

is doomed to fail in its objective to create a scientifically enlightened public, the reason being a lack of proper understanding of the social and cultural embeddedness of science and technology. In order to provide a richer analytic frame, Jasanoff applies the concept of “civic epistemologies”, which refers to culturally specific, historically and politically grounded, public knowledge-ways.

Designs on Nature provides in-depth insights not only for STS scholars, but for scientists and policy makers as well. Social scientists will benefit from excellent comparative studies with disciplinary embedding in STS, while natural scientists and policy makers will profit from a compelling introduction to the politics of science and technology and their contexts. Neither explicating phenomena

nor presenting a model for best practice in scientific governance, the book’s core quality lies in a rich elaboration of the complex issues around the politics of science and technology and its interaction with cultural contexts. Jasanoff’s particular ability to establish comprehensive ties and link multiple levels and sites of science, technology, politics, and culture using strong argumentation might elevate *Designs on Nature* to a classic.

Monika Kurath
Science Studies, University of Basel &
Collegium Helveticum
ETH and University of Zurich,
Switzerland
monika.kurath@collegium.ethz.ch

Lynn E. Foster:
Nanotechnology: Science, Innovation and Opportunity.
Prentice Hall: Upper Saddle River, NJ, USA, 2005. 283 pages.

Any book with the word “nanotechnology” in the title is likely to attract attention in 2006. Interest in nanotechnology has been growing since the word became common among physicists in the 1970s. The initial interest in nanotechnology was centred on the belief that it would be possible to produce technology on a smaller scale than ever seen before and the early literature on

the subject is almost entirely devoted to guessing future applications of the technology. The availability of affordable instruments and advanced microscopes during the 1980s allowed scientists and engineers to see, feel and actually manipulate matter at the nanoscale. Present day interest appears to be less preoccupied with the size of the technology and more interested in the poten-

tial applications and the challenges of making these a reality.

Lynn E. Foster is one of the directors of an international law firm and a specialist in emerging technologies. His aim with this book is to make researchers' views of nanotechnology available to investors and investors' views available to researchers, and to highlight the challenges of bringing new nanotechnology-based products to the market. He attempts to fulfil this aim by gathering contributions from a variety of experts with different interests and backgrounds (mainly scientists, industrialists and investors).

The book is divided into three main sections – (1) Development Drivers, (2) The players, (3) Materials and Industries – and a short section on convergence and integration. Together these give a general introduction to the field, some information on public and private funding of research, an overview of the industries likely to be affected, and a brief introduction to some of the ethical issues. There is little direct reference to existing theories of technological development, although several contributors do refer to nanotechnology as a new paradigm or a new wave. The same contributors do concede that the “new wave” will come ashore at different times for different industries, and those writing about the electronics industry suggest that the nanotechnology is just a natural continuation of the path they are already on. Several contributors make implicit assumptions about a traditional linear model of innovation, but innovation processes are not discussed directly. This is unfortunate because there are many references to nanotechnology being a science-based technology, on the one

hand, while on the other, there are important requirements coming from technology users and producers e.g. high capacity, low-energy, electronic processors and it would be interesting to see some more discussion on this theme. Is nanotechnology different from any other technology in this respect?

The general introduction to nanotechnology is quite comprehensive, but not for the faint hearted. Be prepared to embrace terms like biochips, molecular electronics, micro cantilever beams, quantum mechanical laws, not to mention polymer micelles (polymer surfactant-drug self-assembly). Any non-scientist wanting to gain an understanding of this field will have to put in a bit of effort, there are no short cuts. Many potential applications can be developed in several ways, using different methods, all of which involve some work at the nanoscale and all entailing challenges of interfacing with existing technologies, challenges of manufacturing and potential challenges to health and safety. The various methods of engineering or growing nanostructures are well explained including the new material properties evident at the nanoscale. Not only will the reader have to digest quite a lot of technological terminology but he or she will also have to pay close attention to the use of tense i.e. past, present or future. Writing about nanotechnology seems to give everyone a license to glide over from descriptions and conclusions based on recent research to visionary applications of the technology 30 years into the future.

