

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.1.2: Minimally-/non-invasive devices for diagnostics and/or focussed therapy or surgery

### Scope:

To develop minimally invasive endoscopic instrumentation and devices for in vivo medical diagnostics/imaging eventually combined with focussed therapy or surgery (e.g. endoscopic instruments eventually integrating multiple functionalities such as for example imaging guided surgery).

### 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
- Decreased patients' pain during medical, diagnostic and treatment activities

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

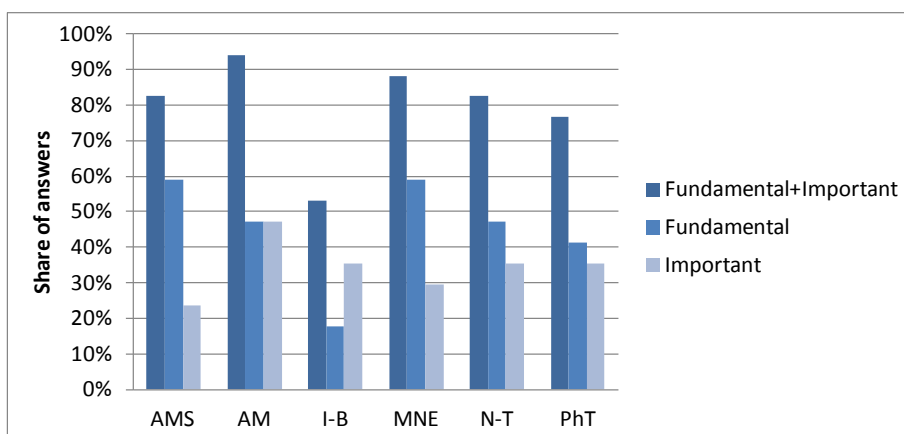
- Miniaturisation for lower invasiveness
- Surface functionalization and “biologicalization” of instruments to increase biocompatibility

### Contribution by cross-cutting Key Enabling Technologies:

In respect to this Innovation Field, the integration of KETs could contribute to the development of more advanced minimally or non-invasive endoscopic instrumentation and devices for in vivo medical diagnostics/imaging, eventually combined with focused therapy or surgery, further contributing to the miniaturization and to surface functionalization of the instruments and devices to increase biocompatibility.

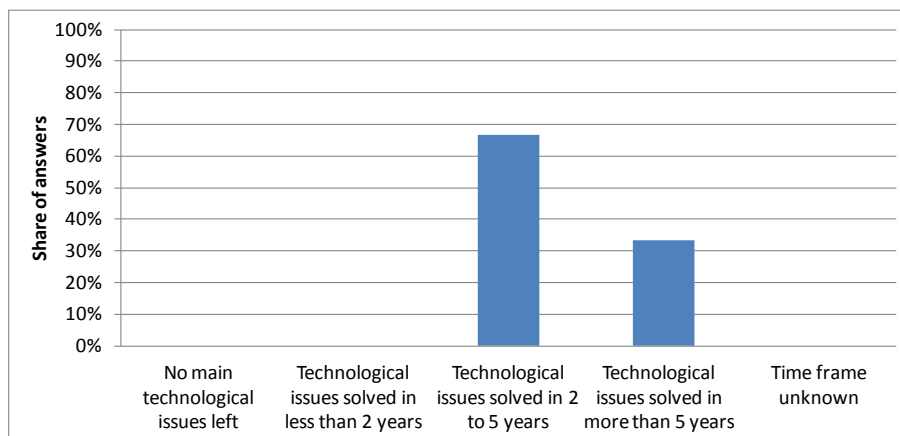
To this aim, the combination of KETs experts' opinions collected through the dedicated survey (whose result is depicted in the below bar chart), the examination of KETs-related patenting activity in respect to this Innovation Field, and desk research activities, have allowed identifying a rather strong 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) to a lower extent



### 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 2 to 5 years, yet significant consensus by experts indicates also longer 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.

