Chapter 8
Governance of Universities and Scientific Innovation

Dietmar Braun

Introduction

A new scientific idea is born, a new method invented, a new technology discovered, a new empirical field scrutinized and bursting with theoretical expectations: all this is scientific innovation. The initial question in this chapter is: what happens to these kinds of innovations once they appear on the radar screen of science?

Any new scientific idea is worthless if it does not find followers. Science is no different from religion or politics in this respect. A new answer to an old question is an isolated event if one cannot convince other scientists of the value of this answer. In other words, scientific innovation is not only the discovery but also the diffusion of ideas among the scientific community. Only if a group of scientists, preferably many groups, adhere to the original idea and accept it as being novel and express their willingness to follow the lines of the new idea, does a new finding become visible and tested by researchers to corroborate or refute it. New ideas can also be ignored and fail to find support, not only from scientists but also from scientific institutions such as, for example, scientific editors, scientific associations, funding agencies or universities. New ideas will disappear, if they cannot be institutionalized in one way or other.

Institutionalization is the best way to stabilize new ideas, to give them continuity, to make them part of the daily scientific struggle for reputation. The institutionalization of scientific innovation is, however, not something that just happens or takes place. It needs not only convincing arguments to find followers but above all resources, and resources are scarce. If one accepts a "competition view" of scientific

D. Braun (✉)
Institut d'Etudes Politiques et Internationales, Université de Lausanne,
Géopolis – 4349, Lausanne, Switzerland
e-mail: Dietmar.Braun@unil.ch

C. Musselin and P.N. Teixeira (eds.), *Reforming Higher Education: Public Policy Design and Implementation*, Higher Education Dynamics 41, DOI 10.1007/978-94-007-7028-7_8,

development, one cannot expect that new ideas that need resources and often contest existing ideas, will be accepted with open arms by the scientific community. This tension between scientific advancement on the one hand and possible social and economic conflicts during the process of institutionalization on the other is the subject of this chapter.

Though there are various steps to be taken in the process of diffusion in order to arrive at a fully developed scientific field—the decision of individual scientists to engage and invest in a new field of science, the creation of research communities in order to gain a hold in the academic community, the acquisition of continuous research funds— this chapter will focus on the last stage of institutional anchorage of new ideas, i.e. the implantation of new ideas into universities.

Universities can be regarded as the center of disciplinary reproduction. They confer academic titles necessary for the pursuit of a scientific career; they deliver the infrastructure for disciplinary reproduction (e.g. the organization of conferences; the education of students and doctoral fellows who are future recruits to the scientific field; office space, laboratories); they put certain resources at the disposition of scientists that are needed for their academic careers (some research money; logistical help with funding applications, etc.); and most important of all, they give jobs to scientists that form the point of departure for academic creativity. This is why each new scientific field must, once a certain critical mass and intensity of communication is reached, settle down in universities. Only then, does continuous financing (above all in the form of salaries) of the new field become possible. Last but not least, universities have authority to set up the main institutional embodiment of disciplines, i.e. departments, as well as faculties. This is the strongest sign of recognition for a new scientific field. On the scale of specialties and subspecialties, they can also install other forms of institutionalization; for example, "schools" (for public health) or research centers and at the level of the "research community" they can support research groups.

New scientific fields can probably grow for a certain time outside universities, for example in research networks or in extra-university research institutes, but for consolidation they need recognition by universities expressed in the employment of scientists as professors. The title of professor not only guarantees resources for the foreseeable future but is also a symbol of the recognition of a scientific field by the academic community. This is possible because universities are, even today, still considered to be the representative of the academic community. The conferral of a professorial title in a university is equivalent to an "accolade" from the academic community.

Study of the institutional conditions of scientific innovation is not a new phenomenon in the sociology of science. There was extensive discussion in the 1960s and the 1970s on *scientific growth* (Collins 1983; Crane 1972; Hagstrom 1965; Mullins 1972) which treated various aspects of the diffusion of scientific fields. Most prominent is without doubt the work of Ben-David (1971, 1991), who looked from a historical perspective into the relationship between higher education systems and conditions of scientific growth. Since then, interest in the sociology of science has mostly been diverted to other areas. There have been, however, a number of

substantial contributions by authors who deal with scientific growth in terms of the development of academic disciplines in general. This literature is often closely linked to higher education studies (Akerlind 2005; Becher and Kogan 1992; Becher and Trowler 2001; Blume 1985; Clark 1983, 2008; Whitley 1974, 1977, 2000).

There are two reasons why it is worth asking these questions again today.

One is the obvious acceleration in the growth of knowledge (e.g. the growth in publications) and the concomitant tendency towards differentiation of knowledge fields, i.e. the increasing number of research communities, subspecialties, specialties and disciplines (Clark 1996). Bonaccorsi has recently pointed to both aspects in his observation of the "new and young sciences" (information sciences, materials sciences, life sciences) with high growth rates of production and an obvious tendency to "diversify," i.e. to create more and more subdivisions of existing knowledge fields (Bonaccorsi 2008, 2010). On the other hand, these new and proliferating tendencies to diversify demand institutional opportunities that, for example, universities built on the "Humboldtian model" may no longer be able to deliver (Bonaccorsi 2007: 309). Existing scientific institutions, especially universities, may fail to furnish a "locus," a "home," for these new scientific fields and thereby hamper "scientific innovation."

University governance regimes play an essential role in the link between university institutions and the spread of scientific fields, above all because governance determines competences and authority within universities and hence the dynamics of cognitive structure in universities. The existence of the hierarchical "chair system" in the Humboldt university, Bonaccorsi explains (2008), is an advantage if a scientific field converges but a disadvantage when it diverges. He does not explain the mechanisms but it is clear that hierarchy situated in chairs makes differentiation into various disciplines difficult whereas other types of internal governance might have a productive influence. As during the last 20 years most universities have experienced the reform of their constitutions and, hence, of their governance regimes (usually the implementation of new public management regimes), it would be interesting to see whether the introduction of such regimes contributes to a growing ability of science to spread scientific innovation by the institutionalization of new scientific fields.

The tension between universities as host institutions of scientific fields and the dynamics of scientific expansion are the subject of this chapter. Governance structures of universities influence this relationship and different governance structures do this in different ways. In this chapter, the new public management governance structure will be the focus of investigation and the research question is: *to what extent is scientific innovation fostered or constrained by the introduction of the new public management model in comparison with the older bureaucratic-oligarchic model*?

We will proceed in the following way. First, the concept of scientific innovation will be elaborated. Second, an attempt will be made to demonstrate the "logic of integration" inherent in the older bureaucratic-oligarchic model. Third, the new public management model and its effects on the governing of scientific diffusion in universities will be discussed.

Conceptualizing Scientific Innovation

In order to spread, a new scientific idea must gain hold in the scientific community and this usually means within the confines of a general discipline. Diffusion of scientific ideas is a continuing process of institutionalizing the original idea on an increasing scale of recognition within the academic community.

Steps of Institutionalization in the Diffusion of Scientific Ideas

One can imagine that the first level of institutional recognition is the status of a *research community* united by a common interest in a research theme, the use of a common method or technology or the application of a certain theoretical approach. Such a community could begin as small research groups and expand later on to form clusters and networks (Chubin 1976). Institutionalization at this stage means the acquisition of continuing funding resources, the conquering of "time slots" in conferences of the mother discipline, the creation of a scientific journal, the setting-up of a working group in the disciplinary association, etc.

The next step—although there is no consensus on how to subdivide the different institutional levels of scientific knowledge domains—would be the ascent to a *subspecialty* which can consist in the foundation of a scientific association (though this is not necessary), the organization of own conferences and, above all, the development of a first teaching canon indicating that a certain unity in the use of theories and methods has been achieved. This is also the time that universities might offer employment to scientists in the form of professorships, usually announced in the form of a discipline-bound professorship with particular emphasis on the subspecialty area. For instance, in the discipline of political science and the specialty of comparative political science, "area studies" would be such a subspecialty.

The next step towards institutionalization is the creation of a *specialty* or, better, the institutional recognition of a specialty. The new field is now considered as being an essential and acknowledged subarea of the mother discipline. Within disciplinary departments, specialties are the main components and they are embodied in the professorships in almost all universities. The teaching canon is now clearly standardized and a substantial number of students are following courses. A specialty has its own associations, has its own conferences and journals, and starts to be differentiated again into different subdomains or subspecialties. The status of a specialty guarantees long-term survival of the subarea.

