF-5 Innovative design of personalised product-services and of their production processes based on collaborative environments

FoF-6 Mini-factories for customised products using local flexible production

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5.1 Factories of the Future (FoF) – Cross thematic Call NMP & ICT

FoF-7 New hybrid production systems in advanced factory environments based on new human-robot interactive cooperation

FoF-8 Innovative strategies for renovation and repair in manufacturing systems

FoF-9 Advanced concepts for technology-based business approaches addressing product-services and their manufacturing in globalised markets

FoF-10 Manufacturing processes for products made of composites or engineered metallic materials

FoF-11 Manufacturing of highly miniaturised components

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5.2 Energy-efficient Buildings (EeB) – Cross thematic Call NMP, ICT, Energy, Environment

EeB-1 Nanotechnology for multifunctional lightweight construction materials and components

EeB-2 Safe, energy-efficient and affordable eco-innovative materials for building envelopes and/or partitions to provide a healthier indoor environment

EeB-3 Integration of technologies for energy-efficient solutions in the renovation of public buildings

EeB-4 Integrated control systems and methodologies to monitor and improve building energy performance

EeB-5 Optimised design methodologies for energy-efficient buildings integrated in the neighbourhood energy systems

EeB-6 Achieving high efficiency by deep retrofitting in the case of commercial buildings

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5.3 Green Cars (GC) – Cross-thematic coordinated call NMP, Transport, ICT, Energy, Environment

GC-1 Improved materials for innovative ageing resistant batteries

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ERA-NET to support innovation in NMP areas

New Procurement Procedures:

Ex post evaluation and impact assessment in NMP area

Enhancing marketing of materials research

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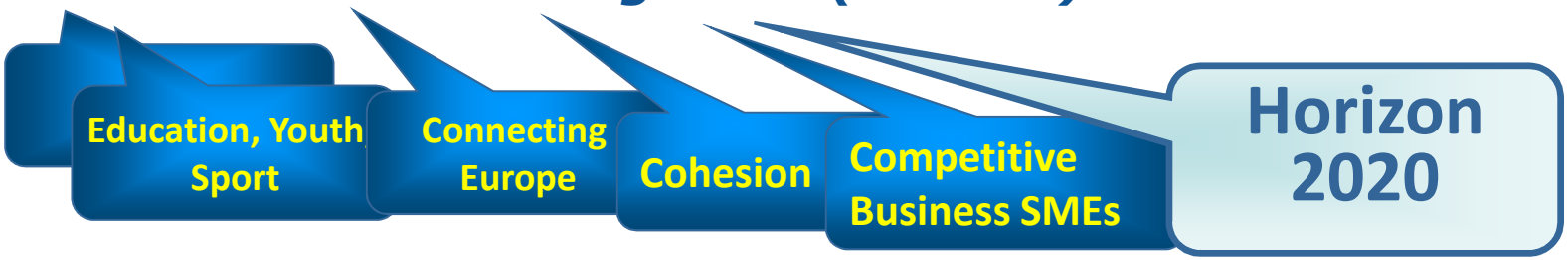
The Multiannual Financial Framework 2014-2020: Commission's proposals 29 June 2011

Key challenge: stabilise the financial and economic system while taking measures to create economic opportunities

