

Cross-cutting KETs: Innovation and Industrialization challenges for Nanobiotechnology and Nanomedicine towards Horizon 2020

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Abstract

Integration between Key Enabling Technologies (KETs) will be essential for competitiveness and innovation in Europe in the coming years. In this context, the new European Commission's initiative Horizon 2020, the biggest financial program for Research and Innovation aims to finance different Risk Management Projects going "from fundamental research to market innovation". This involves the entire innovation chain focusing on the research and development of **crosscutting KETs**, which are among the priorities of the Horizon 2020 Framework strategy. This strategy identifies the need for the EU to facilitate the industrial deployment of KETs in order to make its industries more innovative and globally competitive [1].

Horizon 2020 aims to redefine the cooperation in funding and scientific research by turning scientific breakthroughs into innovative products and services with over 74 billion € budget [2]. It is emphasized on three main pillars: Scientific Excellence, Society Challenges and Industrial Leadership. This last one aims to support SMEs in the industrial development and application of KETs [3], which have been selected according to the economic criteria, economic potential, capital intensity, technology intensity, and their value adding enabling role: Nanotechnology, Micro and Nano Electronics, Photonics, Advanced Materials, Biotechnology Industry, and Advanced Manufacturing Systems.

Nanotechnology, is expected to make a rapid impact on society [4],[5]. After a long R+D incubation period, several industrial segments are already emerging as early adopters of nanotech-enabled products and findings suggest that the Bio&Health market is among the most challenging field for the coming years. Nanotechnology is also considered multidisciplinary since it is not restricted to the realm of advanced materials, extending also to manufacturing processes, biotechnology, pharmacy, electronics and IT, as well as other technologies [6]. These characteristics allow the connection to a diversified set of industries [7], implying that nanotechnologies can be involved directly or indirectly in the other five remaining KETs. This strong interdisciplinary character, combined with the possibility of manipulating a material atom by atom, opens up unknown fields and provides an endless source of innovation and creativity.

While each KET already has huge potential for innovation individually, their cross-fertilization is particularly important to offer even greater possibilities to foster innovation and create new markets. The concept of cross-cutting KETs refers to the integration of different key enabling technologies in a way that creates value beyond the sum of the individual technologies for developing innovative and competitive products, goods and services that can contribute to solving societal challenges. The global market volume in KETS is 646 billion euros and substantial growth is expected of approximately 8% of EU GDP by 2015.

At present, the emerging sector of applied nanotechnology is addressed to the biomedicine (nanobiotechnology and nanomedicine) [8], starting to show a promising impact in the health sciences principally in three main areas: Diagnostics, Therapeutics and Regenerative Medicine (**Figure 1**) [9], [10]. Nanomedicine is considered a long-term play in the market [11]. In fact, the global nanotechnology market is anticipated to grow around 19% by year during 2013-2017 [12]. The expected market size related to radical innovation-based nanomedicines will be 1.000 M€ in 2020 and 3.000 M€ in 2025 [13]. In this context H2020 will spend 9.7% of the total budget in Health, demographic change and wellbeing.

Translation of innovation and time-to-market reduction are important challenges on this framework. Nanomedicine firms have focused primarily on the science and less on the commercial applications resulting difficult to bring products into the market [11]. This remarks the existence of a *gap* between the current high levels of scientific performance and the industrial competitiveness [14]. The Commission states that bridging the so called “Valley of Death” to upscale new KET technology based prototypes to commercial manufacturing, often constitutes a weak link in the successful use of KETs potential. This is meant to be the “European industrial Renaissance” by covering the whole value of chain lab-to-market as the principal aim of H2020 where market is the main starting point.

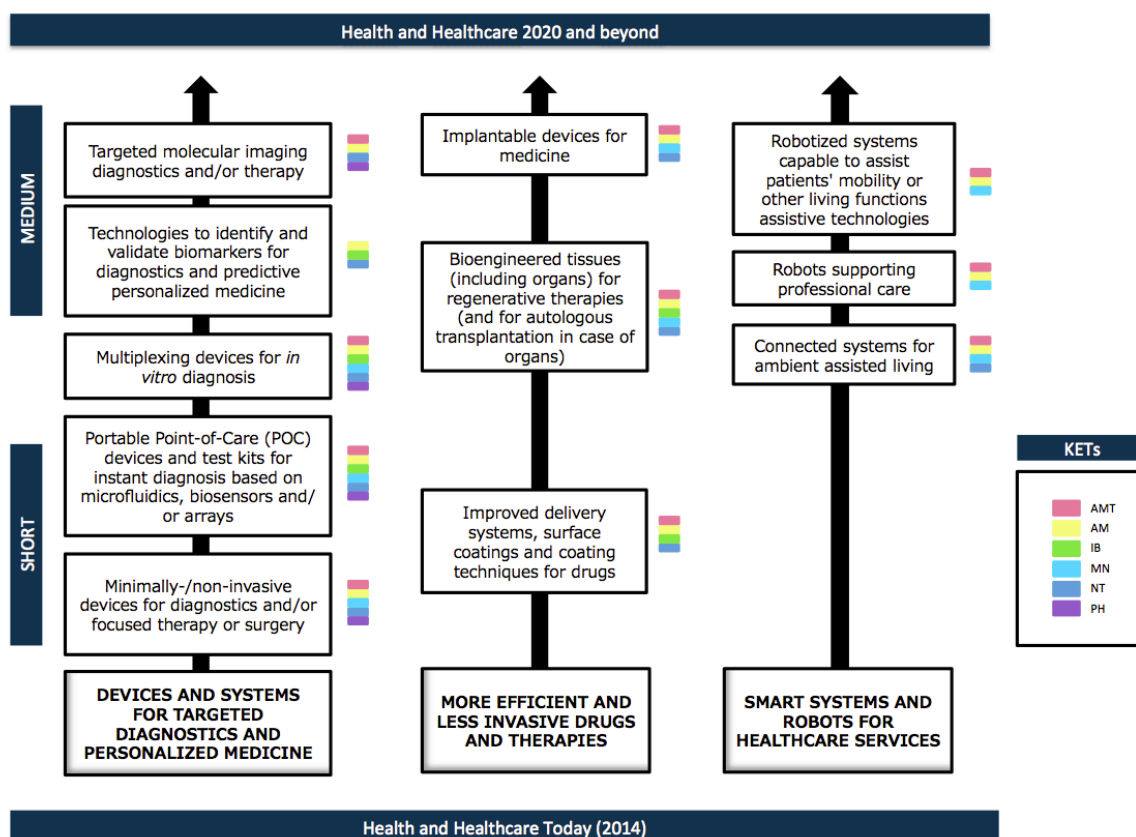


Fig. 1: Fields for cross-cutting KETs innovations in the Health and Healthcare Domain

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