Finally, *disciplines* are such a wide subject area that a differentiation into specialties is a necessity for presenting the discipline to a wider audience. A professorship of "political science" might occasionally exist today but certainly not without more detailed emphasis on the specialty that should be represented. For example, in political science this might be "comparative political science" or "international relations" though the latter has in the meantime almost reached the status of an own

discipline, visible in the creation of own departments. Departments are, as Evans (1995: 253–254) states, the "most concrete and permanent enactment" of a discipline. "This is where a discipline becomes an institutional subject."

Cognitive differentiation, which happens all the time in the scientific enterprise, is therefore a process that needs time, an increasing number of followers and institutionalization strategies of different orders.

In the "*competition view of science*",[1] institutionalization does not just take place. It does not just happen because it is essential for the development of science. There are a lot of investments to be made and a lot of obstacles to overcome. In order to estimate the kind of obstacles that might exist, we start from Bourdieu's vision of a scientific community (the "champs scientifique") which on different levels ("sciences" like natural, life, and social sciences; disciplines; specialties, and so forth) generates constant competition for recognition ("symbolic capital") and resources ("economic capital"). A "newcomer" cannot hope to find immediate praise among those who work in established "cognitive institutional units of science" such as research institutes, departments, faculties, etc. As Becher and Trowler contend, referring to Crane and Spiegel-Rösing (2001: 172): "Whatever their origins may be, emergent disciplines must face the competitive demands of those which are already established (…) If the newcomer is seen as a threat to established interests, or as a rival claimant for the available resources, its development is likely to be inhibited". Disciplines or specialties are "constantly developing strategies of status maintenance" (173).[2]

On the other hand, there is a widespread consensus among sociologists of science that cognitive differentiation is not only a natural feature of scientific development but also a functional must of scientific development. There are two reasons cited for this (Ruscio 1986). One is a cognitive one stressing that the constant search for new knowledge leads to an ever-stronger elaboration of different aspects

[1] A "competition view of science" is not considered to be a distinctive approach in the sociology of science. Rather, various authors who would not consider them as belonging to one school refer to similar dynamics of scientific production and reproduction, though the use of concepts and their interpretation may still differ. Bourdieu (1975, 2001), Whitley (2000, 2003, 2008), Ziman (2000), and authors arguing from the perspective of "economics of science" (Brock and Durlauf 1999; Kitcher 1995; Mirowski and Sent 2002) belong to this group as does the early work of Latour and Woolgar (1979) and Hagstrom (1965). Recently, Van Rijnsoever et al. (2008) pointed to similar views in the "resource-based view" in organizational sociology. Basic elements in this approach are presumably that science is considered to be a field of cognitive development and also a social field in which actors interact as if in a scientific market. Scientists are driven by curiosity but more importantly by social recognition (reputation) and material advancement of their status in the scientific community. Scientists have individual career interests. As in all markets, the producers of the scientific good are in competition with each other and the use of scientific power and authority in order to gain competitive advantage are important elements in this competition. The dynamics of science, including scientific innovation, are therefore profoundly influenced by competition and social conflicts in the scientific community.

[2] Or in the words of Bourdieu (1975: 28): "The dominant are committed to conservation strategies aimed at ensuring the perpetuation of the established scientific order to which their interests are linked."

of the complex world around us. The second reason refers again to the social world: cognitive fields are also domains of recognition for scientists, the base from which to search for the "scientific capital" scientists need in order to acquire positions within the scientific *champs*. New scientific fields often increase the chances of scientists acquiring such capital because competitive pressure is usually lower than in existing and older scientific fields.

So, although attempts at cognitive differentiation will invariably occur, any new field will have to confront the interests, authority, and power of the existing order of cognitive division. In order to estimate the chances of success of becoming part of this division, it is important to understand the level of conflict integration can cause. In order to do so we need a concept that can spell out such conflict levels.

There are many different ways to systematize the reduction of complexity by disciplinary differentiation and de-differentiation (Becher and Kogan 1992; Blume 1974; Clark 1995; Elzinga 1987; Metzger 1978; Spiegel-Rösing 1974). Adopting a "conflict view of science", one can distinguish four possible ways to institutionalize new cognitive fields in the scientific *champs*: multiplication of currencies; currency devaluation; currency competition; and currency dualism.

We use the term "*currency*" as a synonym for Bourdieu's "scientific capital" as a particular form of "symbolic capital." The term currency, however, indicates in addition that there is not one scientific capital but a number of different types of scientific capital, i.e. currencies that are valid in different cognitive fields of science. Scientists are therefore not striving for the same scientific capital but for a specific type.

Types of Cognitive Differentiation

Multiplication of Currencies

This is the main way in which science deals with complexity, i.e. by differentiation of the existing disciplinary field in two or more subfields or specialties or, on the level of specialties, by the creation of a new subspecialty. If the new specialty (or subspecialty) is cognitively sufficiently distinct from existing specialties, this process of differentiation comes down to the creation of a new "currency" which is distributed only within the new specialty whereas the currencies in existing specialties maintain their value. In other words, scientists within the existing specialty maintain their "exchange value" for the "products" they deliver. This kind of complexity reduction is called "*fission*" in the literature (Becher and Kogan 1992) or "*subject parturition*" (Metzger 1987) and usually does not lead to conflict among the "Haves," those working in existing and recognized scientific fields, and the "Have-Nots," those investing in a new cognitive field of science, as long as there is no condition of a zero-sum game when for example material resources shrink and redistribution has to take place.

Currency Devaluation

A second case is the rise of competing paradigms within an existing scientific field. This might happen through "*subject dispersion*" (Metzger 1987). For example, one might have a paradigm in one discipline that spreads over into other disciplines (or into other specialties). An obvious example would be rational choice theory, which was "invented" in economic sciences but has spread into most other social science fields. Another example is the rise of a new paradigm within a discipline or specialty on the base of the use of a different theory, method or technology contesting the "authority of interpretation" of existing theories, methods and technologies. In this case the existing currency remains valid but the exchange value of scientists adhering to older paradigms is questioned and might devaluate if the new paradigm gains ground. Such a development creates strong conflicts and comes down to the "scientific revolution" Kuhn has described (1968).

Competition of Currencies

A somewhat similar conflictive development can arise if two cognitive fields deal with the same subject area but on the basis of different paradigms or if "internally" generated paradigms are confronted with "external" paradigms, external here meaning cognitive fields that come into being through the "interaction between academia and the world that lies beyond its confines" (Becher and Trowler 2001: 171). Such paradigms are often a response to demands from stakeholders in other functional systems (Blume 1985; Elzinga 1987). In the literature on "Mode 2" (Gibbons et al. 1994) it is even contended that this type of differentiation is where most new scientific fields today find their origins.

Competition arises when the new "external" field attempts to create an own currency and become an immediate competitor to the existing scientific field dealing with the same subject area from an "internal" point of view. In this case, both currencies may claim validity and there is a clear competition for dominance both in terms of "status" within the academic community and in terms of "economic capital." There is therefore an imminent danger of devaluation of the existing "internalist" scientific domain once the new "externalist" field is installed. An example of this is the ongoing search of "public health" for academic recognition in health matters, a field in which the medical academic community tries to maintain its authority of interpretation.

Currency Dualism

The final type of differentiation is what is called in the literature the "*fusion*" of cognitive areas or the creation of *interdisciplinary* fields (Becher and Kogan 1992). In this case scientists are working in a new cognitive domain in which in

Table 8.1 Conflict dimensions

	Material resources not affected	Material resources endangered
Cognitive authority not affected	I (no conflicts)	II (resource conflicts)
Cognitive authority affected	III (cognitive conflicts)	IV (strong conflicts)

the beginning no currency exists. There is, of course, a strong interest in creating such a currency to validate the investments scientists have made. If this succeeds, it will be just another case of currency multiplication, meaning that a new and sufficiently distinguished area has come into being. Yet as long as there is no new currency, all scientists working within this field remain anchored within their old disciplines or specialties and depend on their exchange value for these currencies. This gives the existing two (or more) mother disciplines/specialties the possibility of "claiming" the new field and integrating it as a subordinate part. Currency dualism characterizes this process: within the new interdisciplinary field two (or more) kinds of currencies still hold their value as long as no new "third" currency is created. This can lead to jockeying for position by "mother disciplines," which try to get a grip on the new field.

