Brochure „The New Neutron Source FRM II“

Preface
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The articulation of scientific information to the public

The times are not long past when science enjoyed the unlimited trust of society. The contribution of the technical sciences, in particular, towards increasing the standard of living, was too great for people to even think of being mistrustful of technological progress, never mind rejecting it. People had too quickly enjoyed the convenience of the first steam locomotives in their daily lives and, for this reason, the railway rapidly became the popular symbol of technological progress in the second half of the nineteenth century. And the steel industry was also needed for the manufacture of an extensive rail network. It was only when it came to armed conflict that people were reminded of the two faces, the Janus-faced nature of technology: the machinery of war was unthinkable without iron and steel.

We have just taken our leave of the century of chemistry and physics, both of whom have stamped the technological thinking of several generations. It was, significantly, precisely the year 1900 in which the most important types of radiation were discovered and in which the Planck quantum of action served as a basis for modern quantum physics. It was physics and Moseley’s X-ray spectra experiments which, in 1913, put the periodic table of the elements firmly on its feet, and we chemists successfully orientated ourselves according to this map. The enormous variety of materials which industry has won in value-creating fashion from natural raw materials contributes just as much towards ensuring the mobility of modern man as it does towards his high degree of life expectancy.

Miniaturization – the key technical phenomenon

It was chemistry and physics which created the basis for the major and doubtless irreversible developments of today’s high technologies: the communication and information technologies are, just like bio-technology, an outcome of the phenomenon of miniaturization. We no longer wade through our world measuring it in terms of ells; it is now more the wavelength of light which we use to comprehend the structure of matter; not the metre but the nanometre – a millionth of a millimetre – is the unit of measurement of this age following the era of Gutenberg. It was only by means of miniaturization that it became possible to store incredibly large amounts of data in an incredibly small space. The fact that the NASA computer which in 1968 helped to direct the first landing on the moon has the same storage capacity as a present-day mobile telephone is the outcome of the further development of the submicroscopic domains of matter.

Many people, however, are frightened by so much technology around them, in spite of all the daily conveniences it brings with it. And more than this: they are uncertain about the consequences of technological achievements. They have their doubts as to whether it is necessary or sensible to delve into the “innermost secrets of the world” and as to whether this line of action conforms with that fear of God felt by past generations.

Central topics of the century

There is no clear answer to this question and no patent remedy. What we are certainly very much aware of is the exponential increase in the world population figures (“population explosion”). This is for its part very closely connected with the solution of the energy question and the need for alternative primary sources of energy. Food and health are two other categories which must also be viewed in the overall context of interdependence, and above everything thrones the principle of sustained yield.

All this makes scientific and technological research absolutely necessary and inevitable. More than this, it alone can produce the answers to the really big questions of the new century described above. Knowledge of the sub-microscopic domains will provide the necessary insights to enable the development of new working materials and comprehension of the genetic codes of plants, animals and man.

At this point at the latest the articulation of information on the part of the scientific world must come into play as a binding debt to be fulfilled towards the population at large. Applying scientific knowledge in the form of technological equipment, technological procedures and technological services presupposes understanding and acceptance on the part of the people for whom the technology is employed. Technology for man and not against man. Thus technology becomes a social process and just as much account must be taken of scientific, economic and ecological aspects as of sociopolitical implications, at both local and global level.

The new Garching Neutron Source

In the planning and construction phase of the New Research Neutron Source FRM-II we have gone to particular trouble to cater for the adequate provision and articulation of information. Since the beginning of my presidency on 1 October 1995 I have obliged myself in the name of the Technische Universität München to adopt a deliberate and uncompromising policy of transparency towards the public, both internally and externally. It has since then been my determined wish to always openly state and portray the idea behind the new neutron source and any accompanying scientific and technological details and necessities; to establish the socio-political connection; and – where required – to even draw attention to the geo-political constellation in respect of the operating concept of uranium fission. In carrying out these policies I have found a reliable companion in Gert von Hassel, the head of Public Relations, whose primary aim at all times has been the provision of detailed, thorough and unvarnished information to the public. In spite of many clearly trying

and disillusioning attacks, sometimes even of a personal nature, he has remained both upright and honest, even when, on occasion, the situation called for plain words.

In particular with regard to the controversial debate about the use of highly-enriched uranium, science has learned to take a new exemplary stance. It was necessary to explain to the public just what the connection was between the undoubted advantages of a high-performance neutron source and the necessity of employing highly-enriched uranium as “fuel”. What is “highly-enriched uranium” in the first place? Why can low-enriched uranium not be used to achieve the goals set? Why is there a uranium discussion at all and what agreements in terms of international law back up our position? What safety measures were adopted in order to best avoid accidents ranging from an operating accident to a plane crash? And finally: is the total expenditure involved justified in respect of the scientific and technological use of FRM-II? What are the advantages of neutrons in medicine, in engineering, in environmental monitoring, and in relation to the use of solar energy? Where will basic research benefit – in physics, in chemistry, in the bio-sciences?

The new research neutron source FRM-II is not just a high-flux source of world-wide significance for science and technology. It is also a particularly good example for the connection between technological progress and public comprehension of technology, necessarily critical when it comes to the point but cosmopolitan in its overall approach.

Thus in our public relations work we have also attempted to explain how neutrons from Garching will, in the near future, make their contribution towards solving the major problems that will face mankind in the 21st century. With the help of neutrons we will throw light on the structures of the materials of life, the complex biopolymer materials, just as we will help determine the breaking stability of fast-running train wheels. In contrast to X-rays, neutrons penetrate compact matter while allowing themselves to be optimally scattered by light atoms (hydrogen). There is no single discipline in the field of the natural sciences and engineering which would not be able to achieve scientific or technological progress with the help of neutrons. And in many areas of medicine, too, in particular in the treatment of tumours, the extent of potential progress cannot yet be ascertained since a great deal depends on the degree of interaction with other sciences.

Our dearest wish as scientists is that the new neutron source will be a blessing for mankind. In the future, too, we will continue to do our utmost to ensure the unreserved provision of information about any developments associated with the neutron source. We will also continue our endeavours in respect of comprehensibility, which of course at all times also involves factual correctness – this is something we are, as scientists, firmly obliged to do.

When, in the year 2001, the new neutron source goes into operation many people will be able to look upon themselves as having accompanied the coming into being of this extraordinary facility. All those who have continually informed themselves about the project are part of this group. They, too, can also be counted as having pursued

the same path, and their consent is just as important to us as the proper functioning of the technical equipment.