KNOWLEDGE MATTERS

THE PUBLIC MISSION OF THE RESEARCH UNIVERSITY

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Compared with many other countries belonging to the Organization for Economic Cooperation and Development (OECD), Germany is a latecomer to adapting its university system to the changing knowledge economy. The internationalization, massification, and commodification of teaching and research, as well as the blurring of boundaries between the academic world inside the university and the outside world of industry, clients, NGOs, and the state as the central stakeholders, demand a new quality of organizational actorhood from German universities. In many aspects, this actorhood would break with the governance traditions and organizational features for which German universities were well known in the past. According to the ideal dichotomy introduced by Richard Whitley, German universities are currently pushed from 'bifurcated hollow organizations' toward some sort of a "state-chartered employment organization" in order to meet the demands of the new knowledge economy.¹

The traditional governance regime and organizational bifurcation of the German university system was described by Burton Clark as a combination of political regulation by the state and professional self-control by an academic oligarchy.² At the beginning of the nineteenth century, the Humboldtian idea of "solitude and freedom" of teaching and research was granted to universities in return for the political subordination of professors by an authoritarian state that also funded the universities' infrastructure, administrative services, and the salaries of the professors and their staff.³ Despite radical changes in government since World War II, the German university system still is characterized by this historical compromise. In legal terms, this is expressed by the recognition of the dual nature of universities as both public institutions and autonomous corporations.

Until recently, the university had relatively little institutional autonomy in its relationship to the state. Individual professors, however, in all matters concerning research and teaching, were very independent. Indeed, professors were the most important pillars of the German academic oligarchy, a "chair-based organization" of "small monopolies in thousands of parts."⁴ From the chair's point of view, the university and the department were a local corporation of colleagues—the other chairs—all of whom had a basic equality of rights and opportunities. Professors could normally expect that their colleagues, including the deans and members of the rectorate, would not make any decision violating their interests. Such implicit nonaggression pacts transformed a formal structure of majority rule into a structure of informal veto powers.⁵ The consequences were obvious: decision making took a lot of time, and the status quo could be changed only when everybody profited, or at least no one suffered a significant loss. Although compromises were reached, they often led to insufficient solutions or merely to symbolic politics.

This inflexible and conservative bias of German university governance has been the object of political discussion for more than thirty years and led to a rising discontent of state actors with the universities because the latter seemed to be more and more unable to adapt to changing environments and societal demands. For quite a long time, however, nothing changed. On the contrary, the number of university members who claimed that German universities were basically "healthy" and only needed more funding from the state increased steadily. Although German reunification in the early 1990s seemed to briefly open a window of opportunity for a holistic change in higher education structures through the necessary reform of East German universities, it did not greatly help reform-oriented actors.⁶ As in other societal sectors in East Germany, the enormous pressure on universities to agree to the installation of a working system allowed only the substitution of politically discredited persons; those German professors who acted as temporary or permanent agents of renewal did nothing more than implement the West German status quo. Serious efforts of reform started only in the late 1990s, thus change is still at the very beginning.
PUBLIC RESEARCH UNIVERSITIES AND THEIR ECOLOGICAL ENVIRONMENT IN GERMANY

The Higher Education Sector

With a population of more than 80 million, Germany is the largest country in the European Union and one of the world’s largest economies. In 2008/2009, there were 1.97 million students in the German higher education system, which has a binary structure. Of the 364 institutions of higher education, 118 are research universities, and the rest are professional education institutions (Fachhochschulen, etc.). The German higher education sector employed about 184,797 full-time academics in 2008, of which 20.9 percent were professors. About two-thirds of the students are enrolled in universities. In 2005, the universities’ total finances made up 1.1 percent of Germany’s gross domestic product. "Of the 364 institutions of higher education, 235 are public and are funded by the Bundesland (the state) in which they are located." 

The Political Coordination of Higher Education and Science Policies

According to the German constitution, the sixteen states are responsible for all education and culture issues, including the universities. The federal government plays only a subordinate role in the higher education system. The states coordinate their policies with respect to universities and higher education in general at the Standing Conference of the Ministers of Cultural Affairs (Kultusministerkonferenz, KMK), and the states coordinate with the federal government at the Joint Science Conference (Gemeinsame Wissenschaftskonferenz von Bund und Ländern, GWK). Finally, the Council for Sciences and Humanities (Wissenschaftsrat, WR) is the advisory body for all matters of higher education and science policy. The council has two boards, one consisting of representatives of science, and the other is made up of representatives from the states and the federal government.

The German system has three intermediary actors between the universities, on the one hand, and the government, on the other. The Deutsche Forschungsgemeinschaft (DFG) is the most important agency promoting research and funding projects. In fact, DFG funds account for more than 40 percent of the German universities’ entire external income. The DFG’s public funding budget is financed nearly equally by the states (42 percent) and the federal government (58 percent). The German rectors’ association (Hochschulrektorenkonferenz, HRK) is the organized interest group of universities, and the Deutsche Hochschulverband (DHV) is the university professors’ professional association.

All these actors have a say in the external university governance, which is carried out by several administrative actors from the federal and state levels, the intermediary organizations, and the scientific elites. This network structure is, and always has been, a dominant governance pattern in the German higher education system. The reason for its dominance is the “semisovereign” character of the German state, which is characterized by a huge amount of joint decision making between the federal government and the sixteen states as well as the close involvement of corporatist actors in formulating policy. The same holds true for the German system of public sector research outside the universities.

The Extra-University-Research Sector

Many research tasks that in other countries are typically located inside the public research university also are public in Germany but are not included in the higher education sector. This research system is divided into four pillars, most of which developed since World War II and provide different “research services” as public goods in return for state subsidies.

The Max Planck Gesellschaft (MPG)

The oldest and internationally best-known pillar is represented by the Max Planck Gesellschaft (MPG), whose institutes carry out basic research that cannot be conducted in universities because of its innovative cutting-edge character or its size and required resources. The MPG is an umbrella organization with a global lump-sum budget of €1.2 billion annually (plus more than 20 percent external funding), consisting of eighty specialized institutes with 13,000 employees (of whom 4,800 are researchers). The institutes are organized according to the “Harnack principle.” The MPG is famous for producing the greatest number of Nobel Prize winners in German public-sector research.

The Fraunhofer Gesellschaft (FhG)

The second pillar is represented by the Fraunhofer Gesellschaft (FhG), founded in 1949, whose institutes conduct mostly applied science and contracted research for industry and public purposes. Along with the DFG and MPG, the FhG is the
third umbrella organization with a large central administration, consisting of fifty-six institutes with more than 14,000 employees and an actual annual budget of €1.2 billion, of which €394 million is provided by federal government (90 percent) and states (10 percent). The FhG's public mission is focused on contract applied-science research. The state's subsidies to the FhG depend on the amount of third-party funding via research contracts with external partners. For every three euros of external income, the FhG receives one euro in state subsidies. The additional one-third in state funding is to provide a strong economical base and flexibility for the institutes to prepare ideas and solutions for basic research (with a strong bias on future application) that will be valuable to potential contract partners. The FhG, therefore, not only fulfills public and industrial demand but also tries to generate this demand by using the state funding it receives as seed money for innovative research projects.