1. Smart & inclusive growth (€491bn)



2. Sustainable growth, natural resources (€383bn)

3. Security and citizenship (€18.5bn)

4. Global Europe (€70bn)

5. Administration (€62.6bn)

Total: € 1,025bn

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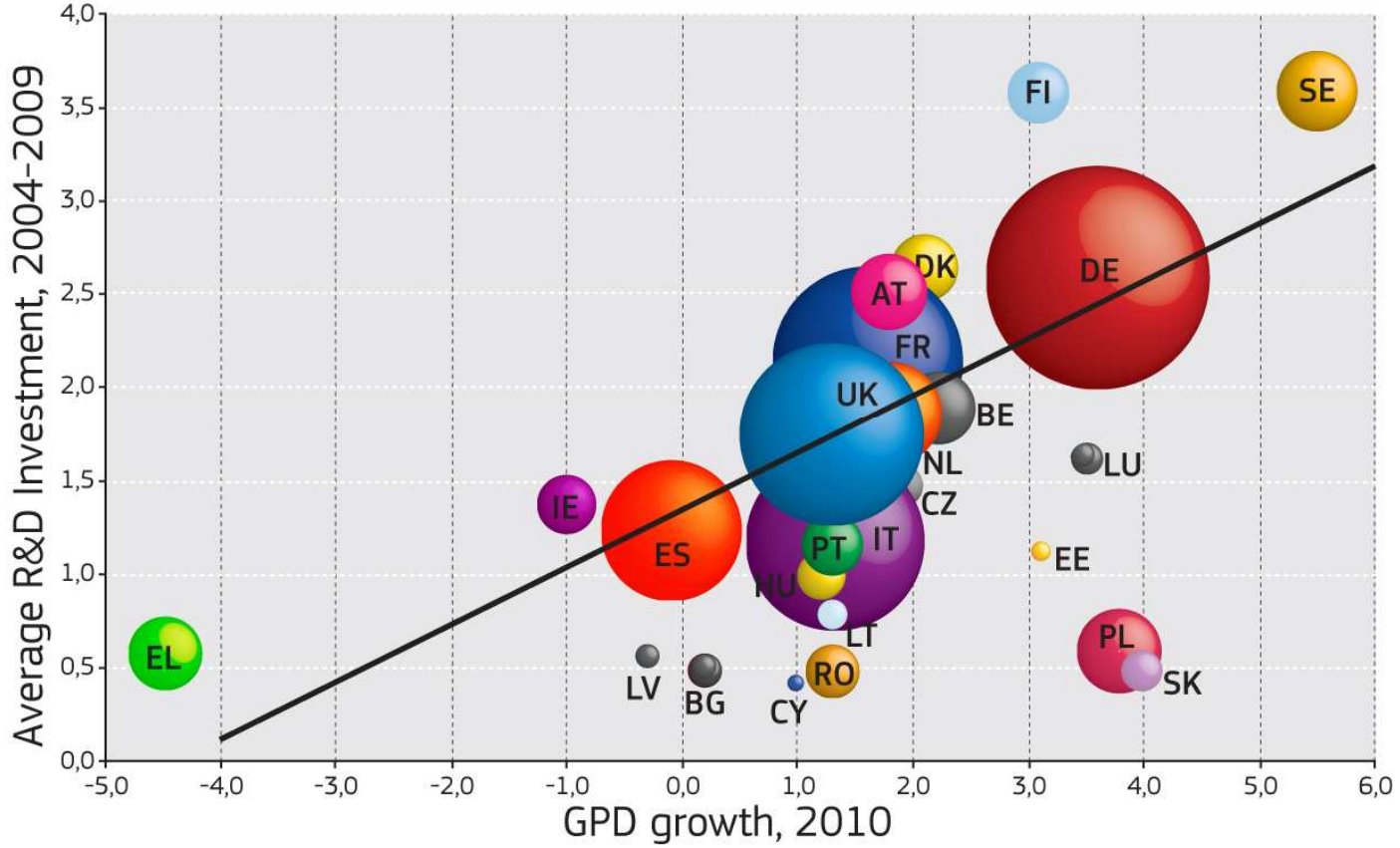
Investment in R&D is part of the solution to exit from the economic crises



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What is Horizon 2020

- **Commission proposal for a 80 billion euro research and innovation funding programme (2014-2020)**
- **A core part of Europe 2020, Innovation Union & European Research Area:**
  - **Responding to the economic crisis** to invest in future jobs and growth
  - **Addressing people's concerns** about their livelihoods, safety and environment
  - **Strengthening the EU's global position** in research, innovation and technology

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Active involvement of stakeholders

- **EU Presidencies: Sweden** (societal challenges-based approach), **Spain** (integration of research and innovation), **Hungary** (FP7 interim evaluation), **Poland** (widening participation), **European Council conclusions** from 4.2.2011 (Common Framework to bring together all EU research and innovation funding)
- **European Parliament** reports: Merkies (Innovation Union), Audy (FP7 evaluation), Matias (Horizon 2020) and Carvalho (simplification)
- Overwhelming response to the **public consultation** on Horizon 2020 (more then 2000 contributions)
- **Survey on administrative costs for participants in FP7**
- **25 workshops on the content** of Horizon 2020

What's new

- **A single programme** bringing together three separate programmes/initiatives*
- **Coupling research to innovation** – from research to retail, all forms of innovation
- **Focus on societal challenges** facing EU society, e.g. health, clean energy and transport
- **Simplified access**, for all companies, universities, institutes in all EU countries and beyond.

*The 7th Research Framework Programme (FP7), innovation aspects of Competitiveness and Innovation Framework Programme (CIP), EU contribution to the European Institute of Innovation and Technology (EIT)

Three priorities:

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

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Priority 1. Excellent science

Why:

- World class science is the foundation of tomorrow's technologies, jobs and wellbeing
- Europe needs to develop, attract and retain research talent
- Researchers need access to the best infrastructures

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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

Why:

- Strategic investments in key technologies (e.g. advanced manufacturing, micro-electronics) underpin innovation across existing and emerging sectors
- Europe needs to attract more private investment in research and innovation
- Europe needs more innovative SMEs to create growth and jobs

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Proposed funding (million euro, 2014-20)

Leadership in enabling and industrial technologies *(*ICT, nanotechnologies, materials, biotechnology, manufacturing, space)	*13 781*
Access to risk finance Leveraging private finance and venture capital for research and innovation	*3 538*
Innovation in SMEs Fostering all forms of innovation in all types of SMEs	*619 complemented by* *6 829 (expected 15% of societal challenges + LEIT) and* *'Access to risk finance' with strong SME focus*