Those interested in learning about the innovation system (Lundvall, 1992) or the technological system (Carlsson &

Stankiewicz, 1995) will find all the usual actors, represented in the form of chapters on universities, policy makers, industries, investors, technology transfer offices (TTOs) and patent offices. Apart from some discussion on the TTOs and patent offices, however, there is little discussion of the all-important interactions between these actors or how these interactions may need to develop. The necessity of interdisciplinary collaboration is mentioned in several chapters, but apart from some references to NSF (National Science Foundation) initiatives the theme is not dealt with in any comprehensive way. The effect of nanotechnology on industry structure is considered. Most contributors do not foresee the development of a nanotechnology industry, although they do acknowledge the development of new firms specialising in some aspect of nanotechnology. The general opinion of the book is that the real value will be generated, not by the "nanotechnology firms" but by existing industrial players who develop new applications based on nanotechnology. With regard to the effects of nanotechnology on existing industry, there seem to be two camps here; those who believe that a model similar to biotechnology will develop with SMEs (small and medium enterprises), closely linked to universities, producing most of the new product ideas and who may subsequently team up with multinationals to bring their products to the market. The other group highlights the importance of early investment in equipment and clean rooms and reasons that only large multinationals will be able to provide the right conditions. This apparent dichotomy is related more to the area of application than to the fact that it is

nano; the microelectronics industry, for example, requires expensive, temperature controlled, vibration-free, clean rooms while some nanostructures could be happily cultivated in a corner of your own bathroom. With the broad definitions of nanotechnology used in this book, there will be room for both large multinationals and smaller firms.

Perhaps the greatest value of this book is the way it tackles the more general aspects of nanotechnology and makes them comprehensible for non-technologists. It attempts to defuse the hype while making it clear, with examples, how nanotechnology will undoubtedly affect many industries. It addresses the problem of unrealistic expectations and attempts to set up some milestones on the path of future development. The problem of the terminology is well addressed with a discussion on the usefulness of such a general term and the possibility of the gradual decline and eventual disappearance of the word "nano". The current problems experienced by patent offices trying to classify new patents, such as overlapping terminology due to different names for the same thing arising from different disciplines, are also discussed. Indeed it even broaches the thorny issue of whether nanotechnology is, in fact, one field or many. However with so many themes in this book they are not discussed in any great depth.

The book mentions that the U.S. is responsible for only 25% of global public spending on nanotechnology R&D (2003); it is therefore surprising that there is virtually no reference to the world outside the U.S. The U.S. has created the National Nanotechnology Initiative (NNI), which unlike most science

and technology bills, has actually been incorporated into U.S. law. It would be interesting to see a comparison of U.S. policy with those of Europe and Asia.

Those interested in gaining a general understanding of nanotechnology, in finding out which industries will be affected and some of the challenges ahead will find this book useful, otherwise the target group of investors and industrialists should find it informative particularly with the regard to the U.S.

References

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Dorothy Sutherland Olsen
University of Oslo
d.s.olsen@ped.uio.no

**Julia Black, Martin Lodge & Mark Thatcher (eds.):
Regulatory Innovation: A Comparative Analysis.
Edward Elgar: Cheltenham, UK, 2005. 230 pages.**

If there is a single message that this comparative analysis of regulatory innovation highlights, it is that neither the occurrence nor the outcomes of innovation can be controlled and predicted. One cannot 'design' bureaucracies or legislatures to produce innovations, nor can one predict the results. Innovation simply cannot be engineered. (p.194).

Regulatory Innovation is the result of tight collaboration between researchers across empirical fields. The book is un-

usually well integrated. Chapters one and two by Julia Black present the definition and problem of regulatory innovation, the field's theory, and five "worlds of regulation". These are followed by six empirical chapters that compliantly apply the vocabulary laid out in the first two, notably without compromising the uniqueness and creativity of each individual study. This well integrated style gives the reader a thorough insight into the approach and empirical field.