The different types of cognitive differentiation have been built so far on the argument that conflict between "Haves" and "Have-Nots" arises whether the "scientific authority of interpretation" of the "Haves" is contested or not and whether this happens inside scientific disciplines or specialties (currency multiplication (not contested) and devaluation (contested)) or outside, either as fusion with other disciplines or specialties or in contact "with the outer world" (currency dualism and competition). Scientific authority of interpretation is pertinent for the social status of scientists and their scientific capital.

There is, however, a second conflict dimension which plays a role in the calculation of scientists and institutionally established cognitive units like departments considering the integration of new scientific fields in universities. This other dimension is the "material resources" or the "economic capital" scientists need to continue their "reputation cycle" (Latour and Woolgar 1979). Also, the cognitive units in which scientists are working inside universities depend on the constant generation of material resources for their reproduction. The arrival of "Have-Nots" can have different effects on the material possessions of the "Haves": it can mean additional resources, if the new scientific field manages to bring in money from outside (for example, with the help of funding agencies or stakeholders), but it can also mean resource competition, if the available money for a department does not rise commensurately with the integration of new disciplines. In this respect, "affluence" (more resources) and "scarcity" (stagnant resources) play a role in the individual and corporate evaluation of advantages and disadvantages of the integration of new scientific fields.

Expectations about the consequences of the integration of new fields for the social status and material resources of scientists and their cognitive units determine the way they will react to the rise of a new scientific field. Table 8.1

cross-tabulates these two conflict dimensions by, one, assuming that the material position of scientists and their cognitive units will either not be affected or that they will be affected if the new field is integrated; and, two, that social status can either be endangered or not by the integration.

The "Haves" can strategically react in different ways to deal with these types of cognitive differentiation.

First, they can accept the new field by granting the status of a subspecialty or specialty with equal rights, a strategy one could designate as "*peaceful co-existence.*" This is a likely strategy when the "Haves" expect "Sector I" as an outcome of integration, i.e. the sector with no major conflicts. We will often find this strategy when currency multiplication takes place and affluence is the resource condition.

The second strategy would be "*subordination.*" This seems likely when a conflict in cognitive authority appears (as in the case of currency devaluation or dualism). Subordination means integrating the new field into the department but granting it a lower social status than that of the "Haves." Different institutional strategies are possible here. Ben-David (1971) has explained how subordination took place in Germany at the end of the nineteenth century, when chair-holders claimed general authority over disciplinary developments within universities and specialties or subspecialties could only find a place in the research laboratory of the professor without obtaining the status of a professor. A second institutional strategy was to demote scientists with a "habilitation" to *Privatdozenten* who had no paid position in the faculty and, hence, no claim on material resources. Again, the title of professor was lacking. Often, these *Privatdozenten* were harbingers of new scientific fields, so the refusal to grant the title of professor and the positioning of scientists in research centers that depended on a chair were opportunities to exercise subordination of new scientific fields.

Contesting paradigms (currency devaluation) could however also face "*exclusion*," a strategy the "Haves" might try to use when they are seriously challenged by a loss in both social status and material resources. If a contesting paradigm means at the same time a loss in material resources because subordination is not possible or too costly, then exclusion is the most reasonable strategy for maintaining the dominance of the "Haves." Exclusion means keeping the new scientific field outside the faculty or even the university and offering it no institutional position. This could also be a strategy to avoid "currency competition" from outside.

Yet another different strategy to combat currency competition or devaluation could be "*marginalization*," meaning that new scientific fields are accepted within the faculty or department but, in order to avoid material losses or competition, they receive an inferior organizational status with, for example, few resources and a diminished guarantee of organizational survival, etc.

These considerations demonstrate that there are different individual and institutional strategies for the integration of new scientific fields and the perception of "threat" by the "Haves" is an essential element in determining which one of these solutions will be chosen (see Table 8.2).

Table 8.2 Likely strategies in cognitive differentiation

	Material resources not affected	Material resources endangered
Cognitive authority not affected	I (no conflicts) Peaceful co-existence	II (resource conflicts) Marginalization
Cognitive authority affected	III (cognitive conflicts) Subordination	IV (strong conflicts) Exclusion

University Governance and Cognitive Structures

Universities, it is argued, are the main place for disciplinary reproduction. It is within their confines that scientists develop institutional strategies of acceptance or rejection of new scientific fields. The conditions, however, vary—and this is our hypothesis for the remainder of the chapter—according to the *governance structures* of universities.

Governance is a very broad notion indicating how rights and obligations are distributed, how the different parts of universities interact, and also how relations with other universities as well as stakeholders are organized. Governance structures determine therefore "who gets what, when, and how" in universities and determines to a certain extent the strategies which individual and corporate actors inside universities have at their disposal.

The main aim of the following argument is to explain whether the change from one governance model (that is, the "bureaucratic-oligarchic model"; Braun and Merrien 1999a, b) to another ("new public management") affects the cognitive dynamics within universities and, if so, how.[3] The bureaucratic-oligarchic model (Clark speaks of the "academic oligarchy" in his well-known triangle of university types) has been dominant in most European countries since the nineteenth century, France and the United Kingdom being notable exceptions. The new public management model, with all its variations, has started to substitute for this model since the 1990s (see Paradeise et al. 2009). Each model follows a different governance logic. We will first discuss the relationship of the bureaucratic-oligarchic model (BOM) and scientific innovation and then the likely implications of the new public management model (NPMM).

The description we offer is ideal-typical. It accentuates those elements that seem to be the most distinguishing traits vis-à-vis other types.

The Bureaucratic-Oligarchic Model

In order to describe the relationship between governance structures of BOM and scientific innovation we will refer to a number of variables that we consider as important

[3] The bureaucratic-oligarchic model is one model of many, though it is probably the best diffused in Europe. France and the UK differed from this model (Ben-David 1971) as did the East European countries. We will only focus here on the transition from the bureaucratic-oligarchic to the new public management model, as space and time in this chapter are restricted.

for the working of governance models[4]: the mode of coordination in the university systems; the ideational frame of reference of universities; the role of the management/administrative layer; the significance of "university capital"; the organization of the "activity structure"; the interaction or games played between scientists.

Mode of Coordination in University Systems

It was Ben-David who pointed to the importance of modes of coordination in university systems. He found that there is a beneficial role of decentralized and competitive modes of coordination with regard to scientific innovation (Ben-David 1971). Ben-David's argument was that universities will be more willing to adapt their structures and learn from "best practices" if they are in a competitive fight for recognition in the academic community and for material resources among stakeholders and if there is no centralized state organization that has an interest in steering the university system. Decentralization in the form of federalism or in the form of an important private university sector helps to develop competition among universities. The USA is the main example in this respect.

Competitive systems create an entrepreneurial spirit in universities and force them to develop a tighter coupling of the cognitive units and individual scientists than is the case in universities that work like "organised anarchies" (Cohen et al. 1972) which is the case with the BOM. There is a strong functional pressure to develop a capacity of flexible reorganization of internal structures able to adapt to external challenges. This has negative effects on the capacity of scientists to veto structural change within the organization.

Universities in the BOM by contrast are usually state-subsidized and lack the competition of private universities. They are not equipped with steering capacities to adapt the organization on their own account because important "power means" remain in the hands of state governments. The pressure to adapt must come from the political side (hierarchy as mode of coordination). As a result the capacity for change is generally low.

Ideational Frame of Reference

The general "ideational" orientation of universities is a corollary to the structure mentioned above. Braun and Merrien demonstrated with reference to Ben-David that university systems are subject to different ideational "frames of reference" that are deeply anchored within politics and society. Although the "market systems" still honor the "service orientation" of universities, the BOM propagates a "cultural vision" of science (Ben-David 1991; Braun and Merrien 1999a). What does this actually mean?

[4]Such variables have been subject to frequent discussion in the rich literature on university and governance types (see Braun and Merrien 1999a; Clark 1983; De Boer et al. 2007; Vught 1989; Whitley 2008).