The Wissenschaftsgemeinschaft Gottfried Wilhelm Leibniz (WGL)

The third pillar in German public-sector research is the Leibniz Gemeinschaft. After World War II, many existing or new research institutes had research tasks of “nationwide interest” and were cofunded by the federal government and the state in which they were located. These independent institutes were merged in the Wissenschaftsgemeinschaft Gottfried Wilhelm Leibniz (WGL) in 1997, which has a secretary and a corporate body of decision making. These institutes form a much looser confederation than those of the MPG or FhG. The WGL today consists of eighty-two research institutes with 13,930 employees (6,347 researchers), has an annual public budget of €852 million (plus more than 20 percent in external funding), and is now described as “conducting problem-solving-oriented research of national interest.” This includes basic research as well as applied research, and the well-being of the WGL institutes today depends heavily on third-party funding via contract research (mainly for state and federal ministries) and on DFG-project grants.

The Helmholtz Gemeinschaft Deutscher Forschungszentren (HGF)

Last but not least, the Helmholtz Gemeinschaft Deutscher Forschungszentren (HGF) represents the fourth pillar in the German extra-university research landscape and is by far the biggest research organization in Germany in personnel (27,913 employees, of whom 9,043 are researchers), infrastructure, and state funding (with an annual public budget of €2.1 billion, plus more than 30 percent in external funding). The HGF is a product of Germany’s efforts in the 1950s to concentrate nuclear reactor research in big research centers outside the universities. Since then, several new centers focusing on other interdisciplinary tasks of strategic relevance to the German state and industry have been founded, for example, for aerospace or polar research. In 1995 fifteen independent research centers joined under the HGF umbrella. Although a powerful president and collegial bodies of self-governance were installed, the institutes remained legally independent. As in the WGL, the conditions of funding and the evaluation of research became the HGF’s main tasks as a corporate research organization.

Other Organizations

Other entities belonging to the German public sector research are the Ressortforschungsinstitute, research institutes that service the needs of and provide information for specific federal ministries; the academies of science; and several smaller organizations. Outside the public sector, industry research provides two-thirds of the funding for R&D in Germany. Nevertheless, the public university is still regarded and idealized as the natural home of basic research in Germany, and recent political reform strategies have tried to reestablish this “natural state.”

NEW PUBLIC MANAGEMENT DISCOURSES (NPM) AND STRATEGIES IN THE GERMAN UNIVERSITY SYSTEM: HOW THEY SHIFT RESEARCH CONDITIONS

Political and managerial talk is different from concrete action regarding the introduction of NPM instruments and new governance structures in the German university system. Furthermore, even if action is taken—for example, the reform of state laws, new funding directives, or the establishment of new managerial units in the university organization—their impact on the real behavior of academics in universities may not always be what policymakers and managers expect. Next we discuss the causal nexus between talk, action, and the impact of NPM reforms in German universities with regard to the question, whether researchers in universities adapt to NPM-caused changes in funding, and, if so, with what consequences for their research.¹⁴

To analyze the adaptation of university management and academics to changes in university governance, we interviewed researchers in six disciplines—
mathematics, biology, geography, physics, history, and political science—in eight
Australian and two German universities, as well as top and middle managers. Here we present the results of interviews we conducted at two German universities in the state of North Rhine Westphalia. In each of the two case studies, we interviewed thirty researchers, three deans, and three members from the university management. We tried to find out whether the actual political reforms and changes in the university governance concerning research had affected their research work and how well the researchers had adapted to changing conditions of their knowledge ecology.

Inclusion Pressures: The Call for “Relevance" and “Responsiveness" of University Research

Universities are dual-purpose organizations and, as such, have functions in both the educational and the research system of modern society. Since the 1960s, universities in all Western countries have become subject to increasing pressures for inclusion. Not only industrial production, health care, and the military, but also political decision making, for instance, in environmental protection, and even sports and family life, were supposed to become more rational by the application of knowledge gained from scientific research. These hopes directed an increasing amount of public money into research, much of which went into the basic funding of universities. Therefore, science policymakers felt the need—and public pressure—to make sure that not all this money was entirely spent on research motivated only by scientific curiosity. In this respect, inclusion pressure means that university research should become more responsive to societal demands for extra-scientific “relevance.” The self-exclusion of university research into the notorious “ivory tower” was supposed to end.

Universities and their professors had to meet this demand primarily for their self-interest. They had to confirm and, to some extent, also practice “relevance” (under the heading of technology transfer, among others) because they anticipated that otherwise a research drain could continue from the universities to the state-financed extra-university sector. In the end, universities and their professors might lose most of their share of research to the Max-Planck Gesellschaft, the Fraunhofer Gesellschaft, the large research centers of the Helmholtz Gemeinschaft, and other kinds of institutes. This would mean that university professors would lose the work that was most interesting to them and also their reputation among colleagues and society at large. Moreover, the universities then would no longer be different from Fachhochschulen or other polytechnical and professional higher education institutions. In turn, the universities would no longer be able to delegate research focused on “relevance” to the Fachhochschulen. If universities wanted to maintain their position as the ultimate “home of science,” where basic research without immediate application value had a safe refuge, they could not ignore “relevance.” Problems stemming from the inclusion pressures in research could not be resolved, however, but continued to accumulate after the higher education system stopped expanding in the mid-1970s while the traditionally slow and risk-aversive mode of collective decision making in the universities was maintained. These problems regarding research included the declining international visibility of research conducted in German universities, the lack of attractiveness for foreign researchers, a fragmented system of quality control, complaints from industry, and other extra-scientific users of research results about the unresponsiveness of university research to their needs. All these were problems plaguing higher education and research policymakers, although it took a long time until they began solving these issues systematically and coherently.

