



The EU Framework Programme for Research and Innovation

HORIZON 2020

Nanotechnology policy and innovation

**Leadership in Enabling and
Industrial Technologies**



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Research and
Innovation

What is Horizon 2020?

- **The European Union programme for research and innovation for 2014-2020 with a budget of €77 billion (in current prices that include inflation, comprising both the TFEU and Euratom parts)**
- **A core part of Europe 2020, Innovation Union & European Research Area:**
 - Responding to the economic crisis to invest in jobs and growth
 - Addressing people's concerns about their livelihoods, safety and environment
 - Strengthening the EU's global position in research, innovation and technology

Three pillars



Horizon 2020: Key elements

- A single programme with three pillars: **societal challenges, industrial competitiveness and excellence in science**
- **Less prescriptive topics – strong emphasis on expected impact**
- More emphasis on **innovation and involvement of industry**
e.g. industrial deployment of key enabling technologies,
Public-Private Partnerships
- **Strategic approach, two-year work programmes**
- **Focus areas** bring together different technologies
- **Simplification** – in access and in participation rules



Horizon 2020 implementation Statistics – Snapshot (July 2015)

- **Nearly 38,000 (full) eligible proposals** requesting a total of € 70.8 billion of EU contribution
- of which **over 4,800 retained** for funding
- **Over 11,000 evaluators** contracted
- **More than 4,300 grant agreements** signed with **€ 7.4 billion EU contribution**
- **8 months time-to-grant met in 93% of cases**, excluding ERC grants, which are not bound by this target
- **Average success rate around 14%**

HORIZON 2020: Open to the world

GENERAL OPENNESS



**Association agreement
with Israel since 2014 !**

Horizon 2020 is open to participation of researchers from anywhere in the **world**, to:

- ✓ Extend the frontiers of scientific knowledge
- ✓ Tackle challenges that affect us all
- ✓ Make industries more competitive

Most active organisations in H2020

(ranked by EU contribution)

WEIZMANN INSTITUTE OF SCIENCE (WEIZMANN)	HES	32
TEL AVIV UNIVERSITY (TAU)	HES	28
TECHNION - ISRAEL INSTITUTE OF TECHNOLOGY	HES	33
THE HEBREW UNIVERSITY OF JERUSALEM (THE HEBREW UNIVERSITY OF JERUSALEM)	HES	24
IBM ISRAEL - SCIENCE AND TECHNOLOGY LTD (IBM ISRAEL)	PRC	9
BEN-GURION UNIVERSITY OF THE NEGEV (BGU)	HES	14
BAR ILAN UNIVERSITY (BIU)	HES	13

Policy Context

Five of the President's priorities:

- To boost jobs, growth and investment;
- To realise a connected digital single market;
- To implement a resilient Energy Union with a forward looking climate change policy;
- To develop a deeper and fairer internal market with a strengthened industrial base;
- To make Europe a stronger global actor

Strategic priorities of Commissioner Moedas:

- Open innovation, Open science, Open to the world

A large part of the Industrial Leadership pillar(~6Bio€) is about mastery and deployment of Key Enabling Technologies (KETs)

What are KETs?

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

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

European KET Strategy

- EC Communications (2009)512 & (2012)341
- KET High-level Group
 - final report '*KETs: Time to Act*', June 2015

Strategic context: Importance of EU Manufacturing

- **66% of private R&D investment**
- **2.1 million enterprises** (10% of total)
- **33 million jobs** (20% of total)
+ twice as many indirect jobs via related services
- **Turnover:** €7.1 trillion
- **Value added:** €1.7 trillion (27% of European value added)
- **Biggest purchaser and user of KETs**
Huge potential for innovation

