The Role of Serendipity in Basic Research

Tales of serendipity in scientific research are always intriguing. From Archimedes' flash of inspiration while lowering himself into a bath, to Newton's moment of clarity while sitting under an apple tree, it is clear that serendipity has played an important role in many fundamental scientific discoveries.

Yet accidental discoveries continue to flourish in modern scientific research with direct consequences for everyday life. Teflon, cellophane, aspartame, polyethylene, rayon and the microwave oven are but a few of the inventions discovered serendipitously while their creators were looking for something entirely different.

In the fields of medicine and pharmacology and in particular the discovery of new drugs, serendipity abounds. Penicillin, aspirin, chlorpromazine, quinine, cisplatin, retin-A and viagra represent a fraction of the drugs discovered while researchers were conducting research in totally unrelated fields.

As chance and good fortune play a significant role in ground breaking discoveries, what then is the role of research policy? In what way do the organization of research activities and framework under which research is conducted contribute to pioneering research?

Conjunction of serendipity & basic research

Research in Europe is frequently strategic, driven by government policies and priorities, commercial interests and the need to address imminent challenges. Indeed this approach has contributed to the public perception that scientific progress is the result of meticulous research and analysis. However nearly all technologies, products and achievements which have lead to economic and commercial success and/or concrete improvements to the quality of life are based on basic research.

The discovery of X-rays and nuclear magnetic resonance has led to many applications in the field of medical diagnosis. More recently, the application of biotechnology to medicine has provided major insight into many diseases.

Work on the principle of stimulated coherent radiation, lasers, in the 1960s has found numerous outlets in industry and medicine. Increased knowledge in the physics of semi-conductors allowed the development of transistors, thus integrated circuits and then microprocessors, the basis of electronics; and in informatics, the sophisticated software which controls user-friendly interfaces and calculation systems is based on mathematical algorithms which were developed in a very theoretical manner.

Indeed environmental management and sustainable development are largely the result of basic research in climatology, oceanography, atmospheric physics etc.

The impact of breakthroughs in the exploration of questions of physics, chemistry and biology have consequences far beyond their individual fields. Furthermore, research beyond the boundaries of discipline and without any apparent practical use frequently results in the broadest range of applications.

Human curiosity and inquisitiveness are the driving forces behind basic research. It is the quest for the advancement of knowledge and the search for a clearer understanding of relations among variables which potentially has the most significant impact on everyday life. Within such a context, revolutionary discoveries tend to result from individual research.

On the EU level, there is now heightened awareness not only of the importance of basic research in driving progress but also the need to create an environment to support young, up-and-coming investigators who wish to lead independent research teams. By nurturing a research system which fosters curiosity and actively promotes basic research without the constraints or pressures of targeted research, we are creating an environment conducive to serendipitous discoveries.

Extending the frontiers of knowledge

The launch of the European Research Council (ERC) shows the importance the EU is now placing on basic research. As the first pan-European funding body, the ERC aims to move beyond the national approach to basic research and to foster competition on the EU level thereby stimulating innovation and creativity.

The ERC contends that the distinction between ‘basic’ and ‘applied’ research has become blurred, due to the fact that emerging areas of science and technology often cover substantial elements of both. The focus is therefore on scientific excellence and encouraging truly creative scientists to go beyond the established frontiers of knowledge and the boundaries of discipline. To reflect this progressive ethos, the ERC has coined the term frontier research.

The promotion of investigator-driven frontier research in Europe shows an eagerness to substantially strengthen the European research system, but also a clear recognition of the importance of advances in scientific knowledge and research for achieving further economic and social progress in the European Union.

Conclusion

Advances in basic research have enabled quantum leaps in economic, social and scientific fields. While serendipity may have played a crucial role in many remarkable discoveries, surely the true genius lies in the ability of great scientists, researchers and scholars to recognise the importance of the unforeseen occurrence?

Creating an environment which actively supports scientific research is therefore critical for future progress. Indeed according to Louis Pasteur: ‘In the field of observation, chance only favours the prepared mind.’
The launch of the ERC and of a progressive approach to basic research shows the level of Europe’s commitment to stimulating innovation, creativity and excellence.
By providing a framework to explore the frontiers of knowledge, the EU is paving the way for future sparks of Eureka creativity.