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Priority 3. Societal challenges

Why:

- Concerns of citizens and society/EU policy objectives (climate, environment, energy, transport etc) cannot be achieved without innovation
- Breakthrough solutions come from multi-disciplinary collaborations, including social sciences & humanities
- Promising solutions need to be tested, demonstrated and scaled up

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Proposed funding (million euro, 2014-2020)

Health, demographic change and wellbeing	*8 033*
Food security, sustainable agriculture, marine and maritime research & the bioeconomy	*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 and partnering

Public private partnerships:

- Through Joint Technology Initiatives or other formal structures (Art. 187)
- Through contractual agreements, which provide inputs for work programmes
- Only when criteria met, e.g. clear commitments from private partners

Public public partnerships:

- Through « ERA-Nets » for topping up individual calls/actions (replacing current ERA-Net, ERA-Net Plus, Inco-Net, Inno-net)
- Through participation in joint programmes between Member States (Art. 185)
- Supporting agendas of Joint Programming Initiatives when in line with Horizon 2020
- Only when criteria met, e.g. financial commitments of participating countries

European Innovation Partnerships:

- Not funding instruments, but for coordination with broader policies and programmes

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Role of the EIT and JRC in Horizon 2020

European Institute Technology (EIT) Combining research, innovation & training in knowledge and Innovation Communities	***1 360+*** ***1 440****
Joint Research Centre (JRC)** Providing a robust, evidence base for EU policies	***1 962***

****Second tranche pro rata from LEIT and Societal challenges (subject to review)***

*****Additional €656 m for the JRC to be funded from the Euratom Treaty activities***

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Euratom Programme 2014-2018

Budget: *TOTAL: € 1665 million, including Fission €336m; Fusion € 673m; JRC € 656m.*

Programme for 5 years, in line with the Euratom Treaty (art.7)

What is new?

- Stronger focus on nuclear safety and nuclear training
- A single Euratom programme bringing together three separate decisions
- The same rules for participation as in the Horizon 2020 - simplified access
- Programme contributes to the implementation of priorities of the 'Horizon 2020'
- Fusion research programme will be restructured

Funding for ITER outside MFF in a separate supplementary programme: *€ 2573 million for 2014-2018*

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Simplification: Rules for Participation

1. A single set of rules

- Adapted for the whole research and innovation cycle
- Covering all research programmes and funding bodies
- Aligned to the Financial Regulation, coherent with other new EU Programmes

2. One project – one funding rate

- Maximum of 100% of the total eligible costs (except for actions close to market, where a 70% maximum will apply)
- Indirect eligible costs: a flat rate of 20% of direct eligible costs

3. Simple evaluation criteria

- Excellence – Impact – Implementation (Excellence only, for the ERC)

4. New forms of funding *aimed at innovation: pre-commercial procurement, inducement prizes, dedicated loan and equity instruments*

5. International participation: *facilitated but better protecting EU interests*

Simplification: Rules for Participation

6. ***Simpler rules for grants:*** *broader acceptance of participants accounting practices for direct costs, flat rate for indirect costs, no time-sheets for personnel working full time on a project, possibility of output-based grants*

7. ***Fewer, better targeted controls and audits***

- Lowest possible level of requirements for submission of audit certificates without undermining sound financial management
- Audit strategy focused on risk and fraud prevention

8. ***Improved rules on intellectual property***

- Balance between legal security and flexibility
- Tailor-made IPR provisions for new forms of funding
- A new emphasis on open access to research publications

Beyond the Rules: further simplified provisions in the Grant Agreement and implementing procedures to facilitate access to Horizon 2020 (e.g. common IT platform).

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Simplification: summary

- **Single set of** simpler and more coherent participation **rules**
- New **balance between trust and control**
- Moving from several **funding rates** for different beneficiaries and activities to just two
- Replacing the four methods to calculate overhead or «indirect costs» with a **single flat rate**
- Major simplification under the **forthcoming financial regulation**
- **Successful applicants to get working more quickly**: reduction of average time to grant by 100 days (current average of around 350 days under FP7)

Contributing to the European Research Area (ERA)

- ERA framework proposal in 2012 to create a single market for knowledge research and innovation
- Complemented by Horizon 2020:
  - Boosting support to ERA priorities – mobility, infrastructures, knowledge transfer, policy learning
  - Stronger partnerships with Member States and private sector to invest more efficiently
  - Taking account of gender, ethical issues, researcher careers and open access to results

Strong participation by SMEs

- **Integrated approach** - around 15% of the total budget for societal challenges and LEITs to go to SMEs.
- **Simplification** of particular benefit to SMEs (e.g. single entry point).
- A **new SME instrument**, building on the SBIR model, will be used across all societal challenges as well as for the LEITs
- A dedicated activity for research-intensive SMEs in **'Innovation in SMEs'.**
- **'Access to risk finance'** will have a strong SME focus (debt and equity facility)

