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Politics, Markets, Science and the Law

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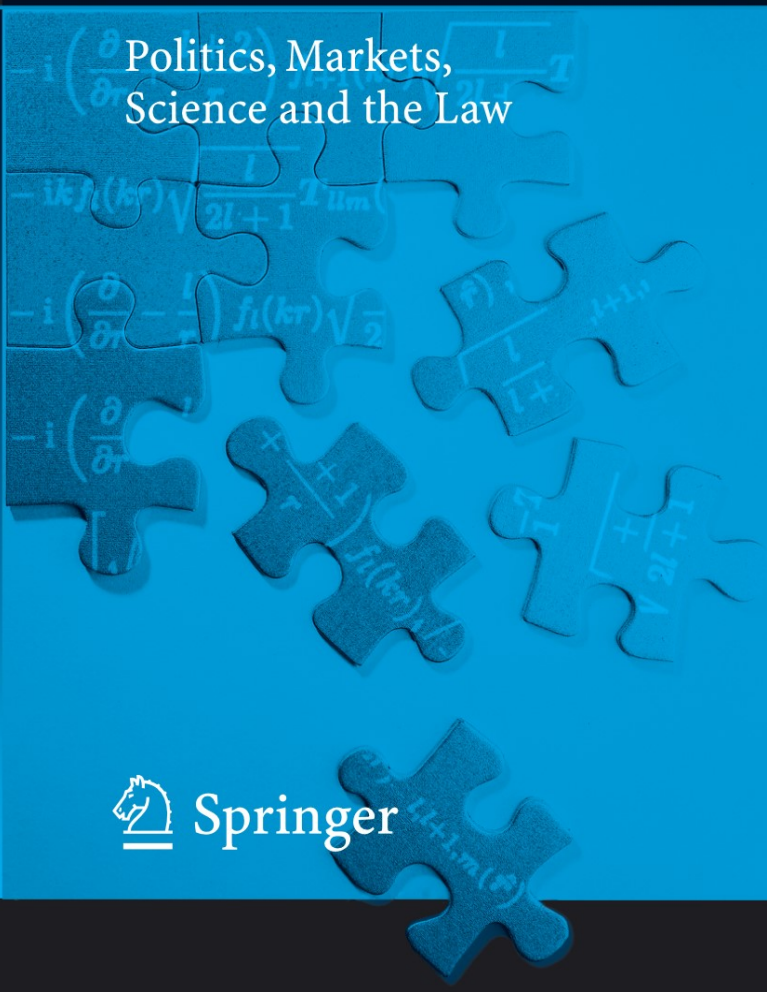

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Preface

Dieter Grimm

In the period of enthusiasm about technology, the relationship between science and the public was marked by trust. It was taken for granted that scientific progress meant human progress. This is no longer true. Today, it is rather mistrust that dominates. The hope for progress through more knowledge has given way to fear of the risks involved in new technologies in the world of globalized competition. Supervision has replaced the granting of autonomy. The increased importance of knowledge in industrial societies and the great importance placed on science and research have been followed by high demands for accountability and transparency, and have given way to political fights for more money and about the purpose of research. Yet, science insists on autonomy, even if it acknowledges that the public has the right to be informed. *PUSH* (Public Understanding of Sciences and Humanities) is an example of the wide range of efforts to improve communication and to bring science closer to the public. As shown by the sale of popular scientific literature, this effort meets great public demand, though it does not recognizably reduce the conflicts. The question, therefore, is why trust was lost and whether and how it can be re-established.

In the Academic Year 2003/04 an interdisciplinary focus group at the Wissenschaftskolleg was concerned with these problems. The group's intention was to make use of the rich experience in substantive and procedural conflict solution accumulated in the legal science. The turn to law seems to be all the more necessary since trust will no longer be the naive original trust but, given the changes within science mentioned above, a trust of the second order, which results from transparency and the existence of effective safeguards, which rules and law can provide. The law has developed a number of principle-guided procedures for making decisions in situations of uncertainty about their consequences and, in particular, how they can be made when the state is not permitted to decide the question of truth. Also, techniques have been developed that facilitate a revision of previous decisions when better knowledge is at hand.

Some results of the Focus group's considerations are published in this volume. I hope that it will help to establish a trading zone between previously disconnected areas where various concepts must be negotiated, not only within the scientific community, but also with society at large.

