

4.4 Key Enabling Technologies (KETs) for Europe

Why invest in KETs?

The European Commission has defined six priority Key Enabling Technologies⁷¹ for Europe. The Commission has reported that mastering these technologies is regarded as crucial for ensuring the competitiveness of European industries in the knowledge economy. KETs enable the development of new goods and services and the restructuring of industrial processes needed to modernise EU industry and make the transition to a knowledge-based and low carbon resource-efficient economy.

Microelectronics and Embedded Systems:⁷² Microelectronics are the lifeblood of 40% of all innovations. Components and Integrated systems are found in virtually all electronic products; from computers and telephones to cars and buildings. The global turnover of the sector alone was around EUR 230 billion in 2012. Despite the current economic climate, the worldwide market for micro- and nano-electronics has grown by 5% per year since 2000. Further growth of at least the same magnitude is predicted for the remaining part of the current decade. In Europe, more than 240.000 people are directly employed in micro- and nano-electronics. Another aspect of why it matters is the establishment of European networks of embedded system design centres which are driven by the vision of “embedded ICT everywhere” and which stimulate connecting innovators across the value chain and across sectors and regions by conducting a critical mass of design and application experiments in application areas such as time-critical systems, or smart environments. In the coming years the market for the Internet of things will further develop, unlocking new economic growth and employment for the European regions. The connected car and smart buildings are only two examples representing EUR 730 billion in revenue.

Photonics:⁷³ Photonics is everywhere around us: from communications and health, to lighting and photovoltaics and to everyday products like DVD players and mobile phones. Photonics is a fast-growing business sector, with a global market of around EUR 350 billion, projected to reach over EUR 600 billion by 2020. Europe has established a strong position with an overall total share of approximately 18% (€66 billion in 2012).⁷⁴ The European photonics industry

employs more than 300,000 people directly, many of these in the over 5,000 photonics SMEs often structured in national and regional innovation clusters which represent a highly educated workforce.

Robotics:⁷⁵ Robotics has a huge potential to contribute to growth, job creation and to solve major societal challenges. In particular, regions should fully exploit the potential in contributions to local economies, for instance advanced robotics technologies with increased flexibility can play a key role in making local manufacturing and production competitive again,⁷⁶ while also contributing to a greener economy, with the potential to re-shore some industries (e.g. food supply). The health and monitoring domains also show great potential at regional level, since these cannot be delocalised.

Manufacturing:⁷⁷ The economically driven concentration processes in terms of size and localisation in today's manufacturing industries have led to regional concentrations of actors along value chains in a smaller number of lead regions in Europe. Less developed regions have little opportunity to participate in value creation. ICT allows the creation of ‘virtual’ value chains regardless of the geographical location of its actors which allow the potential of skilled labour forces in other regions to be exploited, thereby making those regions participate in value creation, often at lower cost. To achieve this, a Smart Specialisation Strategy is key: the aim is to identify and strengthen the competitive advantages of EU regions in terms of skills, R&D capability, industrial output and infrastructures and to link up R&D&I strategies at regional, national and European levels while offering incentives for growth and differentiation. The aim is to leverage the available resources through a European programme and to counter Europe's de-industrialisation.

Barriers & challenges

The key challenge for regions is to make an economic assessment of how the strengths of different sectors can be used to create regional growth and jobs. This will allow them to identify the economic niches and competitive advantages in development and which deployment activities to carry out. To be able to use EU Regional funds such as ERDF the regions will have to assess how KETs can contribute to the creation of growth and jobs. The region should build on their strength and be sure to maintain excellence where their leading position is acknowledged. Regional specialised investment allows excellence to be maintained and new economies developed around them.

71 COM(2009) 512: KETs are knowledge-intensive and associated with high R&D intensity, rapid innovation cycles, high capital expenditure and highly-skilled employment. They enable process, goods and service innovation throughout the economy and are of systemic relevance. They are multidisciplinary, cutting across many technology areas with a trend towards convergence and integration.

72 <http://s3platform.jrc.ec.europa.eu/documents/10157/130815/130620%20A4%20Fiche%20KETs%20Micro%20electronics%20-%2018%20June%20v1.pdf>.

73 <http://s3platform.jrc.ec.europa.eu/documents/10157/130815/130620%20A1%20Fiche%20KETs%20Phot onics%20-%2019%20June.pdf>.

74 EPIC/TEMATYS Report, Photonics Ecosystem in Europe, April 2013.

75 <http://s3platform.jrc.ec.europa.eu/documents/10157/130815/Robotics%20and%20KETs%20special.pdf>.

76 Industrial robots can save production locations and millions of jobs. www.ifr.org/news/ifr-press-release/robots-to-create-more-than-a-million-jobs-by-2016-295.

77 <http://s3platform.jrc.ec.europa.eu/documents/10157/130815/130621%20A3%20Fiche%20KETs%20Manu facturing%20and%20embedded%20systems.pdf>.

The challenge is to identify the topics and candidates for smart specialisation, then develop an ecosystem around them by mobilising all the necessary actors including academia, system integrators, industry, SMEs, potential users, involving local governments, as users, where relevant. The idea is to develop cooperation along the entire R&I value chain, attracting additional investment, sparking entrepreneurship to create new companies, attracting new users, creating new jobs, involving local SMEs and local authorities (e.g. as users to test the technology in public spaces, services, in pre-commercial procurement). Furthermore, sharing physical infrastructures and resources not only at regional but at European level has many advantages, reinforcing the leading position of the region, and also optimising resource and funding at EU level.

How to act?

It could be very useful for regions wishing to develop regional strengths to consider the following elements.

1. Analysis: Identify the main fast growing industrial sectors and the main stakeholders in your region (industry, incl. SMEs and end-users, universities, research institutes, competence centres, etc.); make a SWOT analysis of their capabilities and skills as well as of their competitive advantages; in particular, assess the opportunity in affecting the innovation potential of user industries excelling in application areas and industrial sectors present in your region;

2. Governance/stakeholder involvement: Engage with the stakeholders. Examples of potential lines of action are provided below.

3. Priority setting: Together with relevant stakeholders set strategic R&I priorities (as expressed in your RIS3 operational programmes).

4. Policy mix: Develop roadmaps to reach the set goals, and define implementation actions for the main actors to work together and spur forms of innovation or specialisation. Identify and link with other EU level activities to help your stakeholders find opportunities for cooperation and growth outside your region. A proposition for a number of possible lines of action is listed below.

- Structuring the regional stakeholders around a cluster organisation: cluster organisations can play a pivotal role in

promoting R&I investment in a region, by bringing together main industry and academic stakeholders, investors and government agencies with the aim of generating synergies among the players in R&I in specific markets; and, stimulating the creation of business ecosystems that build on complementarities between the different players, including users, with a view to creating new competitive advantages.

- Linking value chain activities through cross-cluster and cross-region cooperation: Full value chains do not exist in many regions. Cooperation between players and end-users in different clusters of a region or in different regions provides opportunities to work along full value chains to expand the business of local industries.
- Supporting innovative SMEs: Regions can support SMEs competitiveness and growth by: (i) stimulating access to regional / European feasibility, testing, prototyping and manufacturing capabilities for research-intensive and end-user SMEs; (ii) stimulating R&I activities involving SMEs both as part of the value chain collaboration and through specific actions aimed at SMEs. In particular, open innovation models along the value chain can further promote the collaboration between large industry and SMEs; (iii) by supporting the development of open-access pilot line and foundry services that provides SME access to manufacturing capabilities.
- Supporting Manufacturing Platforms & Pilot Production Lines: Regions could explore opportunities to promote manufacturing.
- Supporting Large Scale Deployment Actions: public authorities can act as first users in large scale demonstration actions and public procurement schemes that promote innovation for an effective field testing and deployment of innovative technologies. .
- 5. Monitoring and evaluation:** Relevant key performance indicators for KETs in general are provided both in the KETs high level group report and the KETs observatory feasibility study.

Further reading & forthcoming events

<http://s3platform.jrc.ec.europa.eu/kets-and-manufacturing>