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

Closely coordinated, for instance:

- Integrated financial instruments (debt and equity), with facilities in both programmes serving complementary objectives
- Enterprise Europe Network set up under COSME, but support to SMEs for EU funding

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Socio-economic sciences and humanities

- **Integrated approach**: SSH included as an integral part of the activities, working beyond 'silos' (*e.g. understanding the determinants of health and optimising the effectiveness of healthcare systems).*

- The **'Inclusive, Innovative and Secure Societies' challenge**: issues such as smart and sustainable growth, social transformations, social innovation and creativity, the position of Europe as a global actor as well as the social dimension of a secure society *(SSH have the tools to contribute to addressing security challenges, enhancing the societal dimension of security policy and research).*

- **Bottom-up funding**: ERC, MCA, Research Infrastructures.

Widening participation

- **Principle of excellence**: continue to allocate funding on the basis of competitive calls, selecting only the best projects.
- **Clear division of labour** between cohesion policy and Horizon 2020.
  - Cohesion policy: support for regions in building up their research and innovation capacity.
  - Horizon 2020: widen participation, better coordination between the two Union funding programmes, support policy learning reforms.
- **Accompanying measures in Horizon 2020** to ensure that excellence prevails wherever it exists, including: twinning, ERA chairs, support for access to international networks, development of smart specialisation strategies.

International cooperation

- **International cooperation is crucial** to address many Horizon 2020 objectives.
- **Principle of general openness**: the programme will remain to be the most open funding programme in the world.
- Horizon 2020 shall be open to the **association** of: acceding countries, candidate countries and potential candidates and selected third countries that fulfil the relevant criteria (capacity, track record, close economic and geographical links to the Union, etc.).
- Targeted actions to be implemented taking a **strategic approach to international cooperation** (dedicated measures in the 'Inclusive, innovative and secure societies' challenge).

Next steps

Ongoing:	Parliament and Council negotiations on the basis of the Commission proposals
Ongoing:	Parliament and Council negotiations on EU budget 2014-2020 (including overall budget for Horizon 2020)
Mid 2012:	Final calls under 7th Framework Programme for research to bridge gap towards Horizon 2020
Mid 2013:	Adoption of legislative acts by Parliament and Council on Horizon 2020
1/1/2014:	**Horizon 2020 starts, launch of first calls**

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Innovation from Materials

Some 70 percent of all technical innovations hinge directly or indirectly on the properties of the materials they use.

Material innovations can be used in practically all technology sectors and branches of industry.

Material innovations have the potential to reduce environmental pollution, save energy, conserve resources, make mobility less dangerous and improve the quality of life.

Source: ACATECH, 2009, http://www.research-in-germany.de/dachportal/en/downloads/download-files/9554/high-tech-strategy-2006-112-pages-.pdf

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Impact of Advanced Material Technology

Impact of advanced material technology on ICT, Energy & Biotechnology (% growth attributable to advanced materials)

	1970	*1980*	*1990*	*2000*	*2010*	2020	2030
ICT	***15***	***25***	***40***	***55***	***65***	**75**	**85**
Energy	***10***	***15***	***30***	***45***	***55***	**65**	**70**
Biotechnology	***5***	***10***	***20***	***30***	***45***	**55**	**65**

Advanced materials have an earlier & greater impact in ICT (incl. electronics), followed by Energy (incl. construction) and Biotechnology (incl. health)

Source: Sanford M. Moskowitz, « The Advanced Materials Revolution », John Wiley & Sons Inc, 2009

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Market Potential for specific KETs

	Current market size (~2006/08) USD	Expected size in 2015 (~2012/15) USD	Expected compound annual growth rate
Nanotechnology	12 bn	27 bn	16%
Micro and nanoelectronics	250 bn	300 bn	13%
Industrial biotechnology	90 bn	125 bn	6%
Photonics	230 bn	480 bn	8%
Advanced Materials	100 bn	150 bn	6%
Advanced Manufacturing systems	150 bn	200 bn	5%
TOTAL	832 bn	1282 bn	

Table 1: Estimated global market potentials of Key Enabling Technologies

Source: Background study; Confindustria (2009)