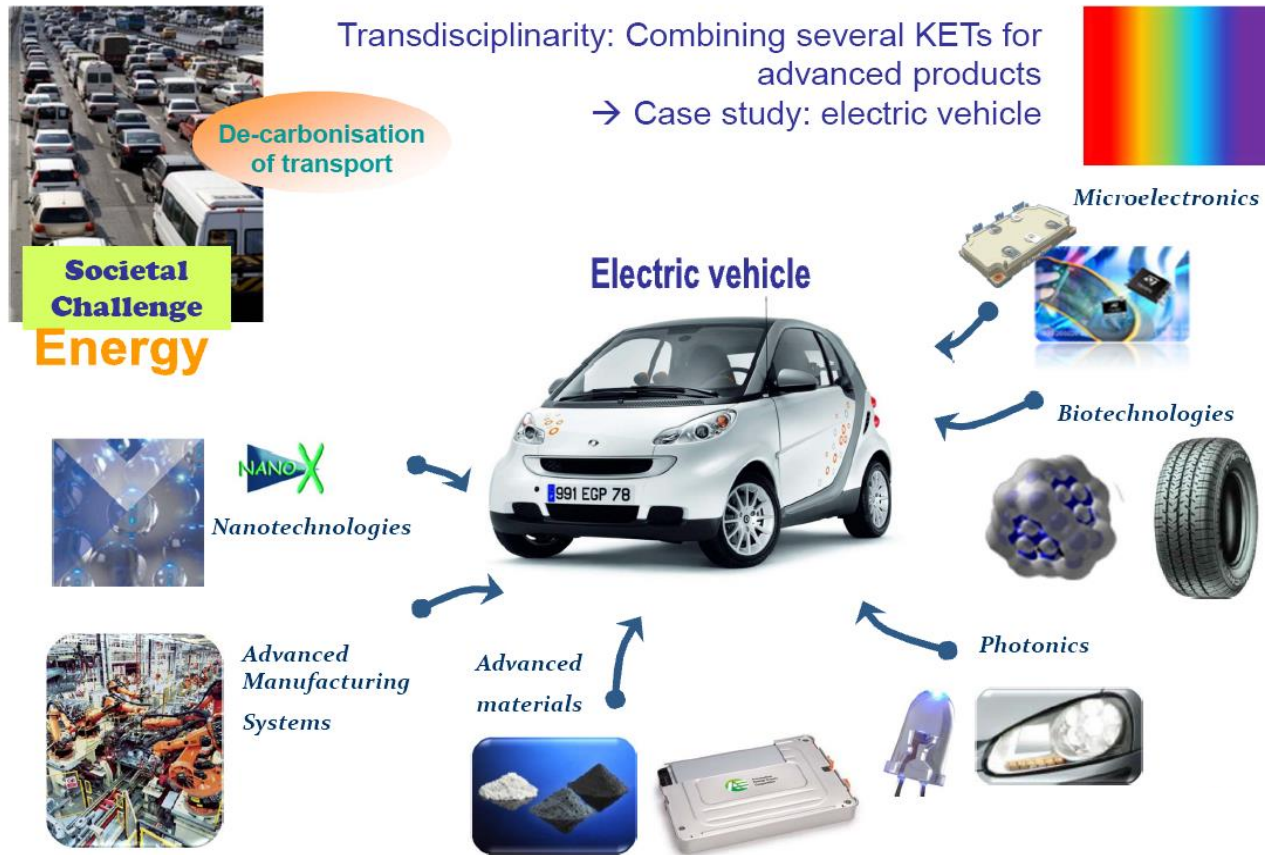
Source: Eurostat ES 2011 "Structure of the business economy" EU-27, 2008,
NACE Section D

Focus on integrative role of nanotechnologies and advanced materials

Mainstreaming Nanotechnologies

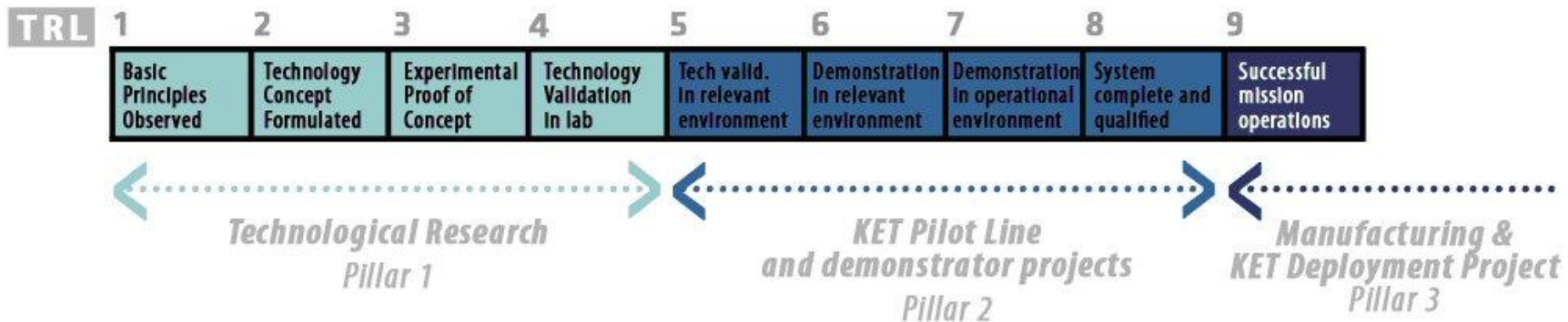
the smart way...