Ben-David demonstrates for example how German universities in the nineteenth century acquired "academic freedom" in exchange for not meddling in societal affairs, which led to an even stronger encapsulation of those universities with a strong emphasis on the value of theory and scientific progress detached from societal influences (Ben-David 1971). This orientation of universities was accompanied by the support of the uprising bourgeoisie, which saw higher education as the main instrument for enlightenment, a means of liberation of the individual. These factors contributed to the stylization of science as a "cultural value". Other European countries followed this orientation.

Institutional encapsulation and detachment are therefore typical characteristics of such an ideational orientation. They create conditions of academic enclosure and conservatism and prevent easy integration of new elements like new scientific fields.

These tendencies made universities and university development part of the internal dynamics of the scientific *champs* that were played out within universities. The opening up of new scientific fields depended on the willingness of the "Haves" to accept them and this again depended on the "types of cognitive differentiation" sketched above.

The Management Layer

In the BOM, the role of the administrative or management layer in universities is typically weak as procedural autonomy is very small. The state has a marked influence on procedural development through the distribution and control of financial flows. To these are often added "substantial rights" of the state like the nomination of personnel including professors and decisions on the organizational structure and infrastructure of universities. Only the contents of teaching and research are free (usually) from state interference. The effects on the internal organization in the BOM are such that, given that the management layer as an intermediary level lacks power and competence, "self-organization" of the academic community in universities and internal dynamics can take place. The power of policy-makers to reorganize university structures in this context is usually limited: it exists in the approbation of propositions coming out of universities and not as a proactive right to change universities on its own account. Again, this favors organizational dynamics in universities based on the competitive "logic of academia" sketched above. The most likely type of scientific innovation under such conditions seems to be "currency multiplication" as it avoids conflicts with the "Haves" within universities.

University Capital

University capital is the symbolic recognition conferred by the university for various performances by scientists and their departments (teaching; research productivity; stakeholder contracts; communication with the public; participation in decision-making bodies of the university). Which of the performance indicators matters and

in what order of priority depends on the historical context and the type of university. University capital is of interest to scientists for two reasons: one is that it could allow access to important administrative positions within the university[5] and, second, it could entitle them to obtain in exchange for this recognition a certain amount of economic capital from the university.

University capital is of small interest to scientists in the BOM and can therefore not be used in any strategic way by the management layer for two reasons: university management does not have sufficient economic means to confer economic capital to scientists independently. Spending is constrained by rules, regulations and approval by the state, and if there is little economic capital participation in decision-making boards is less attractive though there may still be some room for maneuver in terms of the nomination of professors and the agenda-setting of structural questions. University capital is, one can contend, a form of capital little sought in contrast to other forms of capital like scientific capital or economic capital granted by funding agencies. The important point in the context of this chapter concerning university capital is that it cannot be used as a steering resource in the BOM or, in other words, as an incentive for scientists. This diminishes the possibilities of the management intervening in the "self-government" of academics in universities.

The "Activity Level"

The activity level refers to the organization of those who perform in the university. An activity structure means those structures in universities that organize the main functional activities like teaching and research. The institutional division into faculties, departments or institutes, for example, is part of the activity structure, as is the existence of teaching boards or committees. The interaction between scientists, structured by these institutions, is another part of the activity level.

A main difference between the European BOM and the American market model, highlighted in the literature, is the organization by "chairs" in the BOM and by departments in the market model. We will only discuss the former here.

The typical organization of scientific fields in the chair system is a strongly hierarchical and centralized one. It is the "full professor" who is responsible for a wider cognitive area of knowledge, usually a discipline, whereas specialties and subspecialties have to be put, as mentioned above, into a subordinate position in relation to this chair or be excluded altogether from positions at the faculty. The chair system confers substantial powers on the "Haves," who can almost monopolize large cognitive fields and determine the entry conditions for "newcomers."

[5] In fact, Bourdieu uses the notion of "capital universitaire" in exactly this sense of having administrative power in the various decision-making boards within universities (Bourdieu 2001). Participation in such boards is itself a kind of capital that can be used to advance own interests (by distributing money, employing people, etc.). We prefer to speak of administrative capital if it concerns the capital based on participation in decision-making boards and reserve the notion of university capital for the symbolic recognition of the university in a more general sense.

This alone suggests a conservative bias: in the chair system cognitive differentiation, which raises conflicts with the social and economic status of the "Haves," stands no chance of being accepted.

The chair system, however, has another conservative effect which Schimank described after looking at German universities in the 1990s (Schimank 1994). This effect, in fact an interaction effect, is based on the large degree of "academic freedom" the chair system grants to professors and their almost independent position within the department and the faculty. This means that conflicts in the department or the faculty affect actors who have completely equal rights and degrees of freedom. Hierarchy as a principle is of course excluded as a resource in the self-organization of the university. The only actor who can use this mode of coordination is the state itself which can, for example, contest the nomination of professors.

Academic freedom and independence of professors lend themselves to a game of "*standstill*." What are the attributes of such a game?

Schimank discussed the case of resource distribution in university departments and faculties. The point of departure of the game that unfolds in BOM is that professors as actors all have equal power resources and rights. In order to gain resource advantages by redistribution, a professor would need the support of a majority of other professors in the department and/or in the faculty as decisions in the self-organization of BOM are based on majority decisions.

Schimank demonstrates that finding majorities is extremely difficult under the conditions sketched so far:

- Redistribution is unlikely because scientists act risk-averse: they must think about the consequences of their action and what this might mean in the future. As redistribution results in winners and losers, it can be expected that those who bear the costs of the redistribution will, given another feature of BOM, i.e. the low outward mobility of professors and, hence, the relative certainty that one will confront colleague professors for a long time in the same department, seek to retaliate in the future. Also as they are losing, they will use all available means to avoid loss in the present. Resistance will be strong.
- At the same time the professor who has taken the initiative cannot be at all sure that, even if he or she succeeded in building a majority coalition among colleagues, this majority coalition would hold in the future. Academic coalitions are typically ad hoc and therefore unstable. In addition, it needs considerable transaction costs to organize such coalitions.
- Though deans might have some powers in this game, though they will be limited, it is unlikely that they will use them as deans, too, must avoid becoming the object of retaliation in the future. Their tenure is time-limited and within the rank-and-file they might suffer the consequences of their decisions. Rather, deans will, especially if they aspire to a renewal of their tenure, prefer a policy of "blame avoidance" that makes it unlikely that redistribution is taking place.

With these structural characteristics (all actors have comparable power positions and relative independence; the lack of hierarchical authority and the absence of incentive systems; the low mobility of actors petrifying established actor relations

for a long time and leading to a weak discounting of the future) the most prudent strategy is indeed to avoid confrontation and accept the status quo. No overriding general objectives of universities exist that could change the logic of this game. The result is "*informal negative coordination*," an implicit contract to avoid the negative consequences of own action, which leads to extreme difficulties in redistributing resources and, hence, in changing the institutional cognitive structure. Inclusion of new fields under these circumstances can only take place if inclusion is "Pareto-optimal," i.e. has no negative consequences for any professor in the department or faculty. These conditions in our typology of "currencies" are once again only fulfilled in the case of "currency multiplication" under conditions of affluence. In all other cases the "non-aggression pact" would be the outcome of the game and hence new scientific fields could not be included.

In sum, BOM demonstrates governance features that structure opportunities for scientific innovation in a very constrained way: it constitutes currency multiplication, which can find acceptance within universities as the cognitive and social status of the "Haves" is not jeopardized. Yet this only holds if the inclusion of new scientific fields does not generate resource conflict. Only then will we have "peaceful co-existence." In the case of resource conflicts, for example, because universities are confronted with severe austerity measures, the situation changes and even currency multiplication can be denied or at least result in marginalization strategies to avoid any material conflicts.

Did new public management change opportunity structures?

Governance in the "New Public Management Model"

The main question in this part is whether the reforms of governance that have taken place in most countries and particularly in Europe have changed the institutional conditions and "games" that are played within universities in such a way that the capacities of universities to respond to the increasing "diversity" of science have improved. We will discuss the changes in two parts: the first part discusses the structural changes in the governance mode that have taken place and assesses their possible effects on scientific innovation. The second part looks into the kind of games that unfold under the New Public Management Model (NPMM).

