



Editorial

The scientific knowledge dissemination under threat

I feel very proud to have been invited to write the editorial for the first issue of the Journal of Aerospace Technology and Management. Although this is the first time I have written a column like this, it is not the first time I have thought about issues related to aerospace technology and management. As the current Director of the Institute of Aeronautics and Space, I have been thinking along these lines for quite some time. Since the Institute mission includes knowledge production and development of technology, one of our concerns, as expected, is the understanding of the many faces of science-technology relationship.

Throughout history the interaction between science and technology has been persistently analyzed and various models have been proposed which try to explain this relationship from different points of view. In some of these descriptions it is assumed that it is the scientific research that provides the underlying foundation of knowledge needed to enable breakthrough technology. Another description considers that, throughout history, the flow has also gone from technology to science. As an example of the latter we have the development of the telescope by Galileo. This new instrument led to better astronomical measurements, which rendered the prevailing theory of an earth-centered universe so complex, that it led to the significantly simpler idea of a sun-centered universe.

We may also reflect on the science-technology relationship taking into account the interactions among the main protagonists involved in these processes: universities, research centers and industry.

In The United States, during the 1980s, universities were blamed for their ineffective participation in industrial competitiveness. At that time, it was argued that universities had a civic duty to ally themselves closely with industry to improve productivity. This started a kind of partnership rush and since then we have seen a significant rise in the level of collaboration between the private commercial sector, research centers and universities. Good examples are the classic success stories of Stanford University and Silicon Valley in California, and the Massachusetts Technology Institute and the Route 128 beltway around Boston clusters of cutting-edge computing technology. However, this also caused concerns among academic officials that greater involvement of universities with industry would promote a shift from fundamental science to more applied work.

At first glance, this collaboration model seems to be a good example of a win-win strategy. We easily realize everywhere the strong and enduring policy consensus that presently favors scientific knowledge production, mainly in the form of direct subsidies for national industrial development. This practice has been viewed as the most important way of achieving innovation. In this conceptual model, the focus of the research efforts in both universities and research centers is almost entirely product-related.

Although there is nothing wrong with policies that encourage joint development, since it happens to be good in many ways, this practice may have gone too far and we are running the risk of distracting the universities and research centers from their major responsibilities towards society. Research priorities should not be settled by financial interests, and research results should be made available to the public as a whole. This excessive partnership between scientific institutions and industry affects research, teaching, funding, ethics, scientific publications and many other important areas in the science-technology relationship. Presently, we have seen many universities changing their curriculum to adapt it to the demands of industry. This state of affairs also involves growing secrecy in academic research fuelled by industrial competitiveness. This increased confidentiality contradicts the need for the open dissemination of scientific knowledge without necessarily being concerned about commercial viability. But the real problem is that these confidentiality agreements, also called disclosure restrictions, that govern what can be published, threaten the efficient advancement of scientific frontiers.

We turn next to another risk to be considered regarding the dissemination of scientific knowledge. The first scientific journals were the French *Journal des Sçavans* and the British *Philosophical Transactions*, both published in the year 1665.

Since then, publishing journals has become a key activity of learned academies and professional societies. Over time, investors saw an opportunity for business and profit, and these journals emerged as businesses with very high profit margins. Many professional societies handed their journal publishing activity over to commercial publishing houses, which not only started imposing huge subscription prices for the journals they produced, but also started 'bundling', a practice by which subscribing libraries are made to buy a large number of journals not all of which may be found useful by their clients. In the past two decades, average journal subscription prices have increased considerably.

Scientific research is a community activity. In science, as a general rule, no one can claim to be an autonomous creator. One's thoughts and ideas are shaped by the literature one is exposed to, the talks one hears at conferences one attends, and the discussion one holds with other scientists in formal and often informal settings. The Journal of Aerospace Technology and Management is a tool intended to reinforce this point of view. It is a free publication and an additional source of dissemination and interaction for the scientific community. It is going to be published every six months and its main objective is to show the results of scientific and technological research, especially those related to the aerospace field.

The classic relationship between science and technology holds that science is a body of truths about nature and technology the practical application of these truths in the production of useful devices and systems. Especially in a capitalist system, truth and utility belong to different worlds. Today, faced with repeated market collapses, the world economy can no longer afford investments in "pure research", because it does not produce a rapid return on capital. Ironically, in the long run, this increased constraint on science, especially as regards basic research development, undermines the economic and social viability of the capitalist system itself. Developing nations are at particular risk from these trends. Indeed, as many have pointed out, the growing privatization of scientific knowledge is widening the knowledge gap between rich and poor countries.

Lastly, I do believe in the benefits of the synergic relationship between the academic and industrial communities, but it is necessary to perceive that urgent measures should be taken to redress the balance between public access to, and private control over, scientific knowledge. Like fuel, oxygen and heat and their cooperation to produce fire, the universities, research centers and industry, likewise, should work together without losing their individual character to be able to meet society's needs not only for present but for future generations as well.

Enjoy the read!