Case example: the electric car



Technology Readiness Levels (TRLs)

- The LEIT part of Horizon 2020 targets TRLs from 3-4 up to 7 with a centre of gravity on 5-6
- Highest TRLs for cases with a strong industrial commitment



- Beyond TRL 7: *explore paths to commercial exploitation, to deploy technologies funded under Horizon 2020*

Example: Engineering-Upscaling and Pilots

❖ Pilots with a focus on nano-enabled products relevant for several value chains with cross-sectorial and trans-national relevance as characterised by *NANO*utures.

Examples of possible sectors:

- ❖ **Textile:** fiber enhanced performances, finishing treatment, surface functionalization, functionalization of indoor furnishing...
- ❖ **Transportation:** lightweight multifunctional materials, sustainable composites...
- ❖ **Construction and buildings:** lightweight material, enhanced mechanical properties, functionalization of indoor
- ❖ **Energy:** storage with enhanced batteries, energy harvesting and conversion
- ❖ **Medicine & Pharma:** nanopharmaceuticals and/or contrast agents, surface treatments for high-throughput, microfluidic advanced systems for in vitro diagnostics, smart chemical and bio sensors for multi-parameter measurements (multiplexing)...
- ❖ **ICT (Nanoelectronics and photonics):** Multilayer sandwich structures, organic structures etc. for lasers, displays, ink-jet printers, consumer electronics



Translating NT and AM research into products Pilot Calls Summary 2014/2015

- **23** projects approved, receiving a combined grant from the Commission of **130 M€ million**
- **58%** of participants are SMEs or Larger Industry
- **70** pilot lines across the 23 projects
- Estimated over **10000** European jobs to be safeguarded/created.
- A combined income of over **€500** million by 2024 is projected for the projects (& their partners)

SMEs participation

- 92 participants are SMEs & shall receive **€41,4** million € in funding.
- These SMEs come from 20 EU member states and one from Switzerland, with the majority originating from the UK and Spain (31% combined share of SME partners and 45% combined share of SME grants).

NMBP2016/17 Call –PILOT Topics – 80 M€

- ☐ 01-2016: Pilot lines for manufacturing of materials with customized thermal/electrical conductivity properties
- ☐ 02-2016: Pilot Line Manufacturing of Nanostructured Antimicrobial Surfaces using Advanced Nanosurface Functionalization Technologies
- ☐ 03-2017: Pilot Lines for Manufacturing of Nanotextured surfaces with mechanically enhanced properties
- ☐ 04-2017: Pilot Lines for 3D printed and/or injection moulded polymeric or ceramic microfluidic MEMS
- ☐ 05-2017: Paper-based electronics

Industry Driven Initiatives in Healthcare and Energy, targeting TRL5-6, are a additionally receiving $58+48=106\text{M€}$ in NMBP 2016/2017

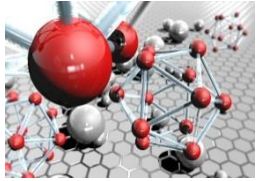
Impact in NMBP Work Programme 2016-2017

- Expected impacts as described in topic descriptions
- For most topics , impact to be underpinned by ***Business cases and exploitation strategies for industrialisation*** (outlined in LEIT Introduction)
- Should be realistic and credible
- Exploitation strategies are to be developed further during projects
- In NMBP calls, the impact criterion is always the first criterion used to resolve proposals with equal overall scores

Policy developments, to create favourable conditions

- Stimulate demand-side actions
- Better collaboration between the public/private sectors to stimulate investments
(e.g. links between Horizon 2020 and European Fund for Strategic Investments – EFSI)
- Financing (e.g. new approaches for SMEs, risk-sharing, risk-financing)
- Better regulation
- Standardisation
- New skills / training / education
- Promoting entrepreneurship (e.g. KIC on Added Value Manufacturing)
- Knowledge and risk management for products and industries
- Public procurement
- Programme evaluation of FP7 / Mid-term review of Horizon 2020

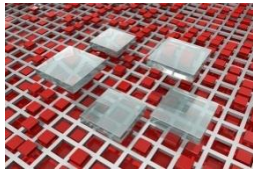
Other main activity fields



Advanced materials and Nanotechnologies for high added value products & process industries

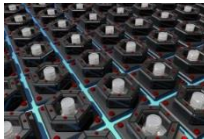


Advanced materials and Nanotechnologies for Healthcare



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Advanced materials and Nanotechnologies for Energy applications



