European Commission

This fiche is part of the wider roadmap for cross-cutting KETs activities

'Cross-cutting KETs' activities bring together and integrate different KETs and reflect the interdisciplinary nature of technological development. They have the potential to lead to unforeseen advances and new markets, and are important contributors to new technological components or products.

The complete roadmap for cross-cutting KETs activities can be downloaded from:

http://ec.europa.eu/growth/industry/key-enabling-technologies/eu-actions/ro-ckets

Potential areas of industrial interest relevant for cross-cutting KETs in the Health and Healthcare domain

This innovation field is part of the wider roadmap for cross-cutting KETs activities developed within the framework of the RO-cKETs study. The roadmap for cross-cutting KETs activities identifies the potential innovation fields of industrial interest relevant for cross-cutting KETs in a broad range of industrial sectors relevant for the European economy.

The roadmap has been developed starting from actual market needs and industrial challenges in a broad range of industrial sectors relevant for the European economy. The roadmapping activity has focused on exploring potential innovation areas in terms of products, processes or services with respect to which the cross-fertilization between KETs can provide an added value, taking into account the main market drivers for each of those innovation areas as well as the societal and economic context in which they locate.

Taking the demand side as a starting point, cross-cutting KETs activities will in general include activities closer to market and applications. The study focused on identifying potential innovation areas of industrial interest implying Technology Readiness Levels of between 4 and 8.

H.1.1: Targeted molecular imaging diagnostics and/or focussed therapy

Scope:

To develop cost-effective techniques for higher efficiency and more biocompatible targeted molecular imaging for in vivo diagnostics eventually combined with focussed therapy (theranostics).

Demand-side requirements (stemming from Societal Challenges) addressed:

- Tackle the "health, demographic change and wellbeing" societal challenge

Demand-side requirements (stemming from market needs) addressed:

- Improved quality (increased sensitivity and speed) of diagnostics approaches
- Early detection of diseases
- Increased safety for patients

Specific technical/industrial challenges (mainly resulting from gaps in technological capacities):

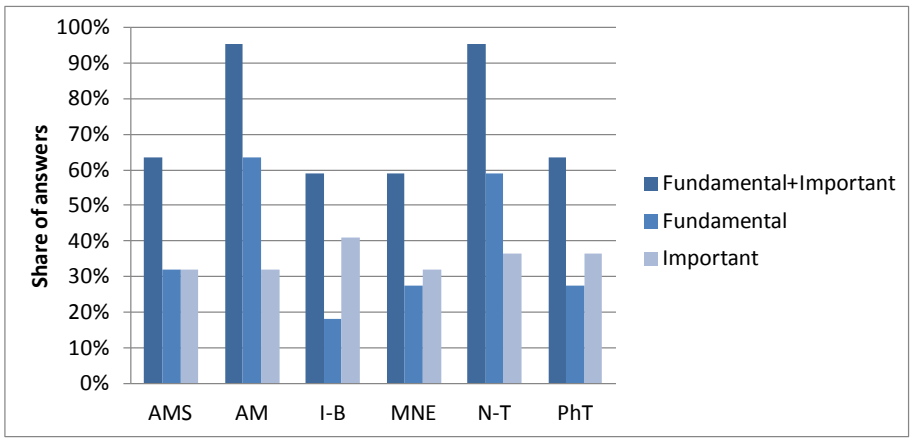
- Development of targeted molecular imaging techniques
- Development of new and innovative tracers or contrast agents for in vivo (imaging) diagnostics
- Improvement of tracers or agents efficiency of targeting
- Improvement of tracers or agents biocompatibility

Contribution by cross-cutting Key Enabling Technologies:

In respect to this Innovation Field, the integration of KETs could contribute to the development of advanced cost-effective techniques for higher efficiency and more biocompatible targeted molecular imaging for in vivo diagnostics, eventually combined with focussed therapy (theranostics), including thanks to the development of targeted molecular imaging techniques and new and innovative tracers or contrast agents with improved biocompatibility.