Structural Changes

Our analysis discusses the NPMM in ideal-typical terms, i.e. we do not refer to one particular subtype or variation in the numerous ways that NPMM can be institutionalized (Agasisti and Catalono 2006; Amaral et al. 2003; Deem et al. 2007; Dewatripont et al. 2002; Paradeise et al. 2009). There are for example different ways to organize the authority structures, i.e. the competences of university direction, political stakeholders, university boards and academic representation boards.

Departments might have a global budget of their own or get their budget from the faculty. Deans might be chosen from within the academic university community or come from another faculty or even from outside the university. They could be nominated by the leadership in the university or be elected, etc. These are all possible variations, and there are others, that change aspects within the general framework of NPMM without touching on the main characteristics like the delegation of operational management from political actors to the university, the strengthening of the role of leadership within the university, the transfer of global budgets to universities and the conclusion of "contracts" which are built on strategic discussions between policy-makers and the university and, often, also stakeholders, as well as the creation of a more competitive environment and performance-oriented payment. When we discuss the relationship of NPMM and scientific innovation we often push conjectures to the extreme, i.e. an ideal-typical case which gives leadership vast powers within the university, a competitive environment is at work, departments have their own budgets etc., though often the university will have experienced more moderate changes in different structural variables. The rationale of this procedure is to demonstrate the logic of development of the NPMM in contrast to the bureaucratic-oligarchic model. This is what the university should look like if the new public management model were at liberty to realize its ideas.

Mode of Coordination

Universities in NPMM have experienced a transition from an almost competition-free environment to a more competitive environment created by the introduction of stronger performance-based funding by the state and concomitant processes of evaluation and accreditation that reveal individual performance by universities (for a good summary of this transition see Larsen 2003). Though "intensity" of the political pressure varies between countries in this respect, almost no universities can escape the need to develop strategies to improve self-image and performance in comparison with other universities in the system and even on the international scale. The changes force universities to strengthen corporate identity and create a competitive profile with a strong impetus to become a "corporate actor" (Coleman 1986) in their own right. As a corollary, this leads to the need for a stronger management layer.

Ideational Frame of Reference

The ideational frame of reference is changing. Next to "academic freedom" as the main and only orientation of universities in the bureaucratic-oligarchic model and "services to society" as the main orientation in market systems, is "*efficiency*" as an additional and often predominant criterion (Christensen and Laegreid 2001).

The organizational philosophy that lies behind this frame of reference has the same effect as the competitive environment: it pushes universities to consider and assess their organizational performance in terms of effort and cost-effectiveness. This strengthens their transition to being a corporate actor and abandons the loosely-coupled form of internal coordination valid in "organised anarchies" (Cohen et al. 1972). Efficiency can only be achieved if certain changes take place within universities: strategies must become an integral part of organizational action; the powers of "leadership" within the institution must be strengthened (Taylor et al. 2008); the basic institutional units of universities need to be bound by these strategies, meaning that they comply with overall objectives and make them an integral part of their own logic of action (Felt 2004). They become more tightly coupled.

The Management Layer

Competition and efficiency as an additional and dominant frame of reference allegedly push for the transformation of governance relationships. The former governance dyad—the academic faculty on the one hand and the state on the other—now gives way to a governance triad because of the strengthening of the intermediary administrative level with broader resources to steer and guide the university. How exactly the relations within the triad are settled depends on the country. As noted earlier, there is a lot of governance variety here but whatever the exact distribution of authority, the management layer and the university leadership respectively have an important part to play as it is the task of this layer to present the university as a corporate actor and to negotiate strategies and structures with policy-makers. The obvious difference of the NPMM from the market model is that the NPMM is built on a triad including the state whereas the market model is very often, and this also applies to public universities, a dyad built on private stakeholders and the university management layer.

University Capital

Decentralized global budgets for universities and the power to develop and implement strategies now render "university capital" a more attractive type of capital for scientists. In the BOM, with centralized politically administrated budgets and lack of procedural freedom, the university itself had little room for maneuver to distribute its own resources. With decentralized budgets and procedural freedom this changed and it has become worthwhile for scientists to obtain such capital in order for example to obtain institutional resources for teaching and research or increasing their own standing and position in the resource struggle within departments and faculties. University capital, on the other hand, can now be used by the university leadership as an incentive system to influence scientists' decisions.

The "Activity Level"

At the activity level various changes take place.

(a) First of all, as in the market model, the status of a scientist in the university becomes more dependent on continuous scientific accomplishments and less on career positions as in the BOM. In the latter model the performance of scientists is measured each time a new career step is taken until full professorship is reached. Any evaluation of performance from this step onwards is unusual, at least within the same university. In the market model evaluation of performance continues after tenure and competitive pressure among scientists is upheld. The NPMM introduces a similar competitive orientation, as the measurement of performances of professors becomes more frequent and transparent, facilitating comparison of scientists' performance. This seldom leads to strong negative sanctions such as loss of the job but strong competitive performance becomes a prerequisite for the acquisition of university capital and therefore for the individual material advantages of scientists. It has an effect on the relative position of the power of scientists within the faculty and departments. Whereas professors were formerly equal, their individual weight or influence could now differ according to the value of university capital, thereby contributing to new "games".

(b) At the same time, it seems that the corporate identity of the academic university community, which manifested itself in the "self-government" of universities, is drawing to an end. The increasing differentiation of the academic workforce (Musselin 2007, 2008; Slaughter and Leslie 1997; Slaughter and Rhoades 2004) destroys the "common interests" of the academic community vis-à-vis university leadership and stakeholders. The more flexible work contracts, the possibility of performance-based payment schemes, the tendency to grant younger scientists early positions of independence within the academic corps (e.g. by the introduction of tenure track positions), and the proliferation of unstable positions within universities all contribute to a fragmentation of interests of scientists as a "labor force," also reducing their powers of veto within the university (Tapper and Salter 1995). This gives the "executive leadership" a stronger weight in decisions, even on the faculty and department level, and hence introduces a more strategic-based reasoning in decisions on the institutional structuring of the cognitive space in universities.

(c) The more flexible ways of employment become resources of the leadership, which employs new scientists more and more in accordance with general university development strategies. This can create opportunities for young scientists and new scientific fields to become more quickly incorporated into universities if the leadership has priorities in such areas. The dominance of the chair and its hierarchical position in the cognitive domain increasingly gives way to a more flexible and changing academic workforce in universities. Again, this increases the flexibility in the creation of professorships and hence the opportunity to give new scientific fields a chance.

(d) On the institutional level we find a similar differentiation: strategies of universities to distinguish themselves from other universities in a more competitive environment as well as the rise of university capital lead to the buildup of more research centers and research groups, of, as Burton Clark indicated in his analysis of European entrepreneurial universities (Clark 1998), "semi-peripheral" and "peripheral institutions" more directly linked to the wider public and stakeholders. Together with the increasing number of resources stemming from third-party funding, this leads to a fragmentation of the former relatively coherent organization of the cognitive "space" in universities and offers opportunities for new scientific fields to gain ground in universities through this indirect method of inclusion. The rise of semi-peripheral and peripheral institutions contributes moreover to an opening up of universities to the "applied context," thereby increasing the possibility of "currency competition" and "currency co-existence."
(e) Decentralized budgeting, though there is still wide variety among the NPM universities in different countries, can lead to the strengthening of departments as relatively independent units of universities, thereby weakening the faculty's position as the main arena of deliberation. Departments become "own enterprises" with stronger "corporate identities" of their own, in addition to their distinctive cognitive identity vis-à-vis other departments. This strengthens the affiliation of individual scientists to departments as well as the importance of departments in the university capital distribution game. Again, this helps to strengthen strategic orientation, this time on the department level. Individual scientists are now obliged not only to defend their own interests in the struggle for dominance but also the "common interest" embodied in the fate of the department. Games become more "mixed-motive games" than before and positive coordination instead of negative coordination becomes a realistic option.

Games and Dynamics in Universities Under the NPMM

We will highlight games and dynamics on two analytical levels: first, the level of individual scientists in the same department who have to decide whether they will give their consent to the integration of a new scientific field in their department; second, the level of decision-making bodies in the university, including the leadership, faculty, departments and deans.