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Modelling for the development of Nanotechnologies and Advanced Materials

**Nanospecificity maintained in one
field in particular....**

EU nanosafety basics

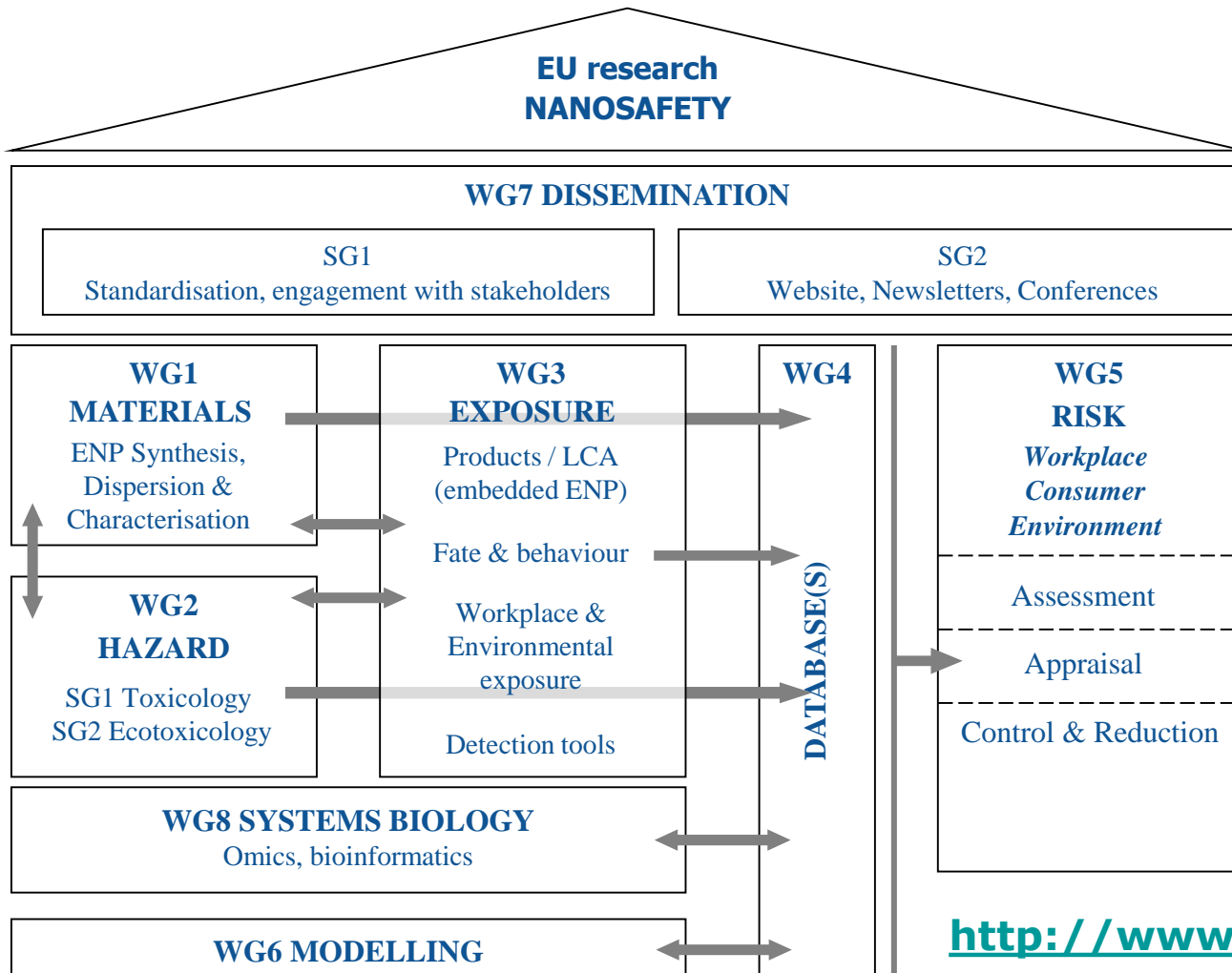
2004: *First efforts in nanosafety with 12 projects under FP6, continuation with 48 projects under FP7*

2009: *EU nanosafety research policy shaped along the lines of:*

- **Completeness:** All technical areas to be addressed: Hazard – Exposure – Risk Assessment - Safe-by-Design
- **Consistency:** All safety management layers to be addressed: Science and technology– regulatory research – market
- **Efficiency:** Synergy with Member States and International dimension and cooperation

