

## Safeguarding Scientific Culture: A Contribution from EIROforum.

This brief document seeks to describe the particular character of science, its significant influence on our society and on our culture, especially in a European context. It argues that just as science is firmly entrenched in our society and culture, science must also be entrenched in any basic document, be it a treaty or a constitution, that serves to provide a framework for how we organise ourselves in Europe.

### The Role of Science in Society

Science and technology pervade almost every aspect of modern society. Increased life expectancy and a (comparatively) secure material existence have added significantly to the quality of our lives. Scientific and technological progress in the past century has underpinned the development and sustainability of the social model of the welfare society that, for all its imperfections, characterizes Europe, providing to its citizens social security, broad and relatively equal access to medical treatment, education and information, governance based on democratic principles and procedures etc. Furthermore, the impact of science and technology is multifaceted. Science has an economic dimension, a social dimension and a cultural dimension. Indeed the very fabric of modern European society is interwoven with multiple aspects of scientific activity.

In essence, science can be seen from at least four different perspectives. As

- An edifice of knowledge, under continuous construction
- A human endeavour
- A unique and powerful way of interrogating the natural world around us
- A powerful way to promote human welfare in a sustainable and appropriate manner

On the first point, *scientific knowledge* provides a unique resource for society in general. First of all this resource forms a backbone of Education. Furthermore, in a cultural context, it has informed and inspired both philosophy and the arts through the ages, perhaps more than any other human activity, forcing us to challenge old, often untenable conceptions about the world in which we live and, not least, our own role therein. A prime example of this process is the ‘dislodgement’ of humankind from the centre of the Universe, through the explorations of Copernicus, Tycho, Kepler, Newton, Herschel, Hubble and others. The edifice of knowledge, with its wealth of insights – some troubling, some reassuring – provides the context for society, as we know it today.

As a human activity, science – perhaps even more so its *practitioners* – have provided role models for generations of Europeans. Who has not heard about those mentioned above, or about Galileo, Darwin, Linnaeus, Pasteur, Fleming? Who has not been fascinated by the perseverance and personal sacrifices of Marie Curie and her colleagues or pondered over the fundamental implications of the findings and ideas by

20th-century scientists like Einstein, Bohr, Watson and Crick, Jacob and Monod, and others. All of them (except Watson) were European, as indeed was the philosophical tradition upon which they based their seminal work, and they worked collaboratively across national borders, bearing the strongest evidence of our common cultural heritage.

But arguably, the most important aspect of science is the way it is *practiced*, expressed in its unique way of addressing questions and searching for their answers. This specific path towards new knowledge is described as ‘the scientific method’ which, despite inevitable operational limitations, still provides the best attempt by humankind to develop a systematic approach - solidly supported by philosophical and epistemological considerations - to obtain reliable knowledge about the material world in which we exist.

Whichever perspective is used, it is clear that science forms an integral part of European culture, in the past as well as now. Fulfilling a vital function as a carrier of knowledge and methodology, it also places on our shoulders a strong obligation towards future generations. As Europeans, we have been formed by our cultural heritage. Clearly, we must protect that heritage and continue to enrich and develop it, incorporating new knowledge, new insights, new ideas and new experience. This places an enormous responsibility on fundamental research and its practitioners. Fundamental research is often referred to as ‘curiosity-driven research’.

### **Fundamental and Applied Research**

The fourth aspect of science is its potential for development of applications, promoting human welfare. In this aspect, science is fundamental to the European economy: historically, knowledge generation has been the major competitive advantage of the European and North American societies ever since the industrial revolution. Agricultural productivity, health protection and promotion, efficient transportation, advanced communication methods, have all depended on scientific research, and research will continue to be an essential engine for innovation and consequent generation of wealth and employment, for the foreseeable future. At the same time, by its own requirements for advanced technologies, fundamental research supports a long and impressive European engineering tradition, developing and delivering technical equipment at the cutting edge of technology. In fact, it is in the realisation of the major scientific infrastructures (such as the LEP collider at CERN, the Very Large Telescope at ESO or the development of ESA spacecraft and launchers, etc.) that European engineering has celebrated some of its most spectacular triumphs, both in technical terms and in terms of international collaboration. Also in this aspect, science and technology function as an integrating factor in Europe. Similarly, the instrumentation and methods for protein structure determination in centres such as EMBL, ESRF and ILL are essential tools for the development of novel and safe therapeutic drugs. Fusion research carried out by EFDA/JET is an investment towards safe and sustainable energy production in the future.

The primary goal of fundamental research is and has always been knowledge creation, which in a deeper sense constitutes what is perhaps one of the most important sources of cohesion in any society. Due to the ever-increasing economic pressures, ever-faster product-cycles and justifiable concerns about international competitiveness, much

attention is given to technology development (innovation). Europe obviously needs to gain and/or maintain international competitiveness in fields of high technology. Equally, great care must be taken to avoid neglect of fundamental research, if our technological edge is to remain sharp in the future, and if we are to remain true to our cultural heritage. Fundamental research is a major and specific human effort with a long time perspective for society. At the same time, it also ‘internally’ operates on long time scales. The training of new productive scientists is a very long process. Maintaining a convincing scientific effort requires adequate ongoing support and sustained investment.

### **The Operational Framework**

To facilitate this, fundamental research needs a legal, physical and societal space within which it can develop, backed by a firm commitment from society that such a space can indeed be provided and maintained.

The creation of the European Research Area is a major step forward with respect to strengthening the internal structure of the European scientific community and its institutions. Thus, fundamental research – not least the natural sciences, which have always, and as a matter of course, been characterised by cross-border co-operation – can evolve in a European frame.

Acknowledging the indispensable contributions that fundamental research can make to the continued development of Europe and European society and the need to provide a strong base that will secure a healthy and active European research effort, also in the future, a formal commitment should now be made by the European Community that it gives its full support to European scientific research. This support should be enshrined in the basic document that will set the framework for the future activities and responsibilities of the European Union. In practical terms this would, as a minimum, require a review of the Research Title of the (present) Treaty with a view to widening its scope, in particular as regards the goals set out in Article 163.