One can assume that on the basis of the structural changes sketched above four components in the struggle for the cognitive composition of universities change with NPMM:

The "*size*" of the department or faculty becomes a relevant element in the preference formation of individual actors. As the university changes to a more competitive environment itself and university capital turns into a relevant form of capital for both individual scientists and organizational units, size, i.e. the number of scientists, above all professors, is a relevant variable for the determination of relative power in

the university. The larger the size of a department, the more votes in decision-making bodies it has and the more claims for resources it can legitimately express. Size is, however, not only a blessing but must be weighted against the additional costs that are incurred with the integration of new fields. As long as the sum of costs and benefits is positive, there is an incentive for inclusion.

The possession or gaining of material resources becomes more important than before. This can not only lead to a higher intensity of conflicts between scientists and between cognitive units but also draws attention to the material contribution a new field can bring in.

Material gains also positively influence the readiness to accept semi-peripheral and peripheral institutions, thereby opening new paths of inclusion even in the case of currency competition, though this might still occur under strategies of marginalization and subordination;

Finally, the role of leadership influences the outcomes of games on the faculty and department level.

If we take this as a starting-point for understanding the stakes in competitions for the cognitive composition of universities one can conjecture the following about individual games:

Individual Games

What matters to scientists, as stipulated above, is cognitive authority which grants social status and material rewards or, in other words, economic capital. Now imagine Professor X, who is more concerned by the integration of a new field because it is cognitively proximate to his or her own field. Next to him or her are all other professors who are less concerned because their specialty is sufficiently distant to the new field. What game will be played?

Currency Multiplication

NPMM does not change the relative openness of professors towards inclusion of new scientific fields in the case of currency multiplication where the new field is sufficiently distinct in cognitive terms so that even Professor X will not be concerned about his or her authority of interpretation. What changes, however, is the rationale for the selection of new fields. Although recognition by the scientific community has been the main driving factor for the inclusion of new scientific fields in the case of BOM, it now becomes important what the new field might "bring in" in terms of material resources and in terms of reputation and social status for the department. A renowned scholar working in a new field will be more welcome than a young scientist, brilliant but not yet famous enough to add to the scientific status of the department, and a scholar who brings in a new field with additional resources from third-party funding not only circumvents possible redistribution problems but

might even add to department resources by overhead etc. Though pressure from the wider academic community for the integration of new fields will still count, material resources give an advantage to new fields in terms of becoming incorporated.

Currency multiplication finds no obstacles only in times of affluence, though. If integration, by contrast, means immediate or future loss of resources for professors, and if this concerns a majority of professors in the department, the chances to become integrated decrease considerably.

Currency Devaluation

The game is a different one if currency devaluation is at stake. In this case the authority of Professor X is contested. His or her position will be ambivalent. On the one hand, he or she knows that monopolization strategies will be the best strategy to avoid future loss in scientific recognition and he or she might try to convince colleagues either to exclude or subordinate the new field (e.g. by not granting a professorship). On the other hand he or she should now be concerned about the size effects of the decision as the employment of a new professor can add to the status of the department and, hence, to future university capital of the department with positive side-effects for members of the department. If the new field can be subordinated, Professor X might in this case opt for inclusion, balancing the advantages of inclusion against the possible threat to his or her own status. Subordination is a strategy that diminishes the risks in this case. If the professor is risk-averse he or she will, however, opt for monopolization and discard the size effects. In this case exclusion might be the best strategy.

This is different for the other professors, who are not directly challenged by currency competition. They are above all sensible to size effects. They would welcome the addition of a new scientific field in the department as long as this means no resource competition (condition of scarcity). Therefore, under conditions of affluence, currency devaluation can take place because Professor X will find no majorities to exclude the new scientific field. If, however, there is a lack of resources and imminent threat of redistribution and loss of resources, the other professors will join Professor X as they are now negatively affected by the new field.

Currency Competition

In the case of currency competition all professors feel cognitively threatened and monopolization strategies leading to exclusion or marginalization will be the answer, as in the case of the BOM. As indicated, however, material aspects are now starting to matter more under the new regime. Either as a consequence of a period of scarcity or because they are linked to general university strategies promoting stronger links with stakeholders, the inclusion of new fields that bring in additional resources (research institutes that have direct contacts with stakeholders or which are able to generate funding resources from funding agencies) becomes more

appealing. It will not change the fact, though, that monopolization remains the first priority of the "Haves" and that subordination (not granting professorships) and institutional marginalization (in the department) will be the dominant strategies. This is why Clark (1996) speaks of semi-peripheries and peripheries: semi-peripheral and peripheral institutions are associated with departments and faculties but they do not have the same status as the existing institutionalized fields.

Currency Dualism

Finally, with regard to currency dualism, we might find relative cognitive indifference concerning the development of interdisciplinary fields as long as no new currency is unfolding. With regard to material aspects, however, professors and departments will try to maintain a grip on the resources (manpower, research money) linked to the development of the new field and integrate the field into their own cognitive domain (size effect). Subordination strategies remain again the most likely strategies. The game changes, however, if the leadership interferes and expresses an interest in the promotion of such interdisciplinary fields. This brings us to the level of decision-making bodies.

The Corporate Level of Decision-Making

Inclusion of Leadership in the Game

The most obvious change in the governance structure is the differentiation of a more powerful and professional intermediary bureaucratic or professional layer within the university. Whatever the precise distribution of powers between university councils, university leadership, senates, faculties and departments, the priorities of the leadership will play a role in the structuring of universities including the cognitive composition of faculties and consequently nomination procedures. In the logic of the leadership, other organizational "rationales" enter into the faculty or department game (Felt 2004).[6]

These rationales can interfere with the interests of social status and material resources of scientists and departments. They will certainly not always become the dominant objectives in strategic decisions but, as the "shadow of hierarchy" is now looming in all discussions of university decision-making bodies, they are at least always present in the discussion and cannot therefore be ignored. Several of them can also have positive effects on the integration of new scientific fields: e.g. a policy

[6]Organizational goals may be the answer to "societal demands" as expressed by the potential number of students in a cognitive domain: to invest in "creative research" with possible breakthroughs in scientific knowledge; to develop the potential of younger scientists ; to establish links with stakeholders; to develop and support regional development; to support promising areas of research, etc..

to foster younger scientists, the support of promising areas of research or the concern for better links with stakeholders and hence overcoming conservative tendencies in the faculty.

Implications on the Departmental Level

The prevalence of the leadership logic is more likely the more autonomous departments become with their own lump-sum budgets and accountabilities. This is certainly still rather the exception than the rule in the world of NPMM but if it is the case it strengthens the power of leadership rationales within the university. The department must now pay more attention to its position within the university, to university capital and, in order to acquire such a capital, must be concerned with the acquisition of social status by means of academic reputation and economic capital. Both can raise the status of the department in the faculty. The integration of fields that seem to "pay off" in the future in this respect becomes more attractive and the buildup of semi-peripheral and peripheral institutions can become pertinent in this respect.

The department becomes a different organizational unit compared with the BOM. The more it receives responsibility to handle its own affairs, the more a "corporate logic" is installed within the department linked to the mentioned social status and acquisition of economic capital as a collective attribute of the department and not of the individual scientist. This is the reason why "size" may be a more important argument than the preoccupation of an individual scientist with his or her own social status, jeopardized by the inclusion of a new scientific field. The department creates a collective logic that no longer allows "standstill policies" in favor of individual interests. The impetus of the collective interests of survival of the department usually overcomes individual concerns. New scientific fields can still be rejected if the costs of inclusion are higher than the benefits for the department. It is therefore the cost-benefit calculus of the department and not of individual scientists that matters.

Side-Effects on Strategies of Scientists

There are other implications of the shift to NPMM.

The first one is that there are now new venues open for scientists in new scientific fields to be incorporated into departments, namely by lobbying on the level of university leadership. With NPMM it becomes attractive for the leadership to demonstrate the competitive strength of the university by raising its social status among the scientific community and by increasing its economic capital. A scientist in a new scientific field with a high reputation stemming from his or her previous research or equipped with substantial resources by funding agencies (e.g. a center grant) or by stakeholders (e.g. an endowment chair or a chair financed by industry) will attract interest among leaders. They can then use their influence to convince the department

of the advantages of the inclusion of the new scientific field. As said, the interests of the department in terms of social status and economic capital are now in many ways equivalent to the university so that it will not be too difficult to convince the department, provided that the majority of scientists within the department do not feel threatened by the new area or costs outweigh benefits.