The Rise of the New Public Management Regime in the German University System

Whereas university rectors and professors claimed that the problems were caused mainly by the growing scarcity of public funding and demanded significant budget increases, governments began criticizing this attitude as unrealistic with regard to their financial possibilities and, even more important, as a diversion from the real causes of performance deficits. Both the federal government and many state governments became convinced that the central cause of all of these problems was the inability of German universities to reform themselves, which in turn was seen primarily as a result of the professors’ unwillingness to change the status quo, which would have meant at least a partial loss of individual and collective privileges. Although the need for a change in university governance had been on the agenda since the Council for Sciences and Humanities passed a “recommendation on structure and administrative organization” in the German higher education system in 1968, the federal political actors’ first move toward reform, on still a purely discursive level, can be traced back to the “sixteen theses from Bonn” by Dorothee Wilms, the federal minister for education, in 1983. Here, words like competition, profile building, the desirability of more third-party funding, and incentive systems for the best professors first had an impact on the political debate. After all, from government’s perspective, universities should become organizations that could adapt to the changing societal demands on teaching and research.
In other European countries and international organizations like the Organization for Economic Cooperation and Development (OECD), New Public Management (NPM) has been debated since the 1980s as a governance regime that should shape public organizations in general toward becoming responsive and even more efficient performers. In Germany, NPM arrived in the mid-1980s through the discussion and propagation of model projects in the Netherlands to reform municipalities. Debates about NPM began to spread to other areas of the public sector until they reached the German universities in the second half of the 1990s. Two streams of literature and reports were influential. The first stream consisted of diagnoses of decline and pathology. In this perspective, "the German university was rotten to the core", "blocked," or simply in deep "misery." The other stream provided the remedy for all the many diseases associated with the German university: As already implemented in other OECD countries, NPM should be more or less adapted to the unique organization distinguishing German universities from other national public organizations, on the one hand, and from private enterprises, on the other hand. Two influential proposals of NPM in this respect were from the president of the University of Kassel, Hans Brinckman, who proclaimed a "new liberty of the university" and Detlev Müller-Böling, who demanded the "unchaining of the university" from direct state control as well as from professorial amateurism with regard to questions of management. Müller-Böling was then the director of the Center for the Improvement of Higher Education (Centrum für Hochschulentwicklung, CHE), a think tank initiated by the German Rectors Conference (HRK) and the Bertelsmann Foundation, a private donation with the mission of acting as an intellectual leader for reforms in German society at large. Other private foundations played a significant role, too, in pushing the reform agenda of NPM in German higher education policies. For example, the Volkswagen Foundation, initiated a commission that brought together some respected and reform-oriented university rectors/presidents, who developed "milestones for a sustainable German science system." Another important private actor promoting NPM is the Association of Donors for the German Sciences and Humanities (Stifterverband für die Deutsche Wissenschaft), which supports the NPM agenda in the German university system through the (co)funding of focused study courses, featuring and initiating memorandi, and awarding scholarships for management qualification matters or grants for conferences and meetings concerning higher education and science management reform. Finally, political bodies like the Enquete Commission of the Federal German Parliament, with its report "Globalisation of the World Economy"—including a chapter on higher education—have attempted to turn public attention toward the need of NPM reforms in the German university system.

The rise of NPM in Germany was a complicated process in which many coincidences played a sometimes decisive role. To understand the NPM reform model and systematically compare it with the German university system's traditional governance regime, we found five mechanisms:

- **Bureaucratic regulation** concerns the traditional notion of top-down authority vested in the state. This dimension refers to regulation by directives, in which the government prescribes, in detail, behaviors under particular circumstances, for instance, in financial or personnel issues.
- **External guidance** refers to activities that direct universities' goal setting and advice. In public university systems, the government is usually an important, but not necessarily the only, stakeholder. It may delegate certain powers to guide to other actors, such as intermediary bodies or representatives of industry in university boards.
- **Academic self-governance** concerns the role of professional communities within the university system. This mechanism is institutionalized in collegial decision making within universities and in the peer review-based self-steering of academic communities, for instance, in funding agencies' decisions.
- **Hierarchical management** refers to the role of university leadership—rectors or presidents on the top level, deans on the intermediate level—in internal goal setting, regulation, and decision making.
- **Competitive pressure** with respect to scarce resources—money, personnel, and prestige—with and between universities mostly takes place not in real but in "quasi markets" whose performance evaluations by peers or quantitative indicators substitute for the demand pull from customers.

In all five mechanisms, the NPM regime differs sharply from the traditional governance regime of the German university system. Traditionally, as shown, strong academic self-governance existed alongside strong bureaucratic regulation by the state. In contrast, NPM strengthens the hierarchical management by rectors and deans, the external guidance of state authorities and external stakeholders (e.g., university boards), and also competitive pressure. At the same time, NPM implies a marked deregulation in budgeting and personnel management and in the approval of study programs. This is what government usually means when it promises greater "autonomy" to universities. Strictly speaking, it promises greater organizational autonomy, which should not be confused with
the individual autonomy of professors. Indeed, a reduction of academic self-governance is another explicit goal of current NPM policies in the German higher education system.

The core issue of NPM in German higher education policies is the increase of competition among and within universities for resources, students, and national as well as international reputation. Deregulation is one prerequisite for organizational competitiveness; another is the establishment of an organizational leadership that can act on behalf of the university as a corporate actor. Finally, greater external guidance is supposed to give broad long-term orientation to a university’s competitive strategy.

The Reform of Research Funding in German Universities: From Basic Supply to Competition

How has NPM actually been implemented in the German university system? The answer is difficult because NPM is still being implemented and also because each of the sixteen states sets somewhat different priorities and uses even the same measure differently.

Individual researchers at universities have always felt competitive pressure, which has become stronger with increasing dependence on funds from the DFG, the Federal Ministry of Research and Education, the European Union (EU), and industry. The share of these funds in the overall university budget has increased steadily and in 2002 was about one-quarter of the budget spent on research. The success rate of project proposals from individual researchers fell from 68 percent in 1995 to 51 percent in 2006. What made this trend even worse is the fact that funded projects were able to cover less and less of their real costs with a DFG grant. This growing dependence on project money has meant greater competition and thus fewer projects on the individual level.

The second big pillar of the German research funding scene is the thematically focused and often mission-based funding programs of the German Federal Ministry for Education and Research (BMBF), the state ministries, and the framework programs of the European Commission. During the past decade, the DFG partly adapted to this model of program funding. In an evaluation of its funding processes by an international expert commission in the late 1990s, the DFG was criticized for its grants for small individual projects and was advised to concentrate more on thematically focused, strong programs: "In principle, resources should be concentrated on a few thematic fields and on fewer more visible projects." In addition to the already existing "large collaborative research areas (SFB), the DFG introduced funding for large decentralized research groups, thematically focused programs, and research centers.

In sum, German funding is developing a bias toward thematically focused, collaborative, or otherwise "big" research. One important corollary of this trend is that the influence of politicians, funding administrators, and academic elite involved in funding is increasing while individual researchers may lose their agenda-setting power in the long run.

Because universities’ basic funding has become more and more inadequate for the demands of internationally competitive research in many fields of science, researchers have been forced to search for other sources of money. Otherwise, they would have to reduce or shift their research or maybe stop doing research altogether. Researchers in the natural sciences, who need expensive equipment, materials, and research personnel, often prefer the mission-oriented programs of the federal ministry or the EU framework programs because these funds allow them more flexibility in how to spend the money than DFG grants usually do. That is, the DFG grants do not cover the cost of basic research equipment, which, according to DFG policy, must be provided by the universities. The budget of cost-intensive disciplines is not sufficient to maintain expensive laboratory equipment or even to modernize. So professors need external funding to keep their equipment up to date and to maintain employment contracts with their laboratory staff. Although some sources, such as the EU, have been used more extensively than before and have increased their funding, overall funds have dropped because the demand has grown faster than the supply from all available sources.

