

Ireland's narrow research focus on commercial technology is short-sighted

Cormac O'Raiheartaigh

Last Updated: Thursday, April 30, 2015, 02:00

A recent letter to *The Irish Times*, signed by more than 1,100 scientists, noted that funding for scientific research in Ireland has become increasingly focused on the [commercialisation of technological applications](#), with nothing left in the pot for research in the [basic science](#) underpinning such technologies. A recent article in this newspaper by the noted [Trinity College](#) Dublin geneticist David McConnell noted the same trend.

Such concerns have been expressed many times before, but this appears to have little impact on official policy. Research funding remains almost exclusively targeted at certain technological areas considered important, while few, if any, funding schemes are open to researchers in fundamental fields such as mathematics, theoretical physics, astrophysics and particle physics, to name just a few.

It is a fundamental misconception to assume that significant success can be achieved in the commercialisation of modern technology without paying attention to the [underlying science](#). To my knowledge, no other country has attempted such a shortcut; the reason is that breakthroughs in innovation are driven by an understanding of the fundamentals.

Consider the semiconductor technology that lies at the heart of today's digital devices and the modern computer. Semiconductor technology emerged from 40 years of quantum physics, that most abstract of scientific theories. Converting an understanding of quantum physics to the manufacture of the first semiconductor transistors was a tremendous feat of technology and fundamental science. The idea of the silicon transistor being developed or improved by scientists or engineers with no knowledge of fundamental physics is laughable.

Einstein and GPS

Similar examples can be found throughout 20th century technology. Today's Global Positioning System (GPS), relies heavily on Einstein's theory of relativity. Without relativistic corrections for the relative motion of the satellites and the Earth, or corrections for the fact that the satellites are located in a different gravitational field to us, the system would be useless. Another example is the laser, which is firmly based on the quantum theory of light. Lasers have become indispensable, and are used in everything from barcode recognition to advanced techniques in modern medicine. To expect a new breakthrough in laser technology from a research group with little knowledge of the underlying science is foolish indeed.

Yet the Government continues to reserve scarce research funds for certain technological applications of science, while ignoring the fundamentals. Given the pace of change in modern technology, this risks a generation of scientists becoming knowledgeable in one narrow area only, which soon becomes obsolete.

A related problem is that large grants are repeatedly awarded to the same small number of research groups. Given the importance attached to certain fields over others, it is inevitable that such awards increasingly reflect the area of specialisation rather than outstanding merit. Thus, it is by no means unusual for a small, relatively young research group to consistently receive a large amount of research funding, while a highly respected university department receives almost nothing, despite having staff whose research is cited worldwide.

More than 70 years ago, the then taoiseach, Éamon de Valera, set up the Dublin Institute for Advanced Studies, a fourth-level institute concerned with research in mathematics, theoretical physics and Celtic languages. The initiative was opposed by many, but De Valera's strategy was for the institute to foster academic research of the highest quality without incurring the high costs associated with laboratory sciences. It attracted physicists of the highest calibre and quickly established a reputation as a world-class centre for mathematics and theoretical physics. Most importantly, it had a significant impact on the fostering of high-level research in modern physics and mathematics in the Irish universities.

Today, Ireland is no longer one of the poorest countries of Europe, but De Valera's vision of the importance of fundamental science seems to have been completely lost. The only research in science considered worth investment is that linked to narrow areas of technology. This strategy is shortsighted.

- Dr Cormac O'Raiheartaigh lectures in physics at [Waterford Institute of Technology](#) and writes the science blog [Antimatter](#)

© 2015 irishtimes.com