

Nanobiotechnology and Nanomedicine: Innovation and market Challenges towards H2020. A multi-KET approach

Cristina Paez-Aviles¹,
Esteve Juanola-Feliu¹
and Josep Samitier^{1,2,3}

cpaezeviles@el.ub.edu

¹Department of Electronics, Bioelectronics and Nanobioengineering Research Group (SIC-BIO), University of Barcelona, Martí i Franquès 1, Planta 2, Barcelona, Spain

²IBEC-Institute for Bioengineering of Catalonia, Nanosystems Engineering for Biomedical Applications Research Group, Baldiri Reixac 10-12, Barcelona, Spain

³CIBER-BBN-Biomedical Research Networking Center in Bioengineering, Biomaterials and Nanomedicine, María de Luna 11, Edificio CEEI, Zaragoza, Spain

We are at beginning of a new European Commission's initiative. Horizon 2020 is the biggest financial program for Research and Innovation which goes "*From fundamental research to market innovation*" involving the entire innovation chain. With over 74 billion euros budget, H2020 search turning scientific breakthroughs into innovative products and services [1]. All innovative projects will include a risk management strategy to address at an early stage the risk. H2020 is focused on three fundamental pillars: Scientific Excellence, Society Challenges and Industrial Leadership. This last one aims to support SMEs in the industrial development and application of *Key Enable Technologies* (KETs), considered crucial accelerators for innovation and competitiveness [2].

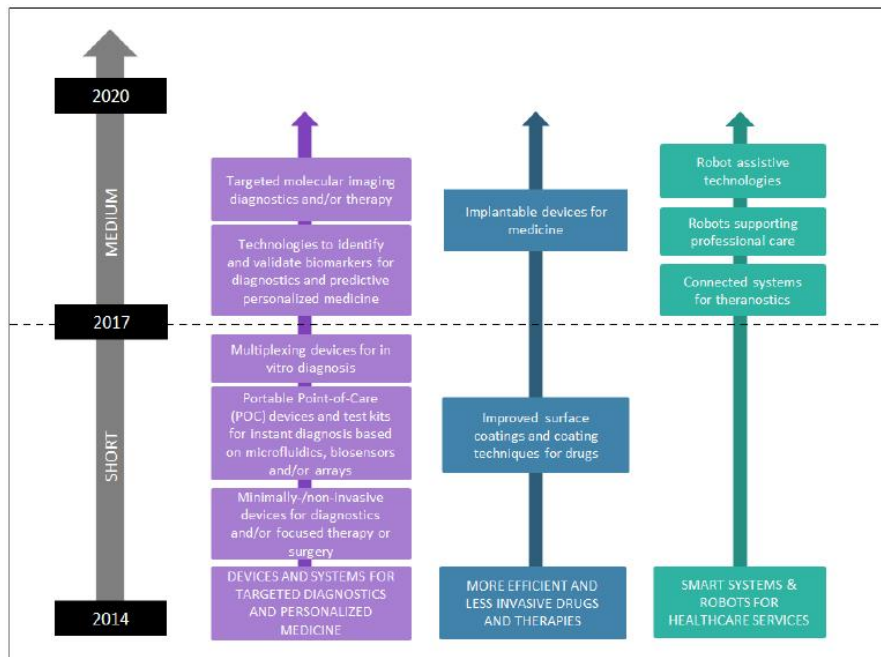
Six KETs have been selected as the most strategically relevant: Nanotechnology, Biotechnology Industry, Advanced Materials, Micro & Nano Electronics and Advanced Manufacturing Systems. One of the most promising is Nanotechnology due to its economic and social growth potential. Individually, each KET has a huge potential, however, their **crossfertilization** is particularly important since their combination offer even greater possibilities to foster innovation and create new markets. The relevance of this combining process relies on the creation of new unique product properties and technology features, which could not have been possible to obtain with a single technology. In the healthcare domain, nanobiotechnology and nanomedicine application areas of **multi-KETs** in a short (2017) and medium

term (2020), are principally based on more efficient and less invasive drugs and therapies, devices and systems for targeted diagnostics and personalized medicine, and smart systems and robots for healthcare services (**Figure**) [3].

In this context, this paper aims to analyze the current situation of Nanobiotechnology and Nanomedicine innovation within the Spanish National Innovation System. Specifically, the authors want to focus on the commercialization perspectives for healthcare applications and how to reduce the gap between academic research and marketable applications. Among all the indicators analyzed, the authors emphasize the Global Entrepreneurship Monitor [4], the Innovation Efficacy Index [5], the European Regional Competitiveness Index [6] and the GERD [7]. Furthermore, Spanish performance regarding publication and patenting activities are analyzed.

At present, the emerging sector of applied nanotechnology is addressed to the biomedicine (Nanobiotechnology and Nanomedicine), starting to show a promising impact in the health sciences principally in three main areas: Diagnostics, Therapeutics and Regenerative Medicine. Nanomedicine is considered a long-term play in the global market; in fact, is anticipated to grow around 25% by year. The global market volume in KETs is 646 billion € and substantial growth expected is approximately an 8% of EU GDP by 2015. About one third of the budget assigned to KETs will be address to support innovative projects integrating

different KETs. By this year, it was expected that 16% of goods in healthcare and life sciences will incorporate emerging technologies [8]. The expected market size related to radical innovation-based nanomedicines will be 1.000 M€ in 2020 and 3.000 M€ in 2025 [9]. In this context H2020 will spend 9.7% of the total budget in Health, Demographic Change and Wellbeing; specifically, the program will invest 3.851 M€ in Nanotechnology and 516 M€ in Biotechnology Industry [10]. Finally, an analysis of the state-of-the-art of these technologies



and their innovation performance environment within an innovation ecosystem of a 5-helix model is crucial to identify strengths and to improve weaknesses facing new scientific and market challenges.

Figure 1. Field for cross-cutting KETS developments on Healthcare (Source: Ro-cKETs Project Conference, Brussels 2-3 April, 2014).

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