The reasons for this rising demand are as follows: First, professors have become "experts in fund-raising" and have devised certain adaptation strategies for different funding sources. Usually the best researchers manage a complex funding-source portfolio in order to guarantee an uninterrupted flow of grants necessary for the smooth continuation of their research. The actual research work often must be done—if the proposals are successful and the money is awarded—by relatively inexperienced young researchers because professors have no time for supervision and advice. Second, some of our interviewees stated that the quality of research has suffered because inadequate financing and time pressures do not allow better work. Third, not only bad research is eliminated by stronger competition for resources, which is an intended effect, but also much good to mediocre research is eliminated as well. Modern science rests on a broad basis of unspectacular routine research, certainly in applied fields but also in basic research. But if this kind of research work cannot be done any longer, the really excellent cutting-edge research also might suffer.
The trend toward a more selective bias in research funding and the preference for big science was reinforced by the "excellence initiative" introduced in 2005 as a joint project by the federal government and the states. The initiative was organized by the DFG and the Council for Sciences and Humanities (WR) as a competition in which universities, instead of individual professors, compete for their share of a budget of €1.9 billion. This money was spent on successful proposals for graduate schools, clusters of excellence (which means the close collaboration of universities with local or regional extra-university research institutes such as the Max Planck, Fraunhofer, Leibniz, and Helmholtz institutes), and outstanding concepts for the university's future development.

Success in the last category—which required success in the other two categories as well—led to mass media–driven public recognition as a German "elite university." Since the results of the first cycle of the excellence competition were announced in 2006 and 2007, nine universities hold the "elite" label. One of the driving motives—especially of the federal ministry—for the "excellence initiative" was the observation that more and more public spending on research went into the extra-university research institutes. Universities as the "natural home of science" seemed to have been forgotten in regard to research. This was seen as a shortcoming in the German higher education and research system because only the universities train and graduate young academics and only the universities supply industry and the extra-university research sector with promising and innovative personnel. The federal government feared that a decline in university research could have a bad long-term effect on its teaching and the labor market, too. But one of the best effects of the "excellence initiative" so far is the partial breakdown of the rigid five-pillar structure of the German research system with its narrow mission targets for each of the pillars, which hinders the international visibility of research conducted in Germany. Universities now work, or try to work, more closely with the regional Max Planck, Fraunhofer, Leibniz, or Helmholtz institutes. Even those universities that failed in the excellence initiative's category of building "excellence clusters" have tried to tighten their ties to the extra-university research sector because these ties and collaborations are now regarded as an advantage in the national and international competition for external resources and recognition.

Another tool to boost competition in the German university system is the substitution of some of the basic funding of universities by performance indicator–based funding. Most states now distribute part of the universities' basic funding according to performance criteria, such as the number of graduates or the size of the university's project funds. About three-quarters of a university's budget are fixed personnel costs, however, and the university's possible gains or losses due to performance indicators are usually limited to 1 to 5 percent of the preceding year's budget. This prevents weak performers from getting into financial trouble. Thus, only a very small part of the budget is available for incentives, and their potential effects on motivation are small as well.

Most of the mechanisms of competition do not have a direct monetary influence on demand or supply. Accordingly, because most markets in the system are merely "quasi markets," evaluations of research and teaching have become necessary in order to ascertain the relative position of a university, a faculty, or an individual professor. All states have started making evaluations, and some, for example, Lower Saxony, have created own evaluation agencies. Although the methods and criteria differ considerably, in most cases, the evaluation is some kind of informed peer review.

In accordance with these recent developments, German universities began establishing certain research profiles and—in most cases, interdisciplinary—research centers to fit these profiles. This new form of NPM-driven research organization pushes the universities toward corporate actors, with the aim of changing research from individual to collaborative projects and to the development of "critical masses" inside the universities as well as in cooperation with the neighboring extra-university research institutes. These actions should offer an advantage in the competitive bidding for external research grants and in research areas that have priority on the government's funding agenda. All the universities in our sample invested in building research centers based on certain profiles, shifting financial resources from nonpriority areas to the centers. In many cases, however, universities can provide only a little start–up money for these centers. The model for these research centers is the DFG-funded SFB, and most universities try to imitate the SFB-structure in their priority areas, hoping that the professors involved will collaborate under the umbrella of the center and write a proposal for the establishment of a SFB or some other coordinated program that attracts third-party funding. The institutional funding of the centers by the universities themselves is highly diverse. In most humanities departments, the newly established centers consist of only those resources that the professors agreed to move from the recurrent funding of their chairs to the center. These centers therefore usually have only a little money to invite guests or hold special seminars. Conversely, in many natural science departments the university management is willing to invest large sums to establish collaborative structures that are predicted to bring high returns from third-party funding in the future. Often such centers are financed by matching funds: the central university management is willing to
give money if the dean of the respective faculty or department will give money, too. In most cases, though, all money allocated to newly established research centers is just start-up money for a few years and is expected to be replaced by third-party funding later. Because this development has just started, we do not know whether the university managements' hopes of creating competitive and self-supporting research entities will be fulfilled.

Most German universities try to invest heavily in special funds to boost and reward researchers' activities in the competition for external grants and to support grant applications and the preparation of proposals. Special funds for these issues are available at both the central and the faculty/department levels. Again, the money that universities can spend on these issues is scarce. In the two universities we investigated, we found efforts by the central administration to support researchers bidding for large collaborative research grants from the DFG or for grants from the "Framework Programs" of the European Commission.

In most German universities, finding replacements for vacant chairs is no longer solely a task for representative boards and commissions on the faculty or department level. All the university managers we interviewed claimed that strategic recruiting according to predefined core areas of research—often with regard to certain profiles on which the university and government decided in so-called target agreements—was the most important tool for a proactive university management. International collaborations, "big" third-party-funded research projects, publications in prestigious international journals, and, last but not least, the fit of the candidates' research priorities to the profiles of the departments or institutes all ranked high on the university managers' list. Most of the faculties/departments in our sample weighted excellent research performance higher for candidates to fill vacant chairs and professorships than excellent teaching performance, despite the claims by all interviewees that they still favored the Humboldtian ideal of the nexus between teaching and research.

Researchers' Adaptation Patterns to Their Changing Environment

University researchers' adaptation to the new ecology of research funding can be observed in four interconnected dimensions, in which the reforms in university governance in general and especially the changing conditions for research funding are mainly seen as problematic: the availability of time for conducting research, the funding situation, adaptation to profile-building activities, and the influence of evaluation schemes.

Time

Time was German university researchers' most frequently mentioned restriction for proper research. Much more than the teaching load, the professors and associates we interviewed saw rising bureaucratization and the resulting increase in administrative work as the greatest restriction of their research activities. Most conspicuous were the increasing accountability accompanying the Bologna Process, the delegation of previously centralized administrative tasks to institutes and chairs in accordance with internal change management, and the bureaucratic drift of externally funded research itself. Competitive bidding for grants and meeting the demands of targeted funding schemes were regarded as time-consuming exercises.

Funding

German university professors are still regularly given basic funding for research. Whether they can conduct research with this funding or whether they are dependent on external funding varied strongly among the disciplines. Nearly all history professors and a majority of the political scientists we interviewed declared that it was hard but not impossible to conduct their research projects by themselves without additional grants. Since this funding does not cover research expenses, most historians reported that they used their own money to get needed books, copies, or microfilms or to visit national and foreign archives and libraries. Political scientists did not report spending much of their own money on research.