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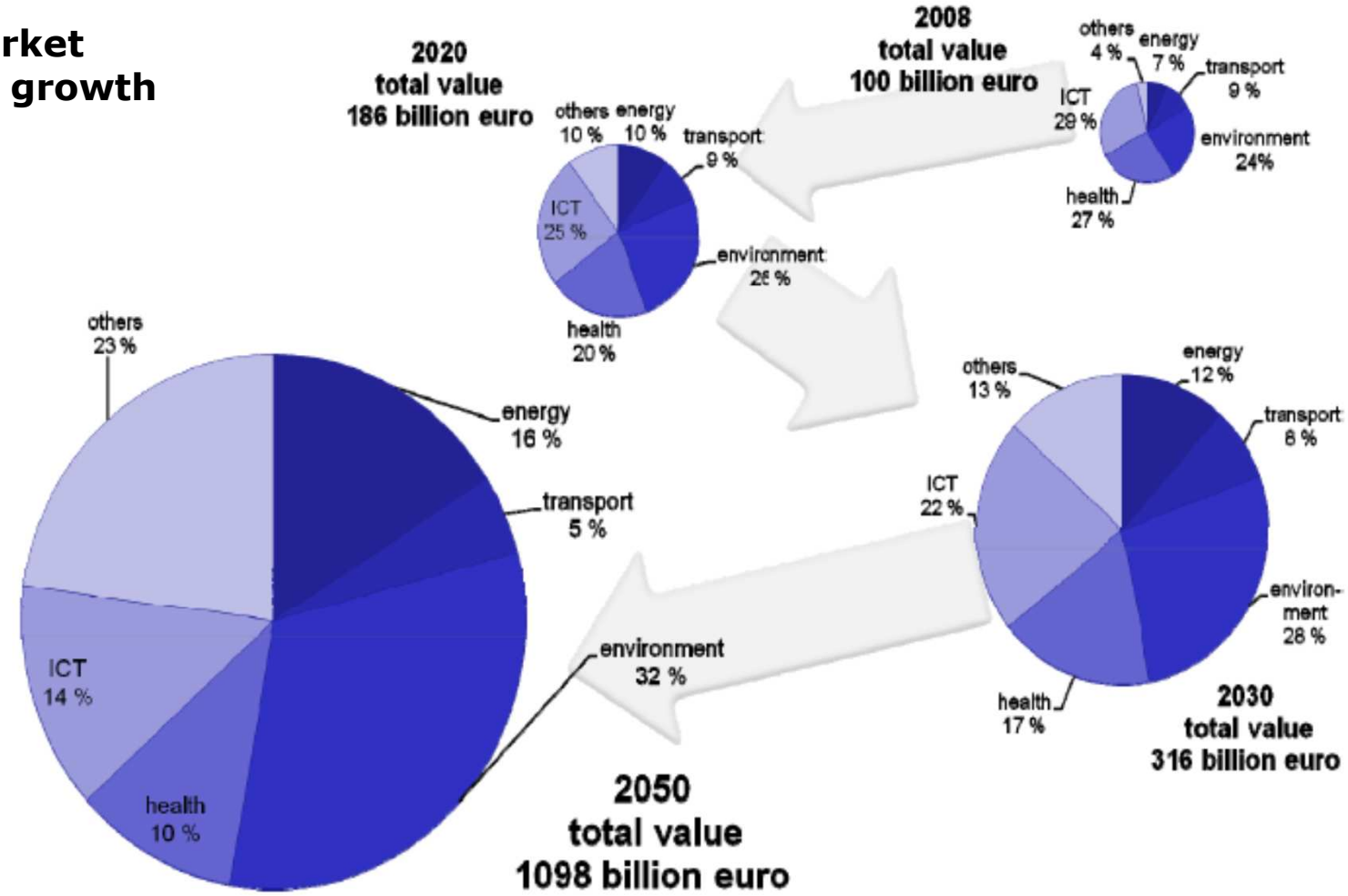
Market growth



Some considerations…

- *Materials (M) are more and more the key of success of a new product*
- *M enable innovations and allow new products and services to exist with improvements of citizens' quality of life, more sustainable industrial economy, improved competitiveness, growth and jobs*
- *Growth potential estimated well above GDP*

- *Success of research is uncertain*
- *Internationalisation of research is strong (to accelerate progress); this, joined to long research and development times, multiplies competitors, often to advantage of less regulated non-EU Nations*
- *Patenting is needed to protect results or to avoid being blocked*
- *An integrated approach is neede e.g. raw materials availability, LCA, recycling…→ integrated hybrid industry*
- *Industrial scale-up to high volume production is expensive (often: 10-100-1000)*
- *M are upstream in the value chain while commercial added-value is rather created downstream*
- *Patient money is needed and investors/VC are normally not very patient*
- *M are exposed to strong price pressure when becoming commodities*

- *Customers of M are mostly manufacturing industries not end users*
- *"Citizens" (end-users / final customers) are often resistant/inert to change unless obvious performance improvements or fashion play a role → internal market, societal innovation, responsible choices and use*
- *Uncertainties about how long market opportunities remain favourable*
- *Markets are often characterised by long product life cycles and/or low innovation*
- *Slow-moving industries centering competition on low cost production and control of market shares*
- *Long-term market opportunities if one has success in entering the market*

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A new model of public support in Materials R&D+I ?

