

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.2.3: Bioengineered tissues (including organs) for regenerative therapies (and for autologous transplantation in case of organs)

Scope:

To develop new and improved techniques for tissues (or organs) regeneration, such as for example engineering of skin, cartilage and bone for autologous implantation or engineering of organs for autologous transplantation.

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:

- Introduction into the market of alternative therapeutic approaches

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

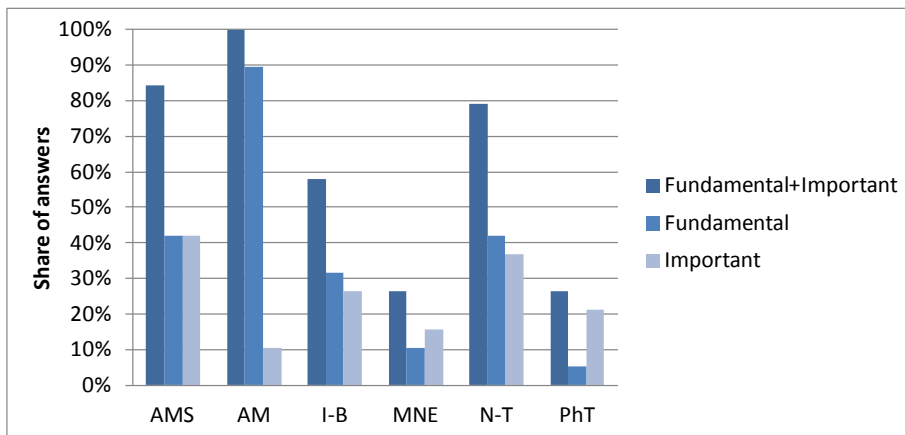
- Development of novel cell culture techniques
- Development of targeted drugs to trigger and control stem cell differentiation
- Use of biomaterials as carriers for ligands stimulating cell membrane receptors and on controlled release of bioactive compounds
- Chemical modification of existing biomaterials to obtain new generation of healing dressings
- Chemical modification of existing biomaterials to obtain scaffolds for in-vitro cell culture or tissue engineering
- Validation of product manufacturing processes in regenerative medicine, including scale-up and manufacturing (process optimization)
- Proof of long term efficacy and safety in regenerative medicine

Contribution by cross-cutting Key Enabling Technologies:

In respect to this Innovation Field, the integration of KETs could contribute to the development of novel cell culture techniques, targeted drugs to trigger and control stem cell differentiation, bio-materials to be used as carriers for ligands and controlled release of bio-active compounds, the modification of existing bio-materials to obtain new generation of healing dressings as well as scaffolds for in-vitro cell culture or tissue engineering.

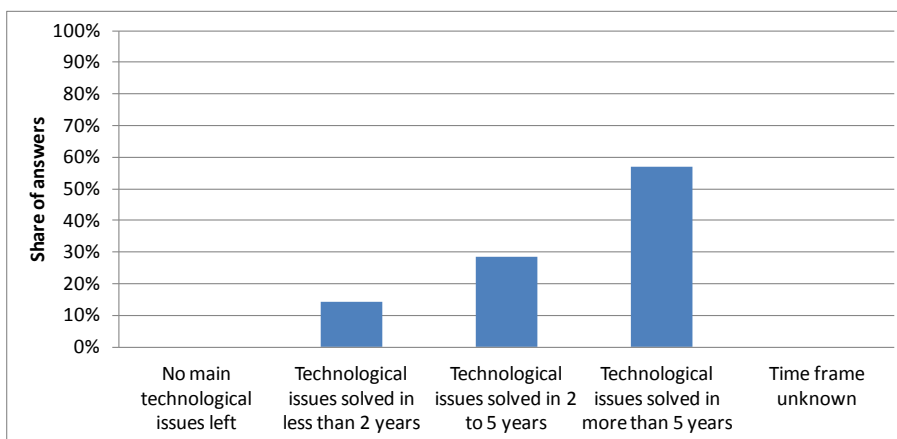
To this aim, the combination of KETs experts' opinions collected through the dedicated survey (whose result is depicted in the below bar chart), the examination of KETs-related patenting activity in respect to this Innovation Field, and desk research activities, have allowed identifying a rather strong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



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 medium term should be taken into consideration within this framework.