The situation of mathematicians was very similar to that of the historians and political scientists. The majority were classic "solitary and free" researchers who conducted low-cost research by solving mathematical problems with "paper and pencil." They did not obtain outside funding because their basic funding was sufficient to supply them with the few things they needed, including a small amount of travel money for attending international conferences.

While basic funding appeared to be sufficient for much historical, political science, and mathematical research, the majority of academics from geology, biology, and physics and those political scientists conducting empirical research, which requires the collection of new quantitative or qualitative data, depended heavily on external funding. Professors in biology and physics declared that they could not perform effectively without much external funding. They claimed that they could conduct successful and internationally visible research in the highly
competitive environments of their specialties only if they could work on several related projects at the same time and had access to up-to-date expensive laboratory equipment or radiation sources. Our observable adaptation was primarily a kind of lip service: researchers in all disciplines who depended on external funds were able to adapt to the "proposal lyrics" of the funding agencies without changing their research substantially. An adaptation pattern like dropping unfashionable and, in the end, unfundable research—which we observed in Australia and Great Britain—we have not yet seen in Germany.

Profile building

Profile building through the establishment of research centers in universities is a new form of research organization introduced by NPM. Its purpose is changing research behavior from individual to collaborative projects and to the development of "critical masses," providing advantages in the competitive bidding for external research grants. We observed in our German case studies that especially in the humanities, a majority of academics dealt strategically with these centers but did not commit to them. Most important was that many professors in unfashionable (but for teaching purposes still necessary) specialties inside their disciplines were sidelined by their universities' profile- and center-building strategies and had to cope with a steady reduction of staff. Their adaptation pattern was in many cases a kind of "inner emigration": they left the university's governance regime and did what they wanted with their limited resources because they did not see any advantage in participation.

Evaluation schemes

We found no adaptation to evaluation-based funding formulas. In the two German cases, the amount of money allocated through performance indicators in the universities was still too small to have an observable effect. No professors would change their research behavior for an annual gain or loss of approximately €2,000 to €4,000 for a chair. Even those who obtained additional money through incentive systems and research performance indicators reported that it was a nice benefit but that they would have conducted the same kind of research without these incentives. In the end, the allocation system of German universities did not have enough money to have a significant impact.

The boundary between academic research and the managerial rationality of the new university governance has started to blur but has not yet changed the academic ethos. The discipline still is a strong principle for almost all researchers in our German sample, and the need of many researchers for external funding has not substantially influenced the contents of research. How far recent political moves like the "excellence initiative" might change the university's influence on the selection of research topics or the way that research would be conducted remains to be seen.

SHIFTS OF UNIVERSITY-INDUSTRY RELATIONS: THE CASE OF TECHNOLOGY TRANSFER

When dealing with university-industry relations, we had to take into account different levels of analysis. Using two research projects, we will try to show that the pace of change differed according to what we analyzed. We found the pace of change at the discursive level was not accompanied by an equally dramatic change in practice at both the organizational and individual levels. German universities only slowly transform radically new ideas into practice because the influence of historically entrenched concepts remains stronger. As a result, we had to take into account very different speeds of change. We illustrate this by first reconstructing briefly the political and academic discourse on university-industry relations. We then discuss actual practices analyzing technology transfer offices, bibliometric data on publication patterns, and interview data with different constituencies in German universities.

University-Industry Relations: The Discursive Side

German universities have interacted with industry since at least the late nineteenth century. The strong ties between academia and industry were especially successful in chemistry. But medicine, physics, and engineering also had strong ties to industrial applications, which resulted in a series of remarkable scientific and technological innovations and, ultimately, economic competitiveness. The historian Margrit Szöllisi-Janze speaks of an early knowledge society when describing the situation in Germany between the 1870s and the beginning of World War I. At that time, though, the ideal of the university did not favor strong and direct university-industry linkages. Instead, the Humboldt ideal of a remote, socially isolated community of students and professors, happily bound together in a unity of teaching and research, prevailed. In this institutional setting, theoretical advancements in the natural sciences were widely recognized,
In the I&D model, the key problem in linking up science and industry is the accelerating pace at which scientific knowledge is produced. The solution to the related problem of knowledge “superabundance” is the creation of information infrastructures that make knowledge available in a methodological and technologically advanced way. Thus, the emphasis is on the creation of new infrastructures designed to improve the flow of knowledge across different institutions. Science-industry relations are supposed to be linear according to the I&D model, so the generation of knowledge is followed by dissemination and then utilization. Personal contacts between scientists and industry do not seem to be necessary. A scientist’s primary role is that of a producer of knowledge, whereas industry is mainly seen as using and applying this knowledge. The I&D model arguably was dominant in Germany between the 1950s and the first half of the 1970s. Specialized archival journals (like Nachrichten für Dokumentation, first issued in 1950) can be seen as early advocates of the national I&D model. In 1962 the federal accounting office (Bundesrechnungshof) issued the first major national public policy statement clearly expressing a federal commitment to the I&D model: “The solution to the problem of how latent knowledge can be brought to interested parties is essential to the competitiveness of modern industrial communities and so falls under the purview of government responsibility. The retrieval of knowledge ... is a tool to considerably improve performance in science, the economy, and public administration.” About a decade later, dissemination agencies like the Fachinformationszentren, which were created in the 1970s under the auspices of the federal government, and political programs like the I&D program (Programm zur Förderung der Information und Dokumentation) launched by the Federal Ministry for Research and Technology in 1975; were established to make academic knowledge more visible to the industrial world.

In the 1970s, the underlying idea of the I&D model—that with sufficient support by dissemination structures, research outcomes would more or less automatically “fall out” or “spill over” from the academic to the industrial domain—was met with increasing skepticism. Many critics maintained that potential users’ access to documented knowledge was not, by itself, enough to stimulate industrial innovations based on this knowledge. Therefore, the cooperation model, which gradually replaced the I&D model, emphasized bringing together researchers and practitioners. Actual or perceived “cultural gaps” between science and the economy were regarded as the main problem. In contrast to the I&D model, the cooperation model regards knowledge and technology transfer as a dialogue among partners from different institutional backgrounds. That is, transfer was no longer seen as a one-way street between universities and industry. This model gained prominence in German science and technology policy during the second half of the 1970s and dominated the discourse during the 1980s. During that period, several political programs aimed at facilitating personnel exchanges between academia and industry were set up. Even more important, since the late 1970s, technology transfer offices were established at almost every German university. Transfer offices were seen as the central mediators between the academic and the industrial world, and they were supposed to establish contacts and clear up misunderstandings in interactions between the university and industry. Because these offices are important to understanding the cooperation model and, more generally, technology transfer in Germany, we will describe them more extensively later.