1. *Downstream integration of M research along the innovation chain associating at an early stage product designers, LCA and socio-economic considerations → from developing M to developing integrated systems, via a synergy of private and public resources e.g. in Horizon 2020 via LEIT and the Challenges → all strategic partners must be in the projects and market segments of at least 1 billion € / year should be targeted, oriented on real socio-economic needs*
2. *Cross-fertilization accelerating advancement of knowledge → important role for public resources e.g. in Horizon 2020 FET and LEIT, COST, mobility of researchers and world-class infrastructures*
3. *Need to accelerate industrial scale-up, developing or adapting production processes (from-lab-to-market) → role for LEIT, including for metrology and standardisation*
4. *Need for a convergence of materials design and development, product design and process design, towards a hybrid industry that has both the features of a materials process and transformation industry (incl. raw materials) and a manufacturing industry*

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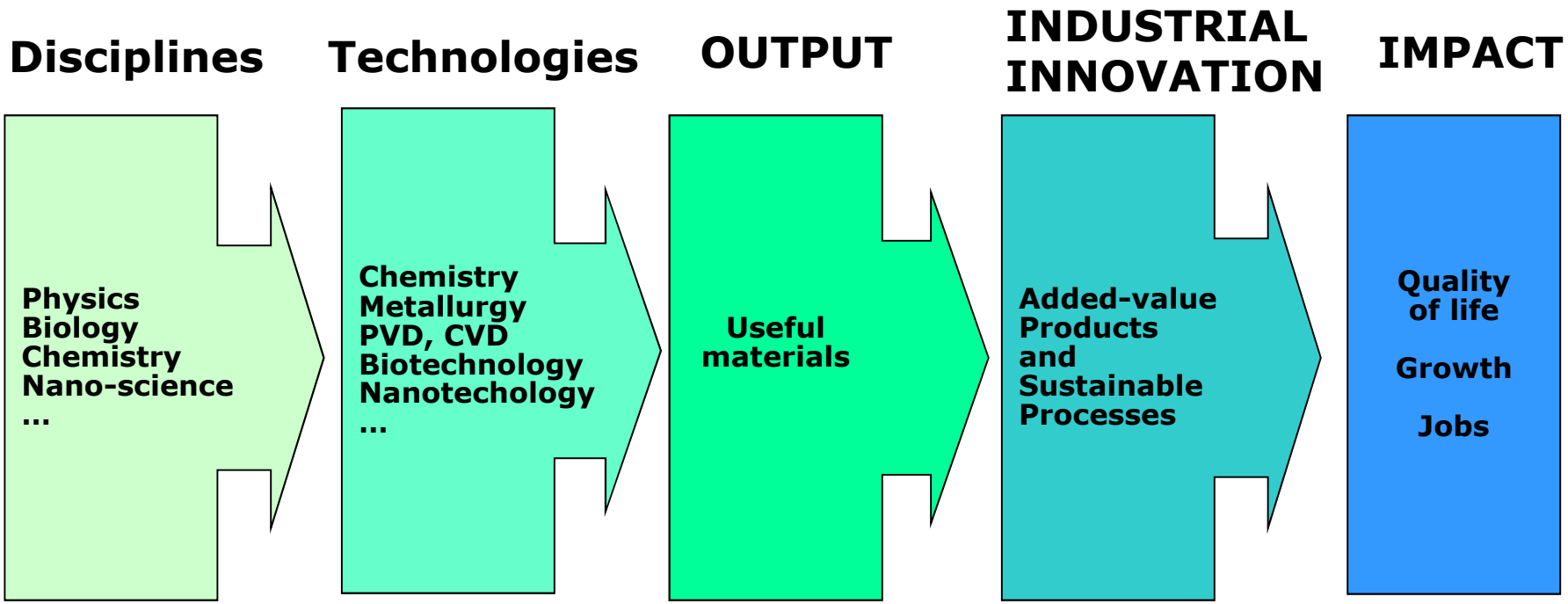
Materials profit from all available technologies and approaches



new atomic precision industry

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Materials are there, just open the drawer!