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The Changing Nature of Public Science

Helga Nowotny

I. The public nature of science: transformation and new demands

My argument in this introductory chapter is that the public nature of science is changing in a twofold way: one is through the increasing *propertization* of scientific data, what constitutes them, who can have ownership rights over what kind of objects, and what ownership actually means. Propertization is being extended and may now include ownership of novel or existing life forms and living organisms as well as of investigative methods and other scientific procedures. While the overall shift is toward greater regulation of ownership of scientific knowledge, procedures, and results, it follows that the formerly free access and free exchange are shrinking and undergoing various kinds of limitations (Royal Society 2003). Researchers themselves, in order to protect what they regard as their legitimate rights, now often claim individual ownership. In an attempt to defend their autonomy, they see themselves as knowledge owners, rather than knowledge workers (*McSherry* 2001). Unwittingly perhaps, they support the transformation of public science into privately owned knowledge domains.

The second way the public nature of science is challenged and changing carries an apparently different, even opposite message. In the demands for greater public participation in civil society, the public nature of science – in the sense of serving the public good – is no longer taken for granted. Rather, science is challenged publicly as not being public enough. It is obvious that the turbulent relations between science and society do not cover all fields of science and technology, nor is it sheer hostility against science that leads people to question some of its proclaimed benefits. But the fact remains that the most controversial knowledge domains are also the most promising future domains of scientific discovery and technological innovation – biotechnology and biomedicine, nanotechnology, energy production, and environmental issues. This underlines the urgency of finding ways to render new scientific knowledge socially more robust and to integrate future scientific-technological achievements in a culturally and socially compatible way into the lives of citizens. The issues these controversies raise touch some of the core values of modern society and of the modern self – questions of identity, privacy, the alteration of kinship patterns through reproductive medicine, involuntary exposure to risk,

and people's relation to the natural environment. Underlying many concerns is the theme of how to preserve a sense of control over one's own life in a bewildering world of scientific-technological complexity, intertwined with the relentlessly ongoing process of globalization.

Public controversies have, for a variety of reasons, led to a pervasive sense of distrust of the independence and impartiality of scientific expertise, side by side with the distrust of political authorities and of industry. The credibility of scientists, even if the public still judges it higher than that of politicians or other interest groups, is in decline. Science is no longer seen as independent and standing above vested interests. In contrast to science's public self-image as neutral, its image has become contaminated by what are perceived as too close ties to state and industrial interests. Moreover, there is an equally pervasive sense that science is not sufficiently listening to citizens' publicly voiced concerns, expectations, and demands. To restore some of the lost credibility and to regain the trust of civil society, so the argument goes, the public should become more involved in the intricate processes of decision-making in techno-scientific issues and developments. However complex these issues may be, if they are likely to have a direct or indirect impact on civil society and therefore will shape the way citizens live and relate to each other, nature, or themselves, the public should be included in the decision-making processes.

In one case to be examined – the question of ownership and of propertization of scientific data – the public nature of science is coming under assault as the result of the real or imagined greater influence of markets and the altered way the demand for increasing investment in research is being met. The extension of the regime of private ownership rights over a growing part of the production of scientific knowledge and its results is coming to be seen as the most efficient form of securing both the needed investment and greater efficiency in producing results. The quest for innovation has extended even to basic research (*Nowotny and Felt* 1997). The push toward more privatization and toward IPR as an efficient form of governance in the domain of knowledge production does not come as an isolated strand. The spreading of affluence in modern societies and the by now ubiquitous presence of modern information and communication technologies have strengthened the tendency to move away from the idea of a centralized state that looks after the needs of its citizens and to move toward satisfying these needs through various forms and degrees of privatization. The rhetoric of the empowerment of the individual, who knows best what is in his or her interest and who masters the art of choice, merely underlines the attractiveness that private ownership – as a promise of individual autonomy – has gained in the context of the interdependencies and complexities of modern societies that are otherwise difficult to penetrate.

In the other case – the demand for democratization of scientific expertise – an increasingly vociferous civil society is questioning the authenticity of the public nature of science. In the demand for greater lay participation, science as an institution comes under pressure to be more accountable to citizens and less closely linked to the interests of politics, the state, and the market. The attractiveness of the shift from the state toward markets and privatization, with their celebration of the individual as consumer and voter, extends to the deliverables that science and technology have been instrumental in bringing to the market or that are offered in semi-privatized public services to the citizens – be they energy, health care, food products, reproductive medicine, or, increasingly, the provision of security. Privatization is therefore not only a powerful underlying theme in the neo-liberal ideology of markets and in political rhetoric, but has also captured the public imagination in the guise of promising greater individual autonomy. The freely choosing consumer is first cousin to the authentic individual (*Skidelsky* 2004).

My argument is that the two apparently opposite tendencies are in fact related. Private ownership and propertization seek to extend a regime that has served industrialized societies well in their pursuit of economic growth. Since science and technology are rightly seen to be the major driving forces of wealth creation and economic growth, some of the latter's governing principles are now expected to work as well in the production of scientific and technological knowledge. The efficiency of markets, competition, and intellectual property rights are to prove themselves by increasing the productivity and output of the production of scientific knowledge, of epistemic things, abstract objects of various kinds, and technological artifacts, all of which constitute the innovative potential of science and technology.

Democratization of scientific expertise is about the extension of principles of governance that also have served Western liberal democracies well in the past. The processes of democratization do not halt before the institution of science. Citizens who have attained a historically unprecedented level of education are no longer over-awed by the achievements of science, presented as miraculous, nor do they accept the word of experts unquestioningly. The process of democratization pushes citizens toward becoming involved in the priority-setting of the research agenda and therefore in the workings of science as an institution that claims to work for the benefit of society. In demanding to re-balance scientific expertise and political representation in the process of actual decision-making concerning scientific-technological innovation and issues, 'society speaks back to science' with a loud and political (sometimes populistic) voice, just as financial investors and markets speak to science when asking for greater efficacy and productivity gains. Calls for

accountability and efficacy are the twin approaches that seek to alter the public nature of science as it has developed historically and as we know it today.

The crucial question is, of course, how far the principles of democratic and economic governance under a private property regime can be extended to the actual modes of the workings of science without endangering the autonomy that science will also need in the future – even if 'autonomy' and what constitutes 'science' may be re-defined as well. The other crucial question is where the visions of a propertized society will lead to and whether such visions and their realization will be politically acceptable. Both the push toward seizing ownership of science and of opening science to demands of democratization must contend with the public nature of science, which they seek to alter in their direction, while science must respond in ways that allow the redefinition of its function while preserving its ways of knowing and working. When science is faced with contradictory pressures from politics, markets, and society, the law can play a role not only in the solution of conflicts, but also in helping to shape a social reality with new institutional arrangements to be put in place. The pressures mirror, and are a part of, far greater economic and political changes that are currently transforming our societies and with which the law should be familiar.

II. The origins of the public nature of science

The institutionalization of modern science in the 17th century depended upon some of its activities being performed in public. What a small group of practitioners, who called themselves natural or mechanical philosophers, did through their investigations of nature, the effects they discovered, and the results they could show was to be displayed in public and 'witnessed' in the legal sense of the term. The heterogeneity of the different practices and methods, often subsumed under the generic term of 'the scientific method', culminated in scientific experiments. They became the public icon that supported the claims and exemplified the self-confidence of those who were now posing questions to nature and, through the experimental set-up, obliging her to give answers. The crucial act of certifying the results, however, occurs through publication. The process of rendering public through writing, and therefore in traceable, unalterable form, remains crucial to this day. Verification and certification of results and of the methods used is a process that is performed both as an essential service to other knowledgeable members of the scientific community and to the public at large. The peers depend in their own work upon the results of their colleagues. They acknowledge their indebtedness by citing the names of those whose work they have used. All depend upon the quality control that is

exercised by the scientific community, through competent mutual criticism and peer review.

Scientists, as a corporately organized collectivity, assume both responsibility for the reliability of their work vis-à-vis each other and public responsibility toward the wider society. In principle at least, scientific findings that have been published should be replicable by others. In practice this is rarely the case, even among specialists, due to the role played by tacit knowledge and other factors. The written form, which lends itself well for certification, and privileges a standardized form of communication, does not sufficiently capture local, practical knowledge, and idiosyncrasies. Knowledge claims are considered temporary, since future findings may at any time overthrow accepted views.[1]

1. Science needs a public – itself

Science therefore is public and depends on having a public – which is first and foremost itself. Publication establishes priority claims and demonstrates the potential usefulness of a researcher's work for others. In recent times, citation counts and impact factors have added to the weight attached to publications as a measure of scientific performance and as a basis for scientific recognition, professional reward, and promotion. Once published, scientific knowledge becomes public and accessible in the public domain, even if it can only be fully understood by other specialists. As long as others can freely use it, science operates as a gift-exchange economy. In return, proper attribution gives credit to those whose work has been used, enhancing thereby their reputation. Although the individual is seen as the originator of new ideas or methods, science operates strongly as a self-organizing collective under a corporatist regime. In this respect, scientists resemble other professionals.