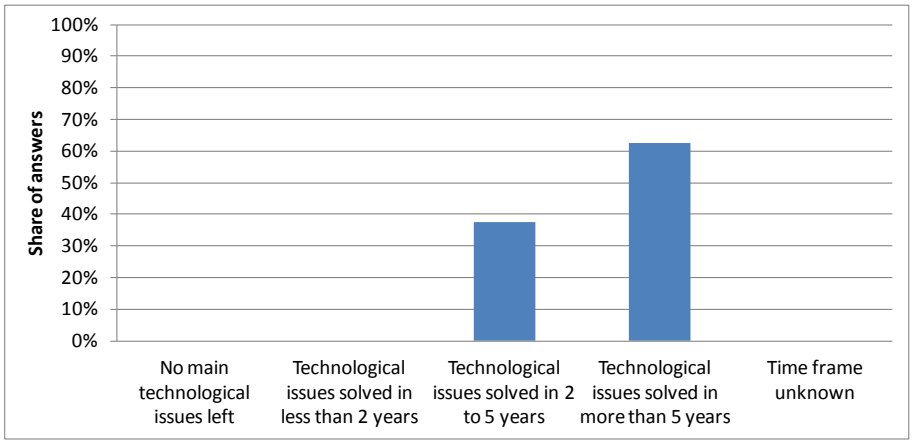
To this aim, the combination of KETs experts' opinions collected through the dedicated survey (whose result is depicted in the below bar chart), the examination of KETs-related patenting activity in respect to this Innovation Field, and desk research activities, have allowed identifying a rather strong interaction of KETs with respect to this Innovation Field, with either fundamental or important contribution mainly by the following KETs:

- Advanced Manufacturing Systems (AMS)
- Advanced Materials (AM)
- Photonics (PhT)
- Micro- and Nano-Electronics (MNE)
- Nanotechnologies (N-T)
- Industrial Biotechnology (I-B)



Timing for implementation:

According to the majority of KETs experts' opinions (whose result is depicted in the below bar chart), desk research, and in line with the KETs-related patenting activity in this field, it is considered that the main technological issues holding back the achievement of cross-cutting KETs based products related to this Innovation Field could be solved in a time frame of more than 5 years, yet significant consensus by experts indicates also shorter periods being necessary:



Hence, depending on the specific technical and/or industrial challenges holding back the achievement of cross-cutting KETs based products related to this Innovation Field, the provision of support in the short to medium term should be taken into consideration within this framework.

Additional information according to results of assessment:

- ***Impact assessment:***
  - The global molecular diagnostics market is witnessing a period of profound growth, coming from different regions and markets. The next years will witness significant developments in molecular diagnostics such as automation, as well as introduction of a wide range of new products. Molecular diagnostics involves multiple technologies to identify genetic variations and cancer development in individual patients. These technologies include PCR, FISH, hybrid capture, sequencing and microarrays. The increase in the ageing population and incidences of various chronic diseases are driving the demand of molecular diagnostics world over. The industry is getting a push from every side and many factors collectively are fuelling the growth in this industry. Growing with a compound annual growth rate (CAGR) of 14.64% global molecular diagnostics market is expected to double its size in 2017 from 2012 (Source: Renub Research, Molecular Diagnostics Market & forecast (by application, technology, countries, companies & clinical Trials) to 2017: Global analysis, April 2013).
  - On the other hand, theranostics is the fusion of drug therapy and diagnostics to optimize effectiveness, safety, and streamline drug development. Combination of medical drugs with diagnostic tests is also known as integrated medicine, pharmaco-diagnostics, companion diagnostics, and Dx/Rx partnering. The theranostics market is an emerging field which is generating strong interest from healthcare industry and regulatory bodies. It is an emerging clinical diagnostics field that focuses on developing specific analysis to predict the use of the most significant drug for the patient. This technique uses molecular assays to determine optimum dose of drug necessary for the patient. Cost and regulatory timelines are some of the important challenges faced by this market. Improved cooperation between drug and diagnostics companies will boost the success of the theranostics industry. Effective communication with physicians to understand theranostics penetration in the market will lead to commercialization of this field. Companies focusing on theranostics with licensed drugs are expected to play a major role in reaching larger pharmaceutical companies (Source: Market Research, Theranostics Market - Global Industry Size, Market Share, Trends, Analysis And Forecasts 2012-2018, 2011).
- ***Results of patents scenario analysis:***
  - 16 exclusively KETs-related patents identified in the period 2001-2011 for the specific Innovation Field
  - Hence, no significant patent-related indicators can be reported in this field