The second implication is linked to the increasing differentiation within the academic workforce. Differentiation means a continuing fragmentation of interests, sometimes linked to the different means of power the scientists hold within departments or in semi-peripheries and peripheries of the department. Scientists endowed for example with a major interdisciplinary research center will probably have an interest in the inclusion of a new scientific field investigated by a highly-rated scientist and often have the means either to finance, at least temporarily, the inclusion of this field or seek arrangements with department heads, deans or university leaders to incorporate it. Scientists in close contact with industry could have their cooperative research lab with industry as a semi-peripheral institution and get sufficient resources to include new scientific areas within their own confines, lobbying in the same way for full inclusion later on among departments, faculty and university leaders. In short, there are more and more ways, because of the variety of means to acquire economic capital and the immanent interest of cognitive units in universities to acquire such capital, to confront the "academic university community" with the inclusion of new scientific fields that would probably have had no chance in the BOM era.

The Role of the Dean

Finally, it might be of interest to discuss the role of the dean as one of the key positions in the governance structure of universities. The dean has to represent the faculty, i.e. the collective interest of a group of disciplines or "sciences" (natural, life, social). Under the NPMM he or she will usually be more strongly attached to the intermediary administrative level than has been the case under BOM.

Under BOM, Schimank contends, no-one wants a strong dean. Everyone is satisfied with "standstill" policies and a strong dean would undermine the "non-aggression pacts" of professors. Under NPMM, however, interest in the power position of the dean changes. Even if the faculty elects the dean, it is in the interest of this body, and of the individual departments as parts of the faculty, to employ a stronger personality able to defend his or her own interests in an increasingly competitive and hostile environment. This would mean endowing the dean with stronger powers that can to some extent override individual departmental interests. His or her interests would be similar to those of university leaders and heads of departments. They are all alike in attempting to strengthen their "cognitive unit" within the university, albeit on different aggregation levels. If decisions must be taken, the dean will decide in terms of the "profit" of a decision for the whole faculty. This means, if resources have to be redistributed, that such resources will be spent on those

scientific fields that are the most promising in terms of returns (reputation among the leadership; amount of resources; output in terms of scientific productivity or teaching, or links to industry, depending on the type of university). If a new field "pays out" in these terms then the dean will not hesitate to decide in favor of such a field – as long as, and here the logic is the same as that of the department, there is not a majority of departments that feel threatened by the inclusion of the new field in terms of social or economic status. It is still questionable whether the dean does indeed have the means of power to realize the "logic of leadership" as Deem et al. (2007) note but if he or she has, the decision will be in favor of the principle of "most return" of a new scientific field.

In sum, it does not matter on which aggregate level one stands in the university; consideration of costs and benefits (social and economic) determine decisions instead of individual interests of scientists or the "academic university community." The "stop sign" is there where a majority of interests of constituent units of the cognitive unit is negatively affected by the decision, and as long as the new scientific fields are seen as currency competition strategies of subordination or marginalization will remain dominant within the decision-making unit. These strategies can be compatible with the general interests of the decision-making unit but if, for example, the attribution of an academic title contributes visibly to the status of the unit, such strategies might be contested.

Conclusions

The new public management governance regime radically changes the "games" that are played by actors in universities in comparison with the former bureaucratic-oligarchic model. Whereas in the latter regime academic self-government and lack of procedural autonomy of universities contribute to a game of informal negative coordination, which leaves room for cognitive differentiation only in the case of currency multiplication in times of affluence, NPMM tightens the coupling between the diverse cognitive units within the university and makes its strategic priorities a strong factor in the discussions on cognitive structuring of universities. The development of a corporate identity and the presence of stronger university leadership as well as the greater independence of departments make positive coordination an imperative in the games that are played. This leads to a weakening of individual veto powers and strategies in departments in favor of the pursuit of common objectives of departments. These developments have effects on the opportunities of new scientific fields to be incorporated in universities. First, though currency multiplication remains the most feasible option, a selection process on the basis of "relative material value" of new scientific fields may set in. Second, cognitive differentiation by currency devaluation now has a better chance to become accepted as long as there is no resource competition. Third, currency competition becomes feasible though such scientific fields usually remain for some time in marginalized positions as "semi-peripheral" or "peripheral" institutions. The fragmentation of

interests within universities and the increasing opportunities for lobbying, however, increase the chances that such marginalized fields will become fully-fledged parts of the cognitive structure in the long run. Finally, cognitive differentiation by currency dualism could be put under stronger pressure than before if "size" matters for the development of departments and faculties. In that case, early attempts at "takeover" of such interdisciplinary fields might prevail. Active protection by university leadership is then required to give such fields a chance to develop their own "currencies."

All in all, these considerations offer a rather positive outlook on the development of scientific innovation: under the NPMM universities seem to become more open with regard to the inclusion of new scientific fields which would reduce at least some of the pressure from the increasing "diversity" of science. The openness remains strongly dependent, however, on the presence or absence of resource conflicts that are generated by the inclusion of new scientific fields. We have demonstrated that the resistance of the "Haves" in universities is reduced under NPMM because material advantages for the majority of members in departments outweigh individual disadvantages in terms of social status. The creation of majorities will, however, fail if these advantages are no longer given. All then depends solely on the authority of university leadership, i.e. if it wants and can include new scientific fields.

Though openness of universities might increase, the new opportunities might not be equal for all scientific fields. This is indicated by the selection considerations in departments: if material advantages are playing a more and more important role, it becomes imperative for new scientific fields to demonstrate their contribution to the social and economic status of the department. New scientific fields which fail in this respect have fewer chances to become integrated. This selection bias has not played a role under BOM.[7]

Finally, the new openness does not say anything about the effects the NPMM might have on the production of knowledge itself, i.e. on the "creativity" of science that is the base of scientific innovation. In this chapter we discussed the possibility of the institutionalization of scientific innovation and not the conditions of creativity. As regards creativity, NPMM might have serious flaws as indicated in the literature because of: the effects of this governance regime on the increasing burden of evaluation for scientists, which becomes as time-consuming as teaching and leaves less time for research; the pressure to raise research productivity, which increases the quantity of research output but not necessarily the quality; the stronger focus on the more lucrative "external" innovation, reducing opportunities for "internal" innovation with possible redistribution of university resources to these areas, etc. In short, though institutional conditions for the inclusion of new ideas might increase under NPMM, the system could run out of ideas.

[7] This is equivalent to what Lawn and Keiner have called the change from knowledge production, in which the "use-value" was relevant, to a knowledge "economy," in which the "exchange-value" determines the value of new scientific fields (Lawn and Keiner 2006).

References

Agasisti, T., & Catalono, G. (2006). Governance models of university systems – Towards quasi-markets? *Journal of Higher Education Policy and Management, 28*(3), 245–262.

Akerlind, G. S. (2005). Academic growth and development – How do university academics experience it? *Higher Education, 50*, 1–32.

Amaral, A., Meek, V. L., & Larsen, I. M. (Eds.). (2003). *The higher education managerial revolution?* Dordrecht: Springer.

Becher, T., & Kogan, M. (1992). *Process and structure in higher education* (2nd ed.). London: Routledge.

Becher, T., & Trowler, P. R. (2001). *Academic tribes and territories: Intellectual enquiry and the cultures of disciplines*. Buckingham: Open University Press/SRHE.

Ben-David, J. (1971). *The scientist's role in society. A comparative study*. Englewood Cliffs: Prentice-Hall, Inc.

Ben-David, J. (1991). *Scientific growth. Essays on the social organization and ethos of science*. Berkeley: University of California Press.

Blume, S. (1974). *Towards a political sociology of science*. New York: Free Press/Macmillan.

Blume, S. (1985). After the darkest hour integrity and engagement in the development of university research. In B. Wittrock & A. Elzinga (Eds.), *The university research system* (pp. 139–163). Stockholm: Almqvist and Wiksell.

Bonaccorsi, A. (2007). Explaining poor performance of European science: Institutions versus policies. *Science and Public Policy, 34*(5), 303–316.