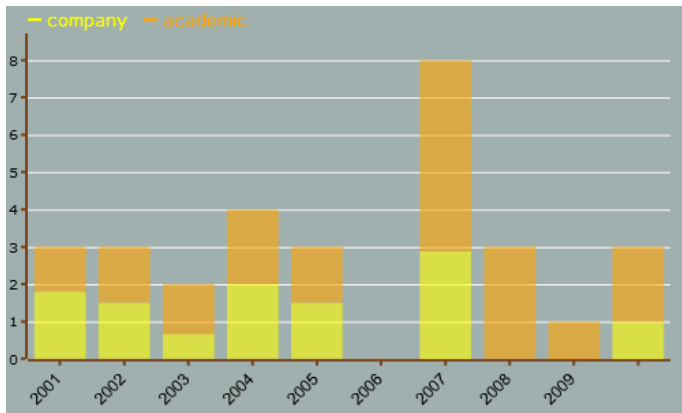
Additional information according to results of assessment:

➤ **Impact assessment:**

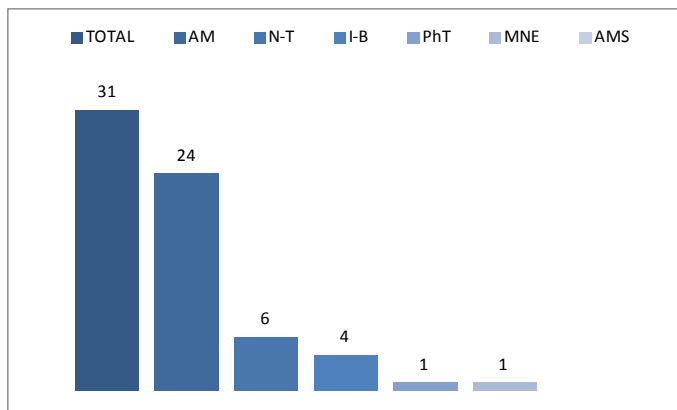
- Human tissue engineering and regenerative medicine in general (e.g. the use of "smart" biomaterials that promote self-repair of damaged tissues) offer tremendous promise for improved patient treatment, faster recovery, improved prognosis and a more biologically favourable situation where the body can be stimulated to heal itself. There is a huge amount of research being undertaken worldwide in all areas mentioned in this overview (and others) and a huge interest in the potential of tissue engineering/regenerative medicine. However, there is still currently a lack of an effective regulatory framework on a European basis. (Source: European Medical Technology Industry Association, Innovations in Medical Technology, Regenerative medicine and human tissue engineering, 2007).

➤ **Results of patents scenario analysis:**

- 31 exclusively KETs-related patents identified in the period 2001-2011 for the specific Innovation Field
- Almost stable trend curve (number of patents per year), despite a peak in 2007, with a generally low patenting activity per year
- The intellectual property ownership is shared between academia and industry:



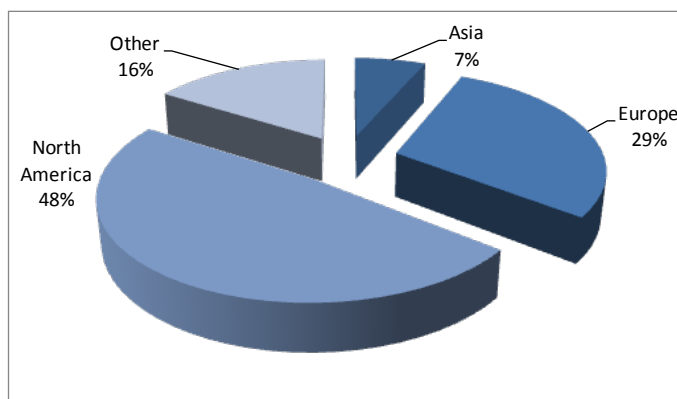
- Patents by KET(s):



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

KET(s)	Number of patents
AM	24
AM / N-T	4
IBT	4
MNE	1
MNE / PhT	1
N-T	6
PhT	1

- Patent distribution by (Applicant) organization geographical zone:



- Patent distribution by geographical zone of priority protection:

