The loss of trust and how to regain it: performance measures and entrepreneurial universities

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Withdrawal of trust from science

The arrangement of science in the western democracies after Second World War has been dubbed a 'fragile contract' [1]. 'Contract' is used metaphorically, meaning here that governments give public funds to science on a promise, namely that it will spend that money wisely and prudently on basic research that will eventually contribute to the public good ([1], p. 2). The arrangement was not self-evident, and competing models of how to situate science in society had been discussed.[2] However, in the context of an intensifying Cold War and the ideological battle between the U.S. version of a free society and the Soviet counterpart of a centrally planned, totalitarian state, 'scientific freedom' as in the contract became the dominant institutional arrangement in the OECD (Organisation for Economic Co-operation and Development) countries.

The contract implies that lawmakers extend considerable 'trust' to the scientific community, i.e. both in their promises of what their research will ultimately contribute to the public welfare, in their 'internal' mechanisms of quality control and in their value system as a whole. They invest and risk their legitimacy in the operation of science. In democratic political systems that is unique, and it privileges science above all other groups and corporate bodies. The funding of 'basic research' means as much as to leave it to the scientific community to decide what research is important and ultimately relevant, and what is of high quality. The 'trust' is justified with the inherent 'inaccessibility' of science owing to its highly specialized languages, methods and theories, which cannot be understood in depth by the lay public. This barrier appears to be insurmountable and, thus, trust is a necessary condition of the flourishing of science in democratic societies. The question, then, is if this trust has been revoked and if so how has this brought about a new arrangement?

The propagators of the arrangement under the contract, paradoxically, pointed to the experience of the Second World War, i.e. the successful construction of the atomic bomb. Research underlying the bomb had been carried out with no

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[2]For example, in the U.S.A., in connection with the establishment of the National Science Foundation. In the U.K., the debate had to some extent already been waged before the war between J.D. Bernal and M. Polanyi.

particular application in mind. Only when Einstein suggested that the Germans may be building such a bomb based on the stock of knowledge to which he had contributed was the effort launched. The story seemed to support the then current conviction of what became known as the linear model of innovation. The simple classification of research into three types: basic research, applied research and development, and the notion that they represent the basic categories of a sequential process originated in the need to capture statistically heterogeneous activities in science. As the categories became popular in the science policy discourse, they were taken as reality: accordingly, innovation is a process that starts with free (i.e. basic) research. The model and its categories dominate the science policy of the OECD countries to this day [2].

One reason for a withdrawal of trust could be the questioning of the model's validity. It came into doubt as early as the 1960s, and again in the early 1970s when, for example, the Rothschild Report (1971) [3] was published in the U.K. The debate over the optimal share of basic research in state R&D (research and development) budgets has continued, however, simply because the freedom given to scientists when funded under this rubric constitutes their core interest. The crucial shift occurred with the end of the Cold War and the demise of the U.S.S.R. The ideological context supporting the notion of undirected research as the essence of freedom dissolved into thin air. The impact on science policy was profound. The old division between basic (i.e. undirected) and applied (i.e. directed) research began to be questioned more fundamentally than before, either as a conceptual artefact [4] or as a structural arrangement of the past [5]. A detailed account of the science policy discourse would probably reveal that this was also the watershed with respect to the institutionalized 'trust' bestowed on the scientific community, until then in the form of the more or less unquestioned acceptance of its self-regulating mechanisms.

It can be assumed that if there were a withdrawal of trust in science and the universities in particular, this would translate into budget cuts. The complaint about the under-funding of the universities seems to corroborate that impression. However, the picture is more complex. Expenditures for R&D have continued to grow in all major OECD countries since the 1960s. However, since the mid-1980s the ratio of state to private (industry) funds has declined. State funds have remained roughly the same or increased only moderately, depending on the country one looks at. The impression that basic research is driven out by applied research may be misleading. In the case of the U.S.A., at least, funds for basic research have actually increased, but the rise is mostly due to additional funds for the biomedical sciences at NIH (National Institutes of Health) [6].

The widespread sentiment that funding was more lavish in the 1960s contains elements of a myth. Actually, funds for science have increased steadily in the major OECD countries, but the ratio of funds per researcher has declined ([1], p. 20). This is owing to the exponential growth rate of science, which, as was predicted even in the 1960s, could not be sustained forever. The crunch is felt especially at the European universities: the dramatic rise of student numbers to achieve mass higher education was never fully compensated by additional funds. In the U.S.A., it has become commonplace that state universities receive 40% and

less of their budget from the state, having to obtain the remaining 60% through tuition fees and from private sources.

Thus it would be greatly exaggerated to say that governments have turned their backs on science and stopped supporting it. Rather, the level of support has not shifted significantly in one direction or another, as is documented in a fairly stable rate of general public investment in R&D relative to GDP from 1.8% (U.K.) to 2.8% (U.S.A.) and 3.4% (Japan) in the major OECD countries (e.g. U.S.A., Japan, Germany, France and U.K.).[3] In other words, the dependence of modern societies on, and thus their willingness to fund, science remains unchanged. Science budgets do not reflect a general withdrawal of trust. Scarcity of funds is primarily explained by the growth of scientific manpower.

Declining trust in institutions is not easily traced. A common approach is to gauge public opinion. Various studies starting in the mid-1970s into the late 1990s saw an erosion of trust in the institutions of democracy, i.e. governments and parliaments. Interestingly enough, though, the relative trust in science compared with other institutions has not changed. Invariably the trust in science is higher than in any other institutions [7].

Michael Power [8] diagnosed a general decline of trust in institutions and the resulting emergence of an 'audit culture' characterized by the spread of evaluations, accreditations and standardized evaluation schemes. Institutions such as public agencies and services are called on in the name of transparency, a fundamental value in democratic societies, to explain and to justify their activities. The move toward 'accountability' was supported by the emergence of a new set of management tools that spread to the public sector. Under the label of NPM (New Public Management), these tools were adapted to the provision of intangible public goods and services. Accountability, transparency, efficiency, market orientation and leadership have also become the new mantra of higher education policy. The reform process started around the mid-1980s, whereas in some countries, such as Germany, it was a little later.

Given the uniquely privileged position of science, as exemplified in the operation of research councils and universities, it is no surprise that they have come under pressure to be held 'accountable'. This applies, in particular, to universities as the core institutions of 'independent' science. Universities are not only the main performers of research, their research activities also mostly fall in the category of 'basic' or 'pure' rather than applied. In addition, they have the monopoly in reproducing scientific manpower and socializing young researchers in the landscape of disciplines. Both functions, knowledge production for the needs of society and the training of new manpower for the labour market point to the line of potential conflict: in the eyes of the governments, knowledge has to contribute to tangible innovation, and trained manpower has to meet the needs of labour markets.

The contract is still in place, but its conditions have been changed. The expectations of governments from science are more direct and concrete. However,

3 The European Union's Lisbon target of 3% has only been surpassed by Finland (3.7%) and Sweden (3.8%; all figures for 2007–2008, OECD).

science policy does not have the means to direct research. Instead, it tries to control the effectiveness and efficiency of universities and research institutions. Trust in the mechanisms of scientific self-regulation and the linear model of innovation have been replaced by benchmarking practices, performance measures and indicators of quality. Three questions arise:

- Are the performance measures really functional equivalents of trust?
- What are their specific limitations and their unintended consequences?
- How can universities respond to the application of performance measures?

Performance measures as 'functional equivalents'

The most conspicuous result of the introduction of NPM to universities (and other scientific organizations) was the introduction of performance measures. Much has been written about them, about the reactions of scientists and about their effects on research organizations and universities in particular, even though systematic empirical analysis is still hard to come by. First, it is necessary to assess the capacity of science policy to actually direct the course of research and to escape the legitimation dilemma, and, in a second step, to look at some known effects of performance measures.

The entire science system, as it is organized as research and teaching in universities, institutes and government laboratories, constitutes a special case compared with other political arenas. Government administrations faced with the task to regulate fields such as public health, transport, economic policy, energy or environmental protection have either developed their own expertise in special departments or they commission specialized organizations. In all of these cases the knowledge of the state is usually sufficient to regulate and control these areas according to the political intentions. It is possible that there is uncertainty about particular causalities, e.g. up to which level of compensation the motivation to work is sustained. However, regulation of the labour market is not, in principle, inaccessible to the comprehension of laymen and the regulating intervention of policymaking. Thus different areas of policymaking are characterized by different 'depth ranges' of regulation. The less accessible a policy arena is to external regulation, the more knowledge is required to make such regulation possible. Government research laboratories or similar organizations have developed together with the expansion of regulatory functions of the state, and in order to improve regulatory depth, systematic knowledge is produced about relevant properties and causalities in various policy arenas.

Science as an object of government regulation is different. The product of the research system is new knowledge that, by definition, cannot be predicted. It is a self-directing system whose effectiveness is made possible by the fact that it has been differentiated from other social references, economic, political, religious etc. Since there are research laboratories in industry, managers are faced with the question of how much freedom they should allow their researchers and how much discipline they can demand from them. Behind these discussions are questions

such as how scientific creativity can be promoted and whether it is a matter of individual or collective achievement. Causes and conditions of new knowledge and innovation are the great unknowns.

Knowledge about science is knowledge about its operations, internal incentives and social structures emerging from them. We know quite a lot about how scientists (in contrast with managers or administrators) communicate and in which gratifications they are interested (reputation rather than profit or power). This knowledge enables us to assess with some probability the intended and unintended consequences of external regulation. Yet, we do not know what measures are appropriate to bring about desired discoveries and their implementation into social and economic innovation. The instruments of science policy mostly rest on assumptions about their actual effects; there are obvious contradictions between some of them; and there is little reflection on their unintended consequences.

The lack of knowledge in science policy makes it dependent on the judgements of scientists themselves. This dependence exists in all policy arenas to some extent, but in science policy the dependence of the regulators from the judgements and information of the regulated, of the principal from the agent, is greater than in any other arena. It allows the regulated, at least in principle, to represent their interests much more effectively vis-à-vis the policymakers. For that reason "science policy is largely played out as science budget policy", and there is neither a capacity nor an intent to undertake centralized, strategic science policy planning ([6], p. 32). 'Science' as represented by funding agencies, research councils, university presidents etc. has become an interest group similar to the trade unions, health insurance or trade associations. The crucial difference is that science is more generally considered the 'most important force' in the modern knowledge society and, in addition, profits from an aura of objectivity and neutrality.

Limitations and unintended consequences of performance measures

In order to compensate for its inherent weakness, governments have adapted NPM to science policy. Creating performance measures and appropriating techniques such as 'management by objectives' to policymaking with respect to research and universities presupposes profound knowledge about the internal operations of science. Performance measures are basically the necessary correlate to a science policy that can only shape the context of the research system in order to influence it. Properly constructed non-reactive indicators enable the directing as well as the directed actors to continuously observe their actions and to correct them if deemed necessary. Thus they are instruments of contextual direction. In fact, they are used, in universities, as incentives and to 'objectify' the distribution of funds. The extent of this movement is illustrated by the surprising fact that those who are subjected to them and whose interests are negatively affected welcome it nevertheless.

> "*The major impact upon academic science of performance measurement systems has come not externally from new government requirements but*

internally from the independent adoption of these techniques by universities initially in the name of rational management and increasingly as devices to foster reputational enhancement." ([9], p. 323)

The indicators now widely used, bibliometric figures such as publications and citations, the number of Ph.D. students, and the amount of third-party funding, are all derivatives of the scientific communication and evaluation process. They replicate and condense the traditional peer-review process, but they do not re-direct it. Since the indicators do not mirror the complexity of the entire process, but only highlight certain aspects of it, and since they are 'reactive', i.e. they can be influenced by the (interested) behaviour of the scientists, a number of unintended and undesired side effects emerge. These effects can be detected on the levels of individual and organizational behaviour. To cite just the best-known and most often mentioned examples: linking publication counts to direct or indirect remuneration has triggered an inflation of articles, mostly by publishing 'least publishable units', i.e. cutting research results into smaller pieces. Citations are being made strategically, which is a problem when the numbers are small, as in individual evaluations. Journal editors attempt to manipulate their impact factor by asking their authors to cite articles from the same journal. Evaluations in the British RAE (Research Assessment Exercise) have shown a steady upward tendency so that the differentiating effect was lost. Martin and Whitley [10] conclude from this that, while administrative staff in universities have gained influence owing to the managerial changes, disciplinary scientific elites have gained influence as well, i.e. the regulatory process intended to weaken their control has actually been captured by these elites.

Notwithstanding the fact that much of the evidence on the unintended consequences of performance measures remains impressionistic, it can be said with confidence that these measures have not achieved the role as functional equivalents to trust in the self-regulating mechanisms of science. Instead they have become objects of contention, manipulation and negotiation between the supervising agencies and universities or between central university administrations and individual scientists. It is not clear that they have contributed to university reform. To what extent they have contributed to solving the legitimacy problem of science remains to be seen. It can be expected that policymakers will only believe in indicators as long as they appear to serve as instruments of control.

Entrepreneurialism in universities as a response: regaining contact with society

The proclamation that especially the European universities have to become 'entrepreneurial' has been popular currency since Burton Clark's [12] analysis almost a decade and a half ago. In line with political expectations and the general 'Zeitgeist', entrepreneurialism has most often been associated with its economic implication, i.e. that universities should promote the entrepreneurialism of their professors and students and contribute to technology transfer, patenting and licensing of new knowledge, and the founding of firms, Silicon Valley style. The high expectations in the innovative function of the universities, once they became

entrepreneurial, have been disappointed, however. Only very few schools are economically successful, and only a small minority of R&D-oriented firms consider patents from universities important sources of public knowledge, i.e. they look elsewhere for innovative ideas ([11], pp. 101, 104). If a direct contribution to economic innovation was to be an answer to regaining public trust, this has only been marginally successful.

Focusing on the relationship between the universities and the general public represented by respective governments, the question is what in the structure or operation of universities makes them appear out of touch with the rest of society and raises the issue of trust. Among the "trends creating turbulent environments" for the universities, Clark lists knowledge growth as the "most troubling trend of all" ([12], p. 12). The cause of this growth is the self-referential nature of disciplines, which have been the organizing principle of university departments since the early 19th Century. They determine the nature of their subject matters, the relevance of research questions and the quality of answers both in the preparation of research and in the publication of results. Disciplines are the basic structural elements of higher education curricula; they also delineate the attribution of expertise, and they are the respective domains of the reputational structure of science. (To be on top in physics is not readily translated to biology or to philosophy and vice versa except in an indirect way of trusted estimation.) The mechanism of self-referential generation of problems has fired the exponential growth for nearly two centuries, each a communicative community such as their respective mother discipline. The disciplines have differentiated into unrelated specialties, more than 8500 by one count, a process with which "entire universities and departments cannot keep up" ([12], p. 12).

The increasingly esoteric nature of knowledge production has created a growing distance to practical concerns. Commercial and technical applications that previously legitimated the utility of the sciences have become secondary to fundamental research in the prestige hierarchy of scientists and their institutions. Most importantly, disciplines and specialties are, with few exceptions and differences in degree, international communities. Prestige is allocated across national boundaries, measured in recognition anywhere in the world. Allegiances of professors and researchers in general are therefore primarily to these communities and not to the university (or worse: the ministry) that pays their salary.

As such disciplines have had a very important function for the advancement of science in that they made in-depth analysis, theory development and systematic experimentation possible. However, in terms of the kind of knowledge they produce, i.e. esoteric knowledge, and in terms of the social organization they represent, i.e. international reputational hierarchies insulated from employing organizations, disciplines as represented in university departments increasingly pose both an organizational and a legitimation risk.

The organizational problems raised by the autonomy of individual professors, by the 'academic oligarchy', have been often described. Chair-holders are compared with "small business men who cannot go bankrupt" ([13], p. 363). At present, with the incentive schemes in place under the NPM regime, depending on their market value, they can move from one university to the next similar to players changing teams from one season to the next for higher salaries. The professors' allegiance is to their disciplinary or specialties' communities, i.e. in the context of the

university to their departments. The central administrations of universities negotiate with department chairmen or Deans over the interests of departments, not about the departments' contribution to the overall objective of the university. Departments by their very nature are organizational units that are primarily oriented to protect and expand their 'territory' within the university against all other departments. Their primary focus outside the university is their reputation compared with that of comparable departments at other universities. Furthermore, their concerns focus on the policies of their respective disciplinary and parallel professional associations. However, they are not concerned with the university's contribution to community service, the politics and economics of the city or the region where the university is located. They are usually not concerned with the university's politics and representation to the non-academic world at all, except where they touch on their immediate interests.

The oft-deplored constitutional weakness of central administrations results from the inherent incomparability of different departments and an assumed incompetence to judge the actual quality of research and teaching of each department. Similar to any complex organization, the executives' knowledge about what is going on at the shop floor level is limited and selective. To compensate for their weakness they too turn to performance measures. But without an external referent, it is virtually impossible to develop a 'mission' for the university as a whole, a vision that would integrate the university internally as an acting organization and thereby enable it to relate strategically to its environment.

This inward orientation is self-reinforcing. The generation of new specialties from 'within', i.e. as a process of differentiation, reproduces the same type of organization and the same pattern of orientation. It is tied to the mechanism of reputation distribution, and it is not apparent, how this can change from inside. Universities, in contrast to research organizations that have specified tasks and are organized accordingly, are organizations whose response capabilities are diminishing as external demands grow ([12], p. 12). They do not have an adequate sensory mechanism that keeps them in touch with their relevant environments. None of these problems have been solved by the performance measures. On the contrary, the worst of all their unintended consequences is probably the fact that they have reinforced the power of the disciplines. Publication activity has been intensified, i.e. communication to peers, the orientation to citations strengthens the need to be 'internally' recognized, third-party funds are often qualified as funds from peer-reviewed research councils or foundations and explicitly exclude political or corporate sources. Overheads obtained from external funds are often allocated to departments or units within departments, thereby posing a disincentive to collaborate across disciplinary lines. For the British RAE, the universities have been observed to improve their position if they focus on basic rather than applied, mono-disciplinary rather than inter- or multi-disciplinary, 'academic' rather than 'professional' research, and on research the results of which can be published in 'top' journals rather than more specialist (and generally lower status) ones ([10], p. 23). Since almost all performance measures are surrogates of the actual 'internal' communication process in science, it should come to no one's surprise that their effect as incentives to the behaviour of professors and researchers is one of reinforcement rather than re-direction.

One notable exception appears to be the so-called 'third funding line' of the German 'excellence initiative' which targets universities as a whole. It rewards them for developing visions of their future course and a distinguishing profile that sets them apart from competing institutions. It is still too early to judge the effects of this particular competitive funding scheme, but a superficial look at some of the winners reveals that one or two can be considered structurally innovative, the most prominent being the KIT (Karlsruhe Institute of Technology). Among reviewers the impression was that only very few universities had a clear picture of their strengths and weaknesses, i.e. a 'sense of purpose' [12]. Also, among the factors of success, evidently the 'right timing' of the initiative was important, meaning that the respective universities had to cope with problems that demanded common action. The initiative helped them ([14], pp. 87, 94). The crucial question is thus how universities can become 'entrepreneurial', i.e. gain the capacity to act as an organization and, by becoming responsive to their environments, augment their legitimacy.

Among the conditions Clark lists as characteristic for active universities, a 'strengthening of the steering core' is also the one most likely to be available. It is an element of NPM and has been promoted by changes in the respective legal frameworks governing universities. The essential function of such a core is the allocation of funds, discriminating between departments and cross-subsidizing ([12], p. 14). Only if it is able to carry out the pertinent decisions and have them accepted inside can a university change its overall profile of research and teaching and respond to challenges from its environment. The 'steering core' is the primary enabling structural feature. All other elements of the pro-active university depend on it.

Another characteristic element that Clark calls the 'enhanced developmental periphery' is a "complex set of units operating on the periphery of the traditional structure reaching across old boundaries, and linking up with outside interests". Apart from "administrative offices that promote outreach" the periphery typically consists of "multi- or trans-disciplinary academic units operating as basic units *parallel to disciplinary departments*". These units are a "place for experimentation"; they are established under 'sunset clauses' and, thus, are much more flexible than the traditional department structure ([12], p. 15, emphasis added by author).

At present, the most radical reform plan is implemented at ASU (Arizona State University). The university's president, Michael Crow, has explicitly termed the task 'building an entrepreneurial university', but beyond instilling the 'spirit of enterprise' considers the larger challenge to be to "redefine public higher education through the creation of a prototype solution-focused institution that combines the highest level of academic excellence, maximum societal impact, and inclusiveness to as broad a demographic as possible" ([15], p. 6). In order to achieve the combination of excellence, access and impact, the university is restructured into various differentiated interdisciplinary schools (two for engineering: one focused on theoretical aspects of technology and the other on practical applications; three schools of education; and three of management or business). As of 2009, ASU was organized into "twenty-three unique interdisciplinary colleges and schools that together with departments and research institutes and centres comprise close-knit but diverse academic communities that are international in scope" [16]. Among the sixteen new schools are one of 'Human Evolution and Social Change', a

'School of Earth and Space Exploration', a 'School of Materials' and a 'School of Sustainability'. Of note, in setting up these interdisciplinary schools and research programmes, the administration has closed a number of departments: biology, sociology, anthropology and geology.

ASU probably provides the most clear-cut example of a university reform that explicitly abandons the disciplinary structure, "arbitrary constructs that may once have served certain social or administrative purposes but are no longer useful as we prepare to tackle global challenges" ([15], p. 7), and directs both knowledge production and teaching to interdisciplinary topics that address societal problems. To date, this strategy seems to have gained the university both legitimacy expressed in U.S. $2 billion of external funds, and academic recognition, measured as a place among the world's best 100 universities in the Shanghai ranking. It remains to be seen whether the underlying assumption of the ASU model will gain dominance in higher education systems: that the traditional academic disciplines have come to the end of their historical destiny and will be replaced by a different logic of the generation and structuring of knowledge. For the universities as core institutions of science it would already be an important move to regain trust and legitimacy if, parallel to the disciplinary departments, they had a layer of inter- and/or trans-disciplinary units, schools, centres or institutes that respond to issues of social and political priority. They constitute a new organization of knowledge that can no longer be ordered along the demarcation of basic and applied research with its respective estimation of 'high' and 'low'.

Two open questions

There are at least two questions that have to be answered. First, how can such universities be synchronized with the labour market? Secondly, would a university that is structured into interdisciplinary schools and centres be able to provide basic education? Since the emergence of the modern mass university, it has addressed a far larger sector of the entire labour market than before owing to the increase in the share of an age cohort attending higher education from approximately 5 to 45% within the last half century. With this the range of different training profiles offered has grown dramatically compared with the 1950s when university education primarily served to train lawyers, doctors, teachers and scientists. The assumption that higher education has to provide basic training exclusively along disciplinary lines has been superseded by reality. The university does not follow the labour market demand, but leads it with innovative knowledge generation.

The second crucial pragmatic question is how can the transition from the traditional to the interdisciplinary structure, from the 'holding company' to the 'entrepreneurial' university, be achieved if a top-down strategy cannot be carried out and if a bottom-up development in that direction cannot be expected? Clark [12], himself, observed a transition from initial strong central administrations whose success profited from contingent pressures mentioned before to 'collegial' arrangements. Obviously a process of re-thinking has to be initiated and developed. Depending on the legal powers given to them, the administrations have a range of instruments from incentives to persuasion. Rarely do they have the power to hire

and fire. Their task is nothing less than to lead the re-structuring of the system of knowledge production. Accordingly, they will have to use these instruments in an experimental spirit, attempting to mobilize 'collegial entrepreneurialism' [12].

Comments by Rolf Torstendahl[4]

In general terms I agree with most of what Peter Weingart says in his discussion. Therefore I want to discuss three questions that refer both to the problem complex of trust in Higher Education Institutions as a whole and to parts of Weingart's section.

Trust and the loss of trust

'The loss of trust' is an expression (as in the title of the chapter) that in itself incites curiosity. Peter Weingart writes about a 'trust' shown by 'lawmakers' in the 'academic community'. It seems to me that the term 'lawmakers' is a euphemism for the 'State', but even if there is a fine distinction between the two concepts of state and lawmakers, I do not quite understand the idea. Trust is a concept I have frequently met in the literature on professions. In an introduction to a special issue on 'Trust and the professions' in *Current Sociology* in 2006, Julia Evetts [17] writes that the traditional trust of the client in the professional has been eroded, and the whole issue deals with this problem complex. There is trust on the individual level, which a client has in a professional. However, the trust that Weingart's problem deals with is one that is still (at least to a degree) held by the lawmakers as a collective (or the 'State') in the collectivity of scientists, 'the scientific community'.[5] He starts with quotation marks around trust, but goes over to discussing it without them.

