

## Editorial

The Need for a Research and Development Strategy<sup>☆</sup>

## La necesidad de una estrategia en investigación y desarrollo

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For the first time in many years, the ratio of gross domestic expenditure on research and development (GERD) to gross domestic product (GDP) has fallen. In 2012, research and development (R&D) expenditure in Spain amounted to €13.392 billion, 5.6% less than the previous year, and 1.30% of GDP, compared to 1.40% in 2010.<sup>1</sup>

It is impossible to determine the best GERD to GDP ratio, since spending nothing is poor practice and spending 100% is unfeasible. However, this figure is far removed from R&D expenditure in the United States, which accounted for 2.73% of GDP for the same period, or in Japan, with 3.25%. A closer look at the figures, moreover, reveals that the Spanish economy accounts for 8% of that of the entire European Union (EU), while in 2009, Spain filed 1.44% of all patents registered in the 27 EU member states. It is clear, then, that R&D performance in Spain is disproportional to the size of the country's economy and population.<sup>2</sup>

With so many numbers in the mix, even experts find it hard to quantify the benefits of research for society, particularly when we consider that technology, and more particularly science, spreads rapidly and globally from sector to sector and place to place. However, it is equally important to remember that scientific development not only contributes to economic growth and technological competitiveness, it is also key to building a country's wealth and improving the future and quality of life of its citizens.

Nevertheless, recent decisions affecting the scientific sector have been less than encouraging, and Spain is slipping back to a situation that we thought was relegated to history. The industrial sector (53.0% of all R&D spending, 0.69% of GDP) has been hard hit by improvidence and the effects of the current economic crisis. While all sectors reduced their R&D spending in 2012 compared to the previous year, the reduction in the industrial sector was 4.1%.<sup>1</sup>

This suggests that funding for scientific research in Spain must continue to come from a progressively debilitated public sector that cannot compete without the public-private alliance. Added to this is the long overdue reform of the university system, a key player in technology and knowledge transfer, thereby ensuring smooth running of the "Triple Helix" model<sup>3</sup>

formed by academia (research, technology transfer offices, etc.), the government (legislation, grants, intellectual property, etc.) and industry (innovation, investment, production, etc.), and the integration of industrial, technological and scientific policies (Fig. 1).

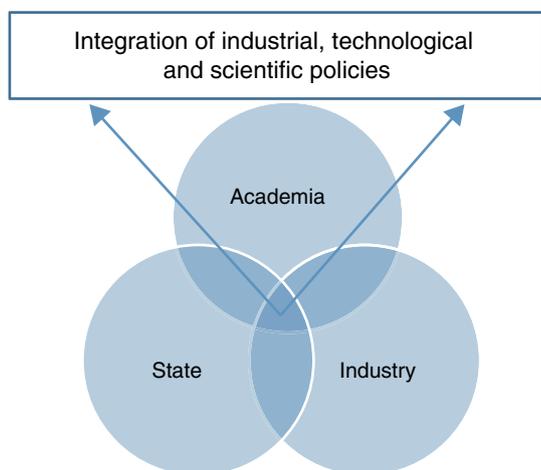
To gear research toward Spain's real interests calls for immediate action to evaluate and prioritize specific areas and objectives while making a concerted effort to generate a critical competitive mass. We must also come to terms with the fact that the governmental and administrative framework underlying Spanish public scientific research is incapable of meeting current and future needs, and must be modernized in terms of technology, competence and flexibility.

In view of the growing disenchantment and frustrations of many scientists clamoring for a raft of measures that include legislative change, structural improvements, investment and political pacts, we must find a way to unite social, political and corporate forces in the conviction that science is the basis for stable future and progress. New ground rules need to be established, such as the definition of a clearly prioritized scientific policy, with a stable outlook capable of attracting foreign investors to Spain. At one stage, this seemed to be within our grasp, only to be snatched away by the current economic situation and subsequent budget restrictions; it will only again become a reality if the reforms needed to support the growth and funding of competitive structures are put in place. An essential part of this approach is to rethink our outdated human resources policy, and to provide a clear career structure for scientists and researchers who currently find it difficult to access positions in the universities and public research bodies.

Another priority is to identify strategic sectors in which we can be competitive right now and others that could be targets in the future, defined on the basis of public and private interests. A good example is the food industry, a key activity in Spain with wide financial horizons that attracts considerable private investment, and where innovations have far-reaching effects. Other important sectors are the automotive industry and tourism, not to mention niche sectors such as biotechnology, pharmaceuticals, genomics, telecommunications and information technology.

The difficult situation in which we find ourselves should in itself provide the momentum to drive through much-needed reforms and strategies. Science is popular right now, and we have the right

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**Fig. 1.** The Triple Helix model of university–industry–government relations.

skills and raw materials that only need to be woven together, coordinated and targeted. In addition, Spain is in an enviable position as an EU member state with preferential treatment in the South American market. Ultimately, the country needs a newly constructed

R&D strategy that is both modern and efficient, based on the kind of social and political support that can generate confidence, guarantee stability and ensure sufficient resources.

All these general reflections are equally applicable to the health sector and biomedical research. Let us not forget that this sector, characterized by the need for research in humans and a dependence on public health institutions dedicated to disease prevention, diagnosis and treatment, accounts for nearly 50% of aggregate scientific output. In this context, respiratory diseases, due to their prevalence, economic and social impact, morbidity and mortality, are particularly important.

## References

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