2015: *Good progress in all fields*

Efforts continue under H2020



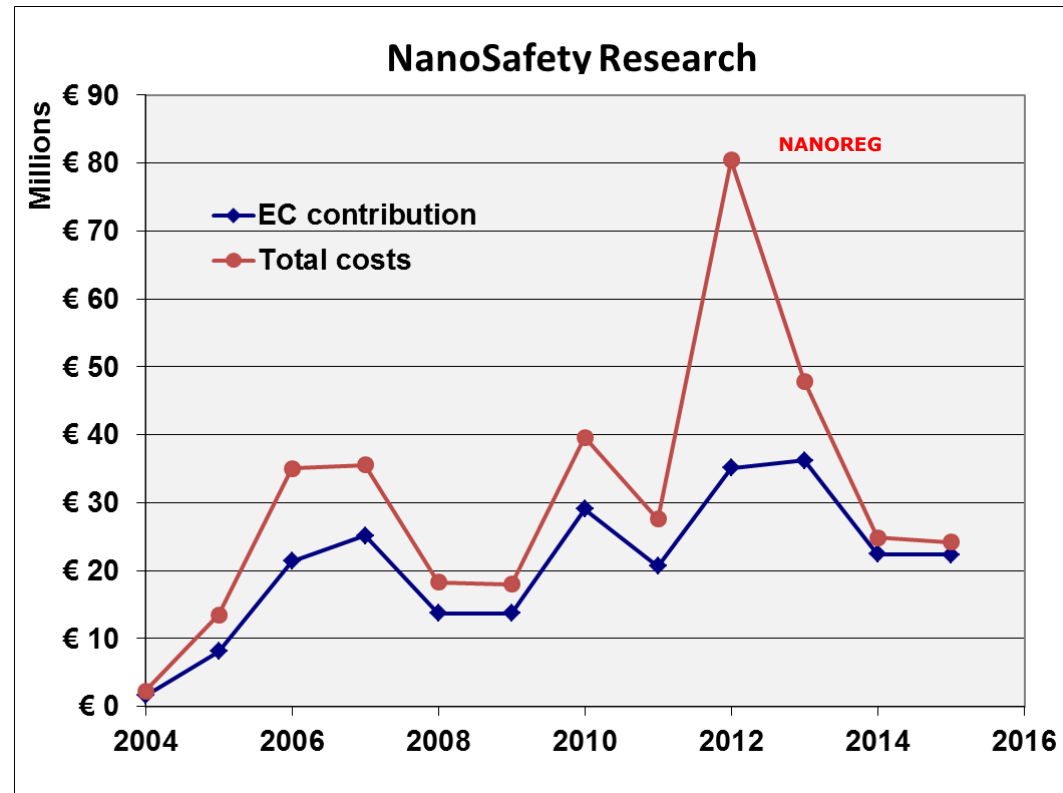
- Finding synergies & complementarities
- To avoid duplicating work and improve efficiency
- To provide a forum for discussion, problem solving and planning R&D activities in Europe (strategic research agenda)
- To provide industrial stakeholders and the general public with appropriate knowledge

<http://www.nanosafetycluster.eu>

Nanosafety research in FPs and H2020 Investment and Compendium

- First nanosafety projects in FP5 (1998-2002)
- Regular budget increase, now levelled off at ~30M€
- FP7: **48 funded nanosafety projects**, representing a total EU investment of **177 M€** (corresponding to total projects costs of 262M€).
- ~5% NMP budget, ~10% Nano@NMP
- In addition to FP, Member States annual funding efforts about 70 M€

→ **European** (EU + EU MS) nanosafety funding about **100 M€ annually**.



NB: These figures do not include safety research in application-oriented projects nor nanomedicine

Regulatory research; NANOREG – PROSAFE

A joint action supported by public funding from EU, Member States and FP7-associated states and industry.

Brings together MS and industry contribution to the OECD-WPMN.

A credible reply to the EP resolution of 2009 for a special fund.

Coordinated by the NL, Ministry of Environment

Total project size €50M. Contribution of resources from:

- Brazil and South Korea, 2M€ each, no EC funding*
- Czech Republic, 0,5M€ with EC funding*
- Greece, 140k€, no EC funding*

First 18-month review was successful, completion early 2017

CSA PROSAFE started on 1-2-2015 for 2 years:

- Complements NANOREG*
- Supports the EU-USA CoRs*
- Launch of one joint call with few MS and USA funding*

Thank you for your attention