Materials are the problem

Materials are the solution

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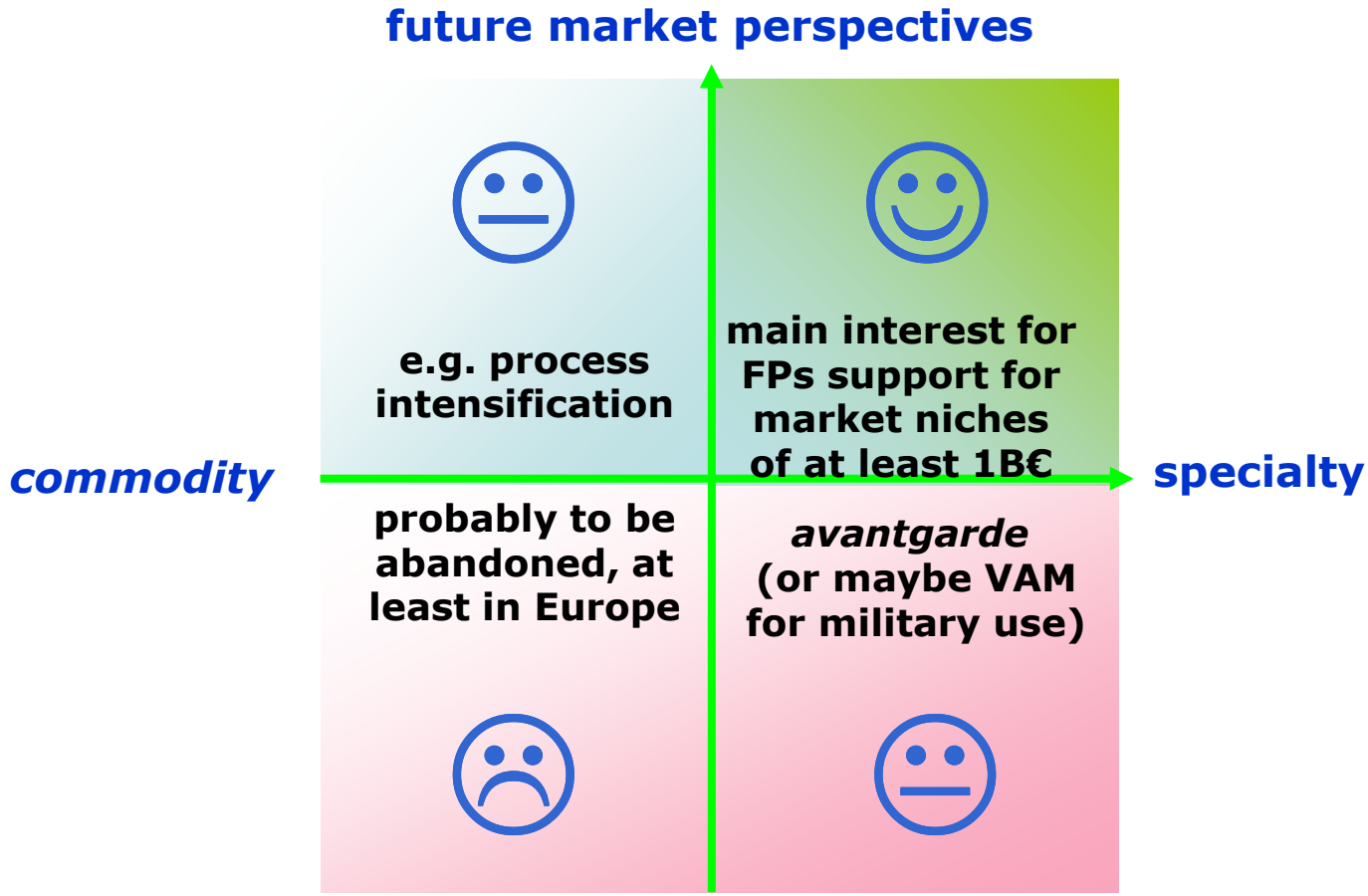
Value-added MATERIALS: attractiveness of EU-FP support



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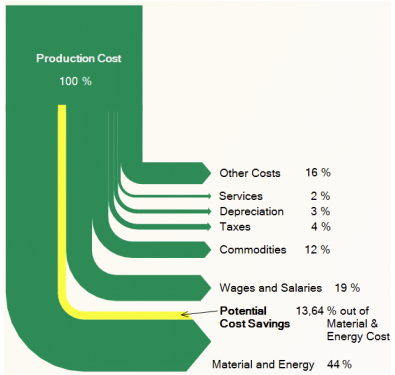
Our final target :

1 – a competitive industry

2 – a green industry



3 – a safe industry

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Business models from industrial revolution to sustainable development

- From (raw) materials or components to products
- End-of-life is not my business, externalization
- To conceive a product for its recycling
- Changes in consumers' behaviour
- Integrated approaches or no externalization

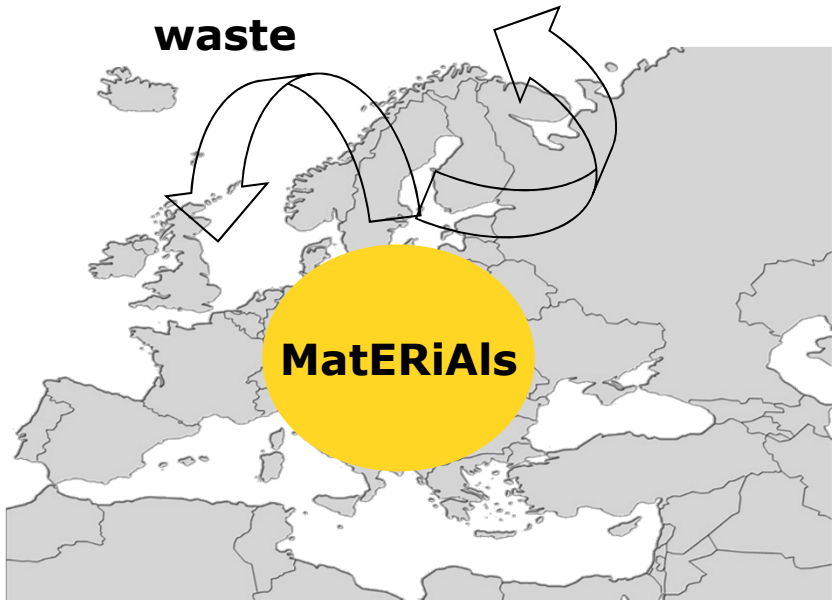
A waste is a resource that we do not know how to use (resources vs reserves : technology and market)