Bonaccorsi, A. (2008). Search regimes and the industrial dynamics of science. *Minerva, 46*(3), 285–315.

Bonaccorsi, A. (2010). New forms of complementarity in science. *Minerva, 48*(4), 355–387.

Bourdieu, P. (1975). The specificity of the scientific field and the social conditions of the progress of reason. *Social Science Information, 14*(6), 19–47.

Bourdieu, P. (2001). *Science de la science et réflexivité*. Paris: Raisons d'Agir Editions.

Braun, D., & Merrien, F.-X. (1999a). Governance of universities and modernisation of the state. In D. Braun & F.-X. Merrien (Eds.), *Towards a new model of governance for universities? A comparative view* (pp. 9–33). London/Philadelphia: Jessica Kingsley.

Braun, D., & Merrien, F.-X. (Eds.). (1999b). *Towards a new model of governance for universities? A comparative view*. London/Philadelphia: Jessica Kingsley.

Brock, W. A., & Durlauf, S. N. (1999). A formal model of theory choice in science. *Economic Theory, 14*(1), 113–130.

Christensen, T., & Laegreid, P. (2001). *New public management. The transformation of ideas and practices*. Aldershot: Ashgate.

Chubin, D. E. (1976). The conceptualization of scientific specialties. *The Sociological Quarterly, 17*(4), 448–476.

Clark, B. R. (1983). *The higher education system. Academic organization in cross-national perspective*. Berkeley: University of California Press.

Clark, B. R. (1995). Complexity and differentiation: The deepening problem of university integration. In D. Dill & B. Sporn (Eds.), *Emerging patterns of social demand and university reform: Through a glass darkly* (pp. 159–169). Oxford: IAU Press/Elsevier.

Clark, B. R. (1996). Substantive growth and innovative organization: New categories for higher education research. *Higher Education, 32*(4), 417–430.

Clark, B. R. (1998). *Creating entrepreneurial universities: Organizational pathways of transformation. Issues in higher education*. Bingley: Elsevier Science Regional Sales.

Clark, B. R. (2008). *On higher education. Selected writings, 1956–2006*. Baltimore: Johns Hopkins University Press.

Cohen, M. D., March, J. G., & Olsen, J. P. (1972). A garbage can model of organizational choice. *Administration Science Quarterly, 17*(1), 1–25.

Coleman, J. S. (1986). *Individual interests and collective action. Selected essays*. Cambridge: Cambridge University Press.
Collins, H. M. (1983). The sociology of scientific knowledge: Studies of contemporary science. *Annual Review of Sociology, 9*, 265–285.
Crane, D. (1972). *Invisible colleges*. Chicago: Chicago University Press.
De Boer, H., Enders, J., & Schimank, U. (2007). On the way towards new public management? The governance of university systems in England, the Netherlands, Austria, and Germany. In D. Jansen (Ed.), *New forms of governance in research organizations. Disciplinary approaches, interfaces, and integration* (pp. 137–152). Dordrecht: Springer.
Deem, R., Hillyard, S., & Reed, M. (2007). *Knowledge, higher education, and the new managerialism: The changing management of UK universities*. Oxford: Oxford University Press.
Dewatripont, M., Thys-Clement, F., & Wilkin, L. (Eds.). (2002). *European universities: Change and convergence?* Brussels: Editions de l'Université de Bruxelles.
Elzinga, A. (1987). Internal and external regulatives in research and higher education systems. In R. Preforms (Ed.), *Disciplinary perspectives on higher education and research* (Report No. 37). Stockholm: University of Stockholm GSHR.
Evans, C. (1995). Choosing people: Recruitment and selection as leverage on subjects and disciplines. *Studies in Higher Education, 20*(3), 253–265.
Felt, U. (2004). University autonomy in Europe. In Magna Charta Observatory (Ed.), *Managing university autonomy. Shifting paradigms in university research* (pp. 15–108). Bologna: Magna Charta Observatory.
Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S., Scott, P., & Trow, J. (1994). *The new production of knowledge: The dynamics of science and research in contemporary societies*. London: Sage.
Hagstrom, W. O. (1965). *The scientific community*. London/Amsterdam: Feffer & Simons Inc.
Kitcher, P. (1995). *The advancement of science: Science without legend, objectivity without illusions*. Oxford: Oxford University Press.
Kuhn, T. S. (1968). The history of science. In D. L. Sills (Ed.), *International encyclopedia of the social sciences* (Vol. XIV, pp. 74–83). New York: Free Press.
Larsen, M. I. (2003). Departmental leadership in Norwegian universities – In between two models of governance? In A. Amaral, V. L. Meek, & I. M. Larsen (Eds.), *The higher education managerial revolution?* (pp. 71–88). Dordrecht: Kluwer.
Latour, B., & Woolgar, S. (1979). *Laboratory life. The social construction of scientific facts*. London: Sage.
Lawn, M., & Keiner, E. (2006). Editorial. *European Journal of Education, 41*(2), 1–15.
Metzger, W. P. (1978). Academic freedom and scientific freedom. *Daedalus, 107*(2), 93–114.
Metzger, W. P. (1987). The academic profession in the United States. In B. R. Clark (Ed.), *The academic profession: National, disciplinary and institutional settings* (pp. 123–208). Berkeley/Los Angeles: University of California Press.
Mirowski, P., & Sent, E.-M. (Eds.). (2002). *Science bought and sold: Essays in the economics of science*. Chicago: University of Chicago Press.
Mullins, N. (1972). The development of a scientific speciality: The phage group and the origins of molecular biology. *Minerva, 10*, 51–82.
Musselin, C. (2007). *The transformation of academic work: Facts and analysis* (Research and occasional paper series, Center for Studies in Higher Education). Berkeley: University of California.
Musselin, C. (2008). Editorial. *European Journal of Education, 43*(3), 1–3.
Paradeise, C., Reale, E., Bleiklie, I., & Ferlie, E. (Eds.). (2009). *University governance: Western European comparative perspectives*. Dordrecht: Springer.
Ruscio, K. P. (1986). Bridging specializations: Reflections from biology and political science. *The Review of Higher Education, 10*(1), 29–45.
Schimank, U. (1994). *Hochschulforschung im Schatten der Lehre*. Frankfurt a.M: Campus.
Slaughter, S., & Leslie, L. L. (1997). *Academic capitalism: Politics, policies, and the entrepreneurial university*. Baltimore: Johns Hopkins University Press.

Slaughter, S., & Rhoades, G. (2004). *Academic capitalism and the new economy: Markets, state, and higher education*. Baltimore: Johns Hopkins University Press.

Spiegel-Rösing, I. (1974). Disziplinäre Strategien der Statussicherung. *Homo, 25*(1), 11–37.

Tapper, E. R., & Salter, B. G. (1995). The changing idea of university autonomy. *Studies in Higher Education, 20*, 59–71.

Taylor, J. S., de Machado, M. L., & Peterson, M. W. (2008). Leadership and strategic management: Keys to institutional priorities and planning. *European Journal of Education, 43*(3), 369–386.

Van Rijnsoever, F. J., Hessels, L. K., & Vandenberg, R. L. J. (2008). A resource-based view on the interactions of university researchers. *Research Policy, 37*(8), 1255–1266.

van Vught, F. A. (Ed.). (1989). *Governmental strategies and innovation in higher education*. London: Jessica Kingsley.

Whitley, R. (Ed.). (1974). *Social processes of scientific development*. London: Routledge & Kegan Paul Ltd.

Whitley, R. (1977). Changes in the social and intellectual organization of the sciences. In P. Mendelsohn & R. Whitley (Eds.), *The social production of scientific knowledge* (pp. 143–169). Dordrecht: Reidel Publishing.

Whitley, R. (2000). *The intellectual and social organization of the sciences*. Oxford: Oxford University Press.

Whitley, R. (2003). Competition and pluralism in the public sciences: The impact of institutional frameworks on the organization of academic science. *Research Policy, 32*(6), 1015–1029.

Whitley, R. (2008, June). *Changing authority relations in public science systems and their consequences for the direction and organization of research* (Working Paper Series). Manchester: Manchester Business School.

Ziman, J. (2000). *Real science: What it is, and what it means*. Cambridge: Cambridge University Press.