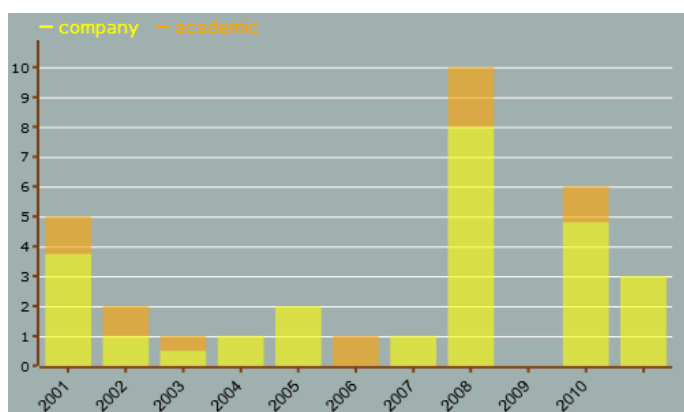
### Additional information according to results of assessment:

#### ➤ **Impact assessment:**

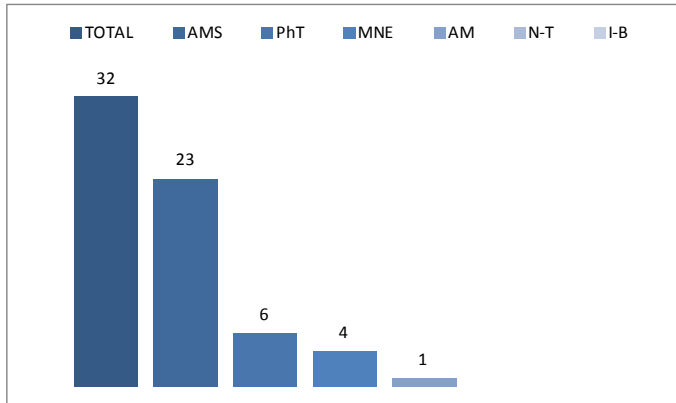
- Endoscopic instrumentation and devices are applied either to in vivo medical diagnostics / imaging or also to focussed therapy or surgery. Endoscopic instruments also exist that eventually integrate multiple functionalities such as, for example, imaging guided surgery. These instrumentation and devices are designed to be minimally invasive in order to provide fewer risks as well as less pain and quicker recovery to patients. This instrumentation is increasingly being applied in almost any surgical field. The approach can in fact allow for small incisions and smooth introduction within the body's lumens and cavities, thus resulting in quicker recovery and fewer side effects to the patient besides enabling a greater number of outpatient procedures, resulting in lower overhead costs for national healthcare systems. Minimally invasive instrumentation for either medical diagnostics or therapy/surgery, which was introduced in the late 1980s, has actually significantly changed the standards of operations and interventions.

#### ➤ **Results of patents scenario analysis:**

- 32 exclusively KETs-related patents identified in the period 2001-2011 for the specific Innovation Field
- Significantly scattered trend curve (number of patents per year)
- Unpredictable share between industrial and academic applicants with intermittent relevant patenting activity by academic applicants, most probably standing for new technologies having been patented in the corresponding periods:



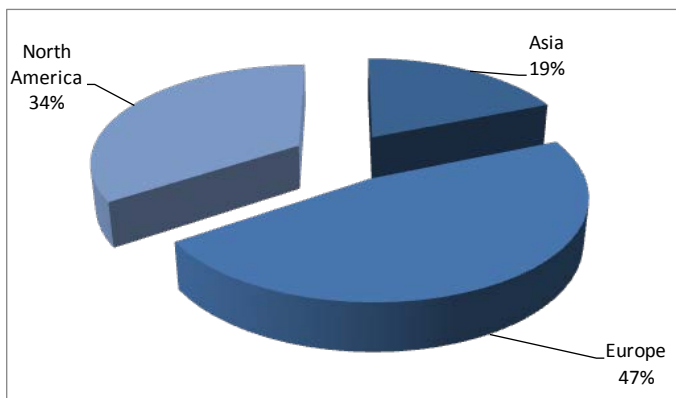
- Patents by KET(s):



- Patents by KET(s) and relevant combinations of KETs:

| KET(s)    | Number of patents |
|-----------|-------------------|
| AM        | 1                 |
| AMS       | 23                |
| AMS / MNE | 1                 |
| AMS / PhT | 1                 |
| MNE       | 4                 |
| PhT       | 6                 |

- Patent distribution by (Applicant) organization geographical zone:



- Patent distribution by geographical zone of priority protection:

