The intensive use of technology is changing the paradigms of clinical health care practice, as well as Biomedicine research, which is now much more evidence-based. Technology plays a part in the entire health care cycle: prevention, diagnosis, therapy, surgery, rehabilitation, remote care and research.

To meet this challenge there must be a continuous and fruitful interaction between bio-experts (doctors, surgeons, biologists, biochemists) and engineers and scientists. Training development (graduate, post-graduate and doctorate) is also a key requirement in the interfaces between both worlds (biomedical engineering, biological engineering, biotechnology, nanomedicine). This will undoubtedly improve the quality of life of citizens and result in reduced public health care costs through increased prevention and remote support with respect to hospital health care. It will also lead to advances in cutting-edge, image-based diagnostic and surgery systems and in advanced therapies (tissue engineering, gene and cell therapy) and state-of-the-art pharmacology (therapeutic nanoconjugates, nanoparticles with guidance control, hyperthermia, controlled drug release).

**Areas of research**
Areas of research identified for development include: Prevention, remote care (household devices, telemedicine); Multi-modal diagnosis (medical imaging, biological signals, predictive modelling, smart devices); Tissue engineering (biomaterials, bioreactors, scaffolds, cell therapy); Nanomedicine (nanobiosensors, drug delivery, nanoconjugates); Disability and rehabilitation assistance (remote rehabilitation, disability support systems). In addition, development actions are also important for graduate, post-graduate and doctorate education in Biomedical Engineering, Nanomedicine and Biological and Cellular Engineering.

Today there is a strong commitment to **Nanotechnology and Bioengineering** in the more technologically-advanced countries. Taking France as an example, there are three important initiatives in the application of nanotechnology in the productive sector, based on setting up companies in an environment of major scientific and technological development with renowned research centres and top-level scientific infrastructures: “Essonne Nanopole” in the Paris region, “Micro and Nanotechnologies” in Grenoble, and “Canceropole” in Toulouse. In each of these scientific-technological-business complexes they have made a strong commitment to integrating micro and nano devices with application in advanced industrial sectors.
Research in the field of **Stem Cells and Regenerative Medicine** focuses on different areas of basic and clinical research. It develops activities in: Molecular Basis of Cell Differentiation; Characterisation of Adult Stem Cells; Tissue Engineering and Cell Therapy.

**Partnerships**

The development of Nanoscience and Bioengineering, and the formulation of the research area in Stem Cells and Regenerative Medicine within the Iberus CIS, have been of major significance, enabling the identification of the Health Technologies area of specialisation:

- There is a large group of biomedical and nanoscience research centres and institutes which are located within the Iberus Campus and which actively works with it. These are listed in section 2.5 of this report.

- Special projects have been coordinated in these areas through the Ingenio 2010 Programme:
  - the CONSOLIDER programme "Nanotechnology in Biomedicine", wherein research is carried out into nanotherapy for drug development and for the functioning of nano-diagnostics through the development of biosensors.
  - the CIBER programme "Bioengineering and Nanomedicine", where the Biomedical Research Centre Network in Bioengineering, Biomaterials and Nanomedicine (CIBER-BBN) brings together some of the principal Spanish research groups in this field, from universities, hospitals and other technology centres. Its vocation is to conduct translational research and transfer its results to the industry. It coordinates the activities of 49 research groups in the fields of Bioengineering and Biomedical Imaging, Biomaterials and Tissue Engineering and Nanomedicine.