Is the state's trust in scientists anything other than a necessary evil for the state, i.e. something that cannot be avoided because of the esoteric character of scientific activity? In other words, is there anything such as confidence in the emotional sense of the word, e.g. the trust between a patient and an old-fashioned family doctor, that goes beyond the trust that is generally shown to people that they do their work when they are out of the reach of control? Continued funding is hardly strong evidence for trust in the qualified (emotional) meaning of the word. It is hardly evidence for trust in the sciences that their work is inaccessible to anyone who is not involved in the specific science that may be object of discussion.

If it is the case, as I am implying, that trust is not the right word for the relationship between those who decide on the funding of universities as such and the scientific community in general, then there cannot be a withdrawal of trust. Science budgets must then be described in other terms.

Administrative organization and scientific activity

What is the relationship of the state to universities, on the one hand, and to science, on the other? Can deficiencies in the structure of science be corrected

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5 I take it that this scientific community refers to those active in *Wissenschaft* generally and not only natural science, but this does not solve the problem.

through a reform of universities similar to the complete reform of ASU described at the end of Weingart's chapter? A restructuring of the institutional structure so that departments are replaced by interdisciplinary schools and research institutes may seem impressive, but does this affect disciplines, on the one hand, and communities of researchers, on the other? My research on community-making in history and to some extent in sociology provides another picture. Communities are formed by spontaneous initiatives and start as networks that may expand into international communities related to a specific field of research, characterized by intensive exchange of views on each other's research and a common research object. I presume that community-making is very similar in the natural sciences. Such a community (which is a speciality) may grow into a new discipline or may become dominant within a traditional discipline under specific circumstances.

The relationship of the state to such elusive phenomena as communities and disciplines in the making cannot be anything but the observer's ideas, when we talk about the internal formation process. This is not to deny that the state is always active through its own funding agencies and its administrations to direct research towards specific ends through allocation of economic resources. Politicians (the lawmakers in budgetary matters) have their ideas about what specialities they want to promote with money. Facilitating the creation of a group of researchers focusing on a special field does not, however, constitute its formation. Only if researchers take the bait can a community be formed.

It seems to me, however, that such a process is quite distinct from department-building within universities or administrative transformation of departments into (teaching) schools or research institutes. Departments are (often) the basic administrative units within universities, but their ties to research specialities are not at all clear. The state has a vested interest in the teaching of universities, because it wants to have a reasonable output of competence in the labour market. But this interest has very little to do with any trust (or anybody's trust) in science as such.

In the best of cases a reform that creates research institutes (or other research bodies) may catch a new discipline in the making, but most often it will have to rely on established scientific disciplines (in the plural). Its function will then be partly that of a department, but without the regular teaching obligations.

Performance measures

It is easy to share with Peter Weingart his distrust in the efficiency of performance measures. Bibliometrical methods have several weaknesses, one of which is the possibility of publishing results in small portions instead of bigger units. Citations may also be done strategically. However, I have yearned for a mention of one of the most highly debated weaknesses here, namely that different disciplines may have quite different possibilities of cutting up their results into small portions. In the humanities this is and has been a long-standing issue.

Evaluations present other difficulties, as they have been shown in some cases to have an upward tendency, as Weingart mentions. His conclusion seems to be in agreement with Martin and Whitley [10] that this procedure, which was intended to weaken the control of the disciplinary elites, has been captured by them. Here, I think that a word of caution is justified. I do not know if anywhere

in Europe administrative elites (or their political mandatories) have had the idea that they should control scientific elites by their own judgement of scientific performance. As far as I know, administrations have always hired good scientists to do the fundamental job of grading the performance of a specific department or a specific institute. If evaluators have become more positive when they see that low marks have brought their speciality less funding, this is hardly surprising. I have also seen, however, that evaluators have occasionally reacted sharply against slack performance in some environments trying to show that administrative failures are to blame.

My conclusion is that Peter Weingart's discussion makes good points but that there are important further complications that do not come out of his specific way of turning the problem.

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