Whereas the cooperation model assumes and even emphasizes clear institutional boundaries between the university and industry, the blurring of boundaries (BoB) model assumes that these boundaries are becoming increasingly permeable, diffuse, and, in some cases, “blurred.” The BoB model sees universities as economic actors, engaging in licensing and patenting activities and fostering spin-offs. By becoming entrepreneurial, the university transcends its institutional identity and traditional boundaries. Whereas the cooperation model focuses on mostly dyadic relations between academic researchers and practitioners, the more complex network model makes it harder or even impossible to differentiate a well-defined academic role from an economic one. In the German discourse, the BoB model emerged in the 1990s, particularly in the federal government and in policy papers by the European Union. It could be found in diverse
programs and policies, supporting universities as economic actors and their participation in innovation networks. In 2002, for example, the legal situation changed, and the titles to all patentable innovations being developed at universities shifted from the individual professor to the university organization, to encourage the latter to become actively entrepreneurial with regard to intellectual property and its exploitation. In addition to the emphasis on entrepreneurial activities, the BoB model conceptualizes universities as nodes in broader innovation networks. The European Union, for example, explicitly supported networks by financing "networks of excellence" within the Sixth Framework Program. In Germany, networks of all kinds—regional networks, innovation networks, excellence networks, and competence networks—are promoted by the states and the federal government. "Innovations require networks" is a typical slogan of such programs, or "All parts of the innovation process, starting with basic research up to the diffusion of new products and procedures, should be linked."46

The discursive shifts traced back here are remarkable. Beginning in the 1950s, three different models of how to conceptualize university-industry relations emerged, each accompanied by political programs, legal changes, and institution building. According to our analysis, the BoB model of science and knowledge production, which currently dominates, is very different from both the I&D model and the cooperation model. Further analysis, however, will show whether new concepts like "universities as economic actors" being embedded in "innovation networks" are mainly radical new labels, which divert from the role that historically entrenched ideals and practices still play. At present we do not know much about the impact of the more recent initiatives. Nevertheless, with the help of our bibliometric and interview data, we are able to offer some preliminary empirical evidence regarding continuity and change in practices and attitudes at German universities.

Transfer Offices at German Universities:
A Watershed in the History of Technology Transfer?

A central aspect of establishing closer links between universities and industry was the creation of technology transfer offices at German universities. From a comparative perspective, the institutionalization of transfer occurred in many countries at the same time, the 1980s. The authors of The New Production of Knowledge state: "There was at the turn of the 1980s a watershed in the history of technology transfer in the universities in the United States and Europe."48 According to them, the transformation of technology transfer from dyadic rela-

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the state's government and its department for science and research did not directly insist on the creation of transfer offices at universities, many interviewees felt strong political pressure to comply. This perceived pressure on the universities was met with a widespread lack of interest by the potential transfer partners. Transfer-oriented professors and industrial firms mostly did not perceive the necessity for a new organizational unit. On the contrary, some even feared that an additional bureaucratic layer would stifle well-established informal transfer activities. To put it differently, the institutionalization of transfer offices in large part neither emerged from within the universities, nor was it a response to industry's demand. Transfer offices were mainly a political role model. As a result, the rapid institutionalization process was much more problematic than at first sight. Although the process met with little open resistance, it lacked the required support from all relevant actors outside the political realm.

This lack of support is reflected in their small size and the concrete task structure, which heavily depends on local circumstances. The activities range from assisting start-up companies and offering advice on public funding to extended professional training. Some of the transfer offices even take part in activities, which, like public relations, only remotely resemble tasks of an organizational subunit specializing in technology transfer. Advice on patenting and licensing plays only a limited role. These activities are not as important in Germany as they are at U.S. universities, due to the legal situation. Until 2002, the title to all patentable inventions belonged to the researcher if he or she were a civil servant. Because of the so-called university professor exemption clause (Hochschullehrerprivileg), universities had no incentive to engage in patenting and licensing activities. As a result, transfer offices mainly recruited personnel with an academic background or from within the academic administration. Business-related experiences and specialized legal expertise were hardly to be found. It comes as no surprise that under these circumstances, transfer offices have to deal with an academic clientele with little or no contact with industry, whereas those with strong links to industry do not turn to transfer offices. Compared with traditional informal and dyadic patterns between university professors and industry, German transfer offices' contribution to university-industry relations has always been marginal. Different studies of this have come to the same conclusion by estimating that less than 10 percent of transfer projects between universities and industry have been achieved through transfer offices.

Given these sobering accounts, the institutionalization of transfer offices can hardly be seen as a watershed in the history of technology, indicating far-reaching institutional change. On the contrary, the institutionalization process allowed German universities to adapt to broader societal expectations, mainly from the political realm, without risking too much institutional change. Conceptually, the process may be thought of as a typical example of what John Meyer and Brian Rowan call the loose coupling between the formal structure and the activity structure of an organization. According to their new institutional perspective, organizations need to be understood as embedded in broader social contexts. They are bound to these contexts through material resources and legitimation. Both are granted by conforming to these external expectations. The conformity is reflected in the formal structure of an organization, which serves as a kind of display window for external parties. The formal structure is only loosely coupled with the organization's activity structures, which serves to buffer it from external pressures. Applied to our case, it is obvious that universities' behavior can be understood only by their dependence on the state's government, which actively promotes technology transfer and the institutionalization of transfer offices as role models. Universities conform to these expectations by creating a new and externally visible subunit, the transfer office, which is part of the formal structure. Transfer offices serve as display windows for the universities' political environment. They effectively guarantee external legitimation and resources without heavily altering the organizations' activity structure. Although transfer offices only slightly affected the practices of the universities and their academic staff vis-à-vis industry, with the help of bibliometric data we could nevertheless detect some behavioral changes.

Bibliometric Analysis, 1980 to 2000: The Increasing Role of Copublications Between Academic and Industrial Partners

The cooperation between academic researchers and industry can be measured by bibliometric tools. Our analysis is based on longitudinal data taken from the online version of the bibliometric data bases SCI, SSCI, and A&HCI of Thomson ISI. We measured the overall publication output (articles) of all universities of the federal state North Rhine Westphalia—the federal state where we conducted our research on universities' transfer offices—as well as those publications produced jointly with industrial partners. We found the following results:

Based on our bibliometric data, we can see a striking increase in university-industry cooperation between 1980 and 2000. While we found only 85 copublications in 1980, this number rose sharply over the years, leading to 711 copublications in 2000 (see figure 11.1).
To interpret these data, we compared them with the total publication output between 1980 and 2000. On the one hand, these figures show that the increase is part of a general trend toward more journal publications, as covered by Thomson ISI (see figure 11.2). On the other hand, the number of copublications with industry, compared with the overall publication output of the fifteen universities in our sample, increased steadily over time (see figure 11.3).

In 1980 only 1.9 percent of all publications were cowritten with an industrial partner, and in 2000 the share tripled to 7.1 percent. Given the strength of our bibliometric indicator, the results certainly indicate a stronger university-industry nexus over time. The relations strengthened noticeably in certain knowledge areas like medicine and engineering, as universities with a medical school and/or an engineering school seemed to be at the forefront of those university-industry relations that jointly published their research results.

Recent Trends in University-Industry Relations and Their Effects on German Universities: The Perspective of the Academic Stakeholders

To obtain a more comprehensive picture of the apparent changes in university-industry relations, as well as of the effects on both the professors involved and...
the overall university, we interviewed three main constituencies: six professors with several copublications with researchers from industry, four university rectors or their deputies, and two deans of humanities departments, whose subjects might be indirectly affected by closer links between academia and industry.

First, we were able to assess some of the impacts of the more recent trends on the management of intellectual property rights in German higher education. As we pointed out earlier, the so-called university professor exemption clause, which caused serious problems for universities' patenting and licensing activities, was abolished in 2002. The titles to patents then shifted from individual professors to the university organization. The new law both permitted and encouraged universities to become more entrepreneurial. As we pointed out, the existing transfer offices did not meet the professional requirements for patenting and licensing, so the federal government created new organizational infrastructures, the patent exploitation agencies (Patentverwertungsagenturen, PVAs), in each of the German states. Even though some of the transfer offices at the university level were abolished, most of them remained untouched. Transfer-oriented professors confirmed that these offices were not involved in their interactions with industry.

We still do not know what role the university's transfer offices will play in the new ecology of organizations dealing with university-industry relations. While some of our interview partners can imagine a role for them, others see them as outdated. Apparently, the PVAs have become major players in the field. Transfer-oriented professors see as critical both of them as well as the universities' new entrepreneurial spirit. All our interviewees reported encountering more bureaucratic procedures when collaborating with industry. The preparation of contracts with industry requires significantly more time, since the university often is willing to engage in tough negotiations over property rights with its industrial partner. In particular, some professors criticized university officials' unrealistic expectations of revenues from inventions. Even though the university rectors did not confirm this impression, the criticism was widespread. We still do not know what impact the shift of the intellectual property rights from the individual professor to the university organization will have on the overall patent rate. Policymakers' expectations were high, but at least in the short run, the rate might fall as an unintended consequence of the new, entrepreneurial university's meddling in the traditional patent arrangements between individual professors and industry.

Second, those professors who, according to our bibliometric data, have very strong ties to industry have maintained the traditional image of the professor's role. The "third academic mission," that is, economic development through technology transfer to industry, did not figure prominently. Instead, our interviewees emphasized research and teaching. Doctoral students acted as the bridge between research and teaching and also between professors and industry. Asked about their reasons for cooperating with industry, our interviewees typically pointed to the necessity for continuing their research. Likewise, the criteria for success are seen as scientific, not economic. In addition, publications also act as signals to industry. "Publish or perish" hold true for structuring the academic field and also is important to maintaining and creating external contacts. Accordingly, the conspicuous changes in the rate of copublications with industry do not necessarily imply equally strong changes in scientists' role models and identity concepts.

From our empirical findings, we found that German research universities still have a long way to go to adapt to the changing knowledge ecology, especially when we compared them with top research universities in the United States. What is striking with regard to the German case is that nearly all reform exercises are formulated and pushed by actors from outside the universities. Private donations and think tanks have had a great impact on higher education and research policy, and state actors tend to conceptualize and implement reform policies in a top-down manner against the resistance of a majority of university teachers and researchers. Policymakers regularly meet members of university organizations, which still have too little managerial capacity to cope with the many reform inputs they are given. Conversely, the new demands are met by a type of public organization that fulfills its two functions of teaching and research under the burden of a steady decrease of basic public subsidies since higher education policies stopped the system's expansion in the mid-1970s. We are not surprised, therefore, that the adaptation to a new knowledge ecology still has not had a great impact on the content of academic work and on the role models and identities of academics in German research universities. In basic research as well as questions of technology transfer, the model of the academic driven by intrinsic motivation, following the norms and regulations of his or her discipline and disciplinary community, remains strong. German academics still see themselves as autonomous and self-determined nodes in the research and technology networks of their choice. It remains to be seen whether actual policies and management strategies trying to push German research universities toward "state-chartered employment organizations" will change that perception (for better or worse) in the near future.
NOTES

5. Uwe Schimank, Hochschulforschung im Schatten der Lehre (Frankfurt: Campus, 1995).
6. Renate Mayntz, Aufbruch und Reform von oben; Ostdeutsche Universitäten im Transformationsprozess (Frankfurt: Campus, 1994).
7. All information about the German higher education system presented here is updated from Uwe Schimank and Stefan Lange, "The German University System: A Late-Comer in New Public Management," in University Governance: Western European Comparative Perspectives, ed. Catherine Paradise et al. (Dordrecht: Springer, 2009), 145–70; and Statistisches Bundesamt, Bildung und Kultur: Personal an Hochschulen 2008, Fachserie 11, Reihe 4-4 (Wiesbaden: Statistisches Bundesamt, 2009).
8. The sixteen German "Bundesländer" are states in the federation of the German nation with their own constitutions, legal powers, and public administrations. The Bundesländer also execute federal laws through their public administrations and courts.
11. All data in this section are from the websites of the research organizations cited in the following section and from (WR) Wissenschaftsrat, Basisdaten Hochschulen/Forschungseinrichtungen in Deutschland, Stand, August 5, 2009 (Cologne: WR, 2009). On German public-sector research outside the universities, see Hans-Willy Hohn and Uwe Schimank, Konflikte und Gleichgewichte im Forschungssystem: Akteurkonstellationen und Entwicklungspfade in der staatlich finanzierten auserverstümmelten Forschung (Frankfurt: Campus, 1990).
12. First founded as the Kaiser Wilhelm Gesellschaft (KWG) in 1911, it was reestablished in 1948 under a new label as the MPG.
13. The Harnack principle refers to a Max Planck Institute (MPI) being organized around an outstanding researcher, who is established as the director of the MPI and independently decides on its research agenda.
14. This research project, "The Impact of Evaluation Based Funding of Research in Universities on the Contents of Research," was funded by the German Ministry for Education and Research (BMBF) and the Australian Research Council (ARC). The research team in this project consisted of Jochen Gläser, Stefan Lange, Grit Laudel, and Uwe Schimank.
17. For this section, see Schimank and Lange, "The German University System," 145–70.
18. Since the mid-1970s, the oil price shock and a weakening economy made less money available for German higher education. In 1977 the KMK decided not to react to increasing enrollment rates by expanding the universities’ infrastructure and personnel. Instead, the ministers relied on the false—as it soon turned out—prognosis that enrollment would decline to the status quo ante by the early 1980s. Although the number of entering students has kept growing until today, the universities’ infrastructure and personnel still have not expanded significantly.
19. WR (Wissenschaftsrat), Empfehlungen zur Struktur und Verwaltungsorganisation (Cologne: WR, 1968); Dorothee Wilms, "Hochschulpolitik für die neuzeitige Jahre," DUZ 23 (1983): 11. Bonn was the (West) German capital then, and still today the Federal Ministry for Education and Research (BMBF) is divided into two big departments: one is located in the new capital, Berlin, and the other remains in Bonn.
I. Introduction

1. German Universities in the New Knowledge Ecology

II. The Role of DFG in Research Funding


25. For an analysis of discourse, see Carsten von Wissel, *Hochschule als Organisationsproblem: Neue Modi universitärer Selbstbeschreibung in Deutschland* (Bielefeld: Transcript, 2007).


28. This situation has changed recently, as the DFG is now allowed also to cover a part of the overhead costs of approved research projects. Until 2007 the universities had to cover all overhead costs for DFG-funded projects from their regular state funding, which could lead to severe financial troubles for strong research universities with many DFG-approved projects. In the “Hochschulpakt 2020” from July 14, 2007, the federal and state governments declared that they would begin to institute full-cost financing for competitive research projects, starting with 20 percent of the total amount of money granted by the DFG for an approved project.