When modern science became institutionalized in the 17th century, the field of natural or mechanical philosophy, as it was called, was populated by amateurs and virtuosi. Practitioners certainly were not the highly professional, formally trained researchers of today. The audience of the Royal Society in London, for instance, before whom demonstrations and experiments were performed, constituted an integral feature of how science was made to be seen 'to work'

[1] Publication being based upon peer review is so much taken for granted within the scientific community that scientists overlook the fact that this practice is not widely known among the general public. Recently, an advisory panel urged that when scientific results are presented in public, it should be made clear which parts of the claims have been peer reviewed and which ones not, in order to prevent the latter from receiving the same status of credibility in public as peer-reviewed ones. See Nature, 1 July 2004:7.

(*Shapin and Shaffer* 1985). The presence of the public was considered necessary; its function was to 'witness'. Eligibility to become a witness, as in other legal procedures of the time, was limited to those qualifying as 'gentlemen', i.e., men of independent economic means. Others, dependent men and all women, were excluded. Scientific claims had to be made openly, demonstrated, and proven in public. The role of witnessing did not necessarily extend to understand the scientific or mathematical content. It was sufficient to having seen and witnessed what had been told and shown. Thus originated the restricted public of the scientific community – itself – and the wider public before and on behalf of which it acts. Its presence is indispensable to render public what the restricted group of professionals does. In this sense, the ivory tower of an ideal, autonomous science has always been surrounded by 'ivory bridges', linking science to society (*Sonnert and Holton* 2002), while simultaneously retaining its privileged status.

The function of verification, validation, and certification of scientific results is as essential today as it was in the beginning of modern science. The peer group remains the only arbiter believed to be qualified and sufficiently trusted in assessing the production of reliable scientific knowledge. The process of rendering this knowledge public is well known. It begins with the submission of a scientific paper to a professional journal, followed by peer review, usually by anonymous reviewers, and progresses to publication. Today, the style and language of the scientific literature are highly standardized, as is the inclusion of the scientific literature in the citation index. This computerized archive of the scientific literature purports to be international and to represent the most important literature in science and engineering. It is owned by a private company, Thomson ISI, previously known as the Institute for Scientific Information, which indexes more than 8.000 journals in some 30 languages. ISI's monopoly is further strengthened by the measurement of the impact factor, which assigns a weighted number for the frequency of a paper's citation. Although publications are intrinsically linked to the internal reward structure in science, they also function 'externally', e.g. when career recruitment and promotion increasingly are based upon citation measures. The currency of the gift exchange economy, now privately administered, is still the reputation bestowed by the peers in return for the scientific contribution that has been made to the entire scientific community. This currency has not yet disappeared.

The dependence of science on a public, although consisting primarily of other specialists, is therefore essential to the public nature of science. It also sends a strong signal on behalf of a corporate collectivity that it claims collective ownership in the sense of self-regulation. It falls only to the restricted scientific

public to certify the claims made in the name of science speaking in a collective voice and to take responsibility toward the wider public. The notion of a restricted public of peers who function as producers and users of knowledge, as collaborators and competitors, as authors and critics of each others' work, is an indispensable condition for the autonomy of science.

Toward the outside, self-governance and non-interference from politics (historically also from religion) is therefore justified by assuming the task of the collective exercise of quality control over its work and results. Utilitarian relevance, which undoubtedly makes support of science attractive to society, is merely one possibility of linking research to societal needs, but does not justify the claim to autonomy, nor does basic research, even though it is highly dependent on being freely and autonomously conducted. The full transparency of obtaining reliable knowledge about nature and for the benefit of society is the reason why misconduct, dishonesty, and fraud are regarded not only as deviant, but also as endangering the claim to the autonomy and self-governance of science. A system that totally depends upon mutual openness, honesty, and trust elicits strong reactions against those who violate these principles, and it must strive to restore credibility as quickly as possible.

2. Secrecy vs. Openness

Another way of potentially undermining both the quality control function of science and its gift exchange economy, occurs through secrecy, i.e. by withholding knowledge from the public domain occurs. Yet, secrecy can officially and legally be permitted in both public and private domains. The predominant reason for secrecy in the public domain is national security. When working for the military or military-related objectives, scientists are usually put under strict rules of confidentiality. Historians of science who have recently reconstructed the conditions for research in the earth sciences in the US during the Cold War period have uncovered an extensive parallel research enterprise, operating side by side with the open science system, although hidden from public view (*Doel* 2003). At present, the US Department of Defense offers contracts to researchers working inside universities that contain not only the usual clauses restricting publication, but also stipulating that research must be shielded from foreign scientists.

The other legally acknowledged exemption from open publication occurs within private industry, especially in the competitive phase of the research and innovation process, when development for market is under way. To protect previously made investments from competitors before products reach the market, publication is restricted or subject to seeking prior permission. This is