Need for research, new technologies, societal innovation, integration or changing business models
→ Role for the public authorities and Horizon 2020

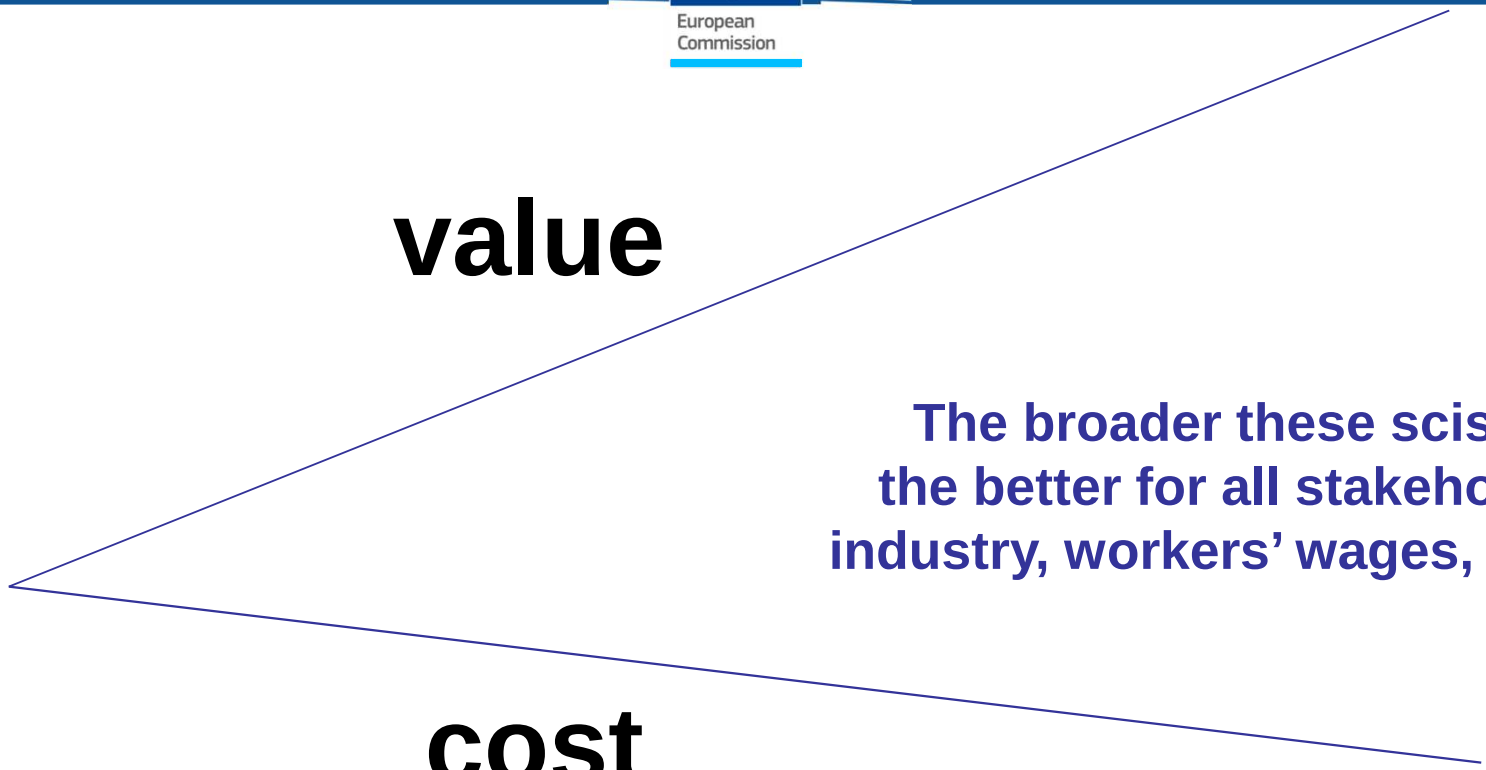
CO2

waste

raw materials



products, VAM



The broader these scissors the better for all stakeholders: industry, workers' wages, State, ...

GDP → NDP

competitiveness + sustainability + inclusivity

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Thank you for your attention!

Find out more:

www.ec.europa.eu/research/horizon2020

PARTICIPATE IN:
http://industrialtechnologies2012.eu/event/

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