30. A DFG-funded “Sonderforschungsbereich” (SFB) is an interdisciplinarily coordinated research program proposed and conducted by several professors (and their associates) from several institutes or departments in one university, usually including external collaborations. Such a research program has a framework consisting of several smaller projects that are peer reviewed and evaluated by the funding agency. One of the involved professors acts as the SFB’s speaker and coordinator. These programs are evaluated by the DFG every four years and can last up to twelve years. The SFBs’ establishment was politically enforced, especially by the federal ministry, to boost cooperation and the building of research profiles in German universities. With regard to their duration and the pooled resources, these coordinated programs provide more support for cutting-edge research than the usual two-plus-one-year funding for individual research projects usually provided by the DFG. The SFB programs have been successful and have been role models for all recent funding instruments, such as TransRegio and other new research programs, which aim to bring together researchers from different universities in coordinated programs to boost nationwide (and international) research collaboration.


32. This has consequences for the efficacy of research as well: As a postdoc in biology stated in an interview, doctoral students and postdocs in third party-funded projects often have good results in laboratory work but lack the experience and skills to publish their results in journal articles. Because there is no one available to support them in these matters, many results are never communicated to peers and public.

33. What makes things even worse is that the excellent research staff employed in short-term third party-funded projects often leave a project for a better or more secure job while the project is continuing.

34. Uwe Schimank and Stefan Lange, *Hochschulpolitik in der Bund/Länder-Konkurrenz,* in *Das Wissensministerium. Ein halbes Jahrhundert Forschungs- und Bildungspolitik in Deutschland,* ed. Peter Weingart and Niels C. Taubert (Weilerswist: Velbrück, 2006), 311–46; Peter Strohschneider, *Über Voraussetzungen und Konzeption der Exzellenzinitiative,* *Beiträge zur Hochschulforschung* 31 (2009): 8–25. Since the first excellence initiative was terminated from 2006 until 2011, the federal government and the states recently passed a new agreement to establish a similar initiative from 2012 until 2017, with an increased budget of €2.7 billion. The new initiative is
open for new proposals from the winners of the last initiative as well as for those of new candidates.
35. The "excellence initiative" does not, though, mitigate the significant reduction in financial support for German universities that has taken place over the last three decades and that has made an increasing proportion of German university research dependent on external funding. The proposals for all three categories in the competition are reviewed by commissions made up of international peers. The experts for the review commissions are selected by the DFG as the German organization most experienced in peer-review processes.


39. The "Bologna Process" is a politically enforced reform establishing a three-tier study program structure (Bachelor/ Master/ PhD) in all German universities, which requires several curricular reforms and time-consuming involvement in accreditation processes.


41. They are able to adapt via "inner emigration" because of their employment status as civil servants with tenure. No matter how badly they might perform and how many duties they might neglect, as civil servants they cannot be sanctioned by the university or be dismissed.

42. The first project concerned technology transfer offices at universities in the German state of North Rhine Westphalia. It was conducted by Georg Krücken between October 1997 and April 1999 with the support of the Department of Sociology at Bielefeld University. See Georg Krücken, "Mission Impossible? Institutional Barriers to the Diffusion of the "Third Academic Mission" at German Universities," International Journal of Technology Management 25 (2003): 18-33; and Georg Krücken, "Learning the 'New, New Thing': On the Role of Path Dependency in University Structures," Higher Education 42 (2003): 315-39. The second project, conducted by Georg Krücken, Frank Meier, and André Müller, was larger in scale, as it compared technology transfer discourses and practices at German and American universities. This project was funded from March 2003 until February 2006 by a grant from the DFG. For findings, see Georg Krücken et al., "Information, Cooperation, and the Blurring of Boundaries—Technology Transfer in German and American Discourses," Higher Education 53 (2007): 675-96.


45. Interestingly, one can find similar models in the American discourse. In contrast to Germany, where the three models followed one another in chronological order, the American picture was more strongly marked by overlapping models, to which, beginning with the R&D model, aspects of subsequent models were added in piecemeal fashion.

46. Bundesrechnungshof, Untersuchung über die wissenschaftliche Dokumentation in der Bundesrepublik Deutschland (Frankfurt: Bundesrechnungshof, 1962).

47. BMWi (Bundesministerium für Wirtschaft und Technology)/ BMBF (Bundesministerium für Bildung und Forschung), Innovationspolitik—Mehr Dynamik für zukunftsfähige Arbeitsplätze (Bonn: BMWi / BMBF, 2002).


50. Krücken, "Mission Impossible"; Michael Reinhard and Heinz Schmalholz, Technologie transfer in Deutschland: Stand und Reformbedarf (Berlin: Duncker & Humblot, 1996); Norbert Kluge and Christoph Oehler, "Hochschulen und Forschungstransfer,"


52. Before presenting our results, we would like to say a few words about the indicator. On the one hand, it is quite clear that the indicator only brings to light a very limited fraction of the actual collaborations taking place. On the other hand, coauthorship is a very strong indicator for collaboration. It points to a form of cooperation that goes beyond sporadic contacts but is characterized by a certain degree of depth and intensity. Moreover, the indicator measures collaborations that are not taking place somewhere in the periphery of academic work but are reflected in the central process of scientific communication: the process of publication.

53. Here one can see striking similarities to (in theory) and differences (in practice) from the Bayh-Dole Act that the U.S. Congress passed in 1980, which enabled universities to patent and to issue licenses for inventions developed with public funding. Although the Bayh-Dole Act was not directly modeled on that example, German policymakers saw it as a means of increasing universities’ patenting and licensing activities. The Bayh-Dole Act certainly has had a strong symbolic impact on the role that universities are supposed to play. But the effects on the actual rate of patents are not as strong as expected in the policy discourse. See David C. Mowery et al., Ivory Tower and Industrial Innovation. University-Industry Technology Transfer Before and After the Bayh-Dole Act (Stanford, Calif.: Stanford University Press, 2004).


55. Whitley, "Constructing Universities as Strategic Actors."

Redefining university-based knowledge as intellectual property—particularly since the U.S. Congress's passage of the Bayh-Dole Patent and Trademarks Act in 1980 and the increasing commercialization of higher education over the past ten to fifteen years—has led to criticism from intellectuals both inside and outside U.S. universities and beyond. The vigor of the academics' neoliberal onslaught on the university's public mission, if not always in deeds then at least in words, has tended to mask the universities' success in helping their governments' and policymakers' economic development around the world. Indeed, both the People's Republic of China and European countries have sent PhD students to U.S. research universities; the whole world seems to envy U.S. higher education. ¹ Over the past decade, the reason that the European Research Area and the European Higher Education Area were created was to compete against

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¹ I would like to thank Dr. Timothy J. Mead, former registrary of the University of Cambridge, and Mrs. Anne Lonsdale, deputy vice-chancellor of the University of Cambridge, for introducing me to the case presented in this chapter and for their informative comments on the matter.