

# Cluster-Building and the Transformation of the University<sup>1</sup>

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One of the noticeable recent changes of universities in many Western countries consists in efforts to establish research clusters, »critical masses«, centers etc. Let us, for the moment use the term »cluster« in a broad sense and refer to larger-scale arrangements of coordinated research – as opposed to individual research. Of course there are disciplinary fields with a strong tradition of hierarchically integrated research. However, what we can observe recently across disciplinary boundaries is an increasing attention for clusters, an increasing relevance in discourse and in intra-organizational decision-making. At the same time a considerable and increasing share of public funding is spent on clusters.<sup>2</sup>

As an observer of the German university scene states: »Suddenly everything seems to rhyme with priority areas, centers, clusters, alliances, networks. Small research arrangements are eyed with suspicion, and are perceived as outdated and not very efficient.« (Mittelstraß 2011: 14; our translation).

Much of the appeal of clusters is based on the widespread belief in their functional superiority. On the one hand clusters are identified with cooperation and cooperation is generally considered to be a good thing (Katz, Martin 1997). On the other hand a »belief in size« (Fischer 2012: 28) has become part of the idea of how »good« research should look like (Schiene, Schimank 2007). According to a critical mass argument scientific work requires a certain minimum size of a research entity in order to allow for high

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1 An earlier version of this paper was presented at the 27<sup>th</sup> EGOS Colloquium in Gothenburg, Sweden.

2 In 2009 the DFG spent 54.9 % of its funding on coordinated programs (DFG 2009: 177).

quality research. Clusters are also perceived as being the appropriate organizational form for more complex research problems. Proponents of cluster-building see in this respect an irresistible inner-scientific dynamic towards larger-scaled research problems as well as an equally irresistible extra-scientific dynamic towards »bigger questions« of societal relevance such as climate change or the performance of national school systems.

In this paper we cannot discuss in detail whether these functional arguments are empirically accurate. Here it is only important to state that functional arguments are in the air. They are available to scientists, university leadership, and politicians to legitimize cluster-building efforts. Nevertheless we will see that also critical accounts find a powerful voice in discourse.

What we want to explore is the tight connection between cluster-building, on the one hand, and two other recent transformations of the university system: the emerging actorhood of universities which manifests itself mainly in the strengthening of university leadership, and the expectation directed at university leadership that it should promote profile-building of its university. It is this triangle of transformations we want to explore. We start with a descriptive exposition of what is meant by clusters. Then we ask with respect to researchers, on the one hand, and university leadership, on the other, why the latter and some of the former have got interested in cluster-building whereas others of the former oppose. After that we take a look at the interplay of top-down and bottom-up activities involved in cluster-building. Here we distinguish the creation of a new cluster from the handling of an existing one. In this way we follow the life-cycle of a cluster from its beginning to its end.

This is a theoretical exploration of the subject which aims at conceptual clarifications, useful typologies, and general hypotheses which guide further research. Empirical evidence from various sources is used for illustrative purposes only. Most of our examples refer to Germany but we also use examples from other countries.

## Clusters:

### Contacts – Communication – Coordination – Cooperation

The empirical variety of what can be called »research clusters« is confusing, even if the institutional specificities of just one country such as Germany are

taken into account.<sup>3</sup> The term cluster as we understand it may refer to two levels of analysis we have to distinguish carefully. On the one hand clusters are social structures of actual scientific contact, coordination, and cooperation. We refer to this as the *substantial level*. On the other hand clusters are formal structures that are deliberately designed to establish or to foster these structures of contact, coordination, and cooperation. We refer to this as the *formal level*.

### The substantial level

In a typology of elementary forms of governance, clusters can be categorized on the substantial level as networks or communities (Schimank 2007). In an abstract view clusters as social configurations grow from opportunities for contacts which lead to an intensification of communication. If this in turns brings about a deliberate collective effort of coordination a cluster comes into being; and to some extent that coordination may even become cooperation.

Thus, on the substantial level cluster-building starts from contact opportunities which exist or come into existence among certain researchers. If these opportunities turn up frequently enough they can be used for a regular communication. A one-shot contact – for instance at a discussion after a lecture – can sometimes re-direct a researcher's work in a radical way; still, to be the starting point of the emergence of a cluster more frequent contacts are required.<sup>4</sup> Wherever the density of communicative exchange exceeds a certain level ongoing mutual inspiration may arise. Mutual inspiration certainly has the important side-effect of a tacit collective coordination of research activities both as a negative and as a positive coordination.<sup>5</sup> The former means no more than the avoidance of conflicts, mainly by staking and respecting each other's claims whereas positive coordination aims at the pursuit of a common research agenda in a certain division of labour. To be a cluster a regular communicative configuration of researchers has to have the explicitly negotiated and articulated positive coordination of the research activities of each cluster member as one of its principal purposes. This means a cluster has not just a *de facto* but an agreed-upon division of labour framed by a common set of overall research goals under which the sub-goals of each

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3 See many illustrations in von Graevenitz, Mittelstraß (2011).

4 In other words, clusters are not »weak« but »strong ties« (Granovetter 1973).

5 For this distinction see Scharpf (1972).

project can be subsumed. This is the minimal level of social order which constitutes a research cluster. Many clusters may not go beyond this level not even after a sometimes rather long existence. However, other clusters reach a level of positive coordination higher than the minimal. In these clusters more or less and smaller or larger islands of cooperation emerge as a higher quality of positive coordination.

### The formal level

On the formal level clusters can take the form of centers or institutes that rest on the basic funding of the university. However, as we will see in most cases cluster-building aims at the acquisition of external funding so these university-funded units are no more than a platform to pursue this goal; and if this is no longer successful the center or institute will be closed down. So the resulting entities of cluster-building are in formal terms most of the time mainly externally funded collections of projects shaped by the requirements of the funding agencies and their coordinated programs.

To be sure, success in the acquisition of external funding will usually require positive coordination while conversely ongoing coordination and cooperation will clearly benefit from (or even require) some additional funding. The actual level of coordination, however, may be very different within similar formal structures. And we assume that at a closer look some formal clusters only manage to bring about negative coordination and do thus not breed clusters on a substantial level.

Taking a look at existing institutional forms within the German university system we find a considerable variety of cluster-funding. To begin with there are the »coordinated programs« of the DFG (Wagner 2011): the »Sonderforschungsbereiche« (collaborative research centers) which consist of about 12 to 24 projects in different disciplines at the same university or at two universities pursuing a coordinated research agenda for up to 12 years; the »Schwerpunktprogramme« (priority programs) which last for six years and consist of up to 30 projects at different places framed by a common theme; and the »Forschergruppen« (research groups) which last for six years and consist of 6 to 8 projects framed by a common theme. In addition the DFG supports »Graduierkollegs« (graduate schools). Within the framework of the »excellence initiative« there are graduate schools, too; moreover,

»excellence clusters« are supported which are similar to collaborative research centers but can be larger and include a greater variety of infrastructural measures. Each phase of the »excellence initiative« lasts for five years; the second phase expires at the end of 2017 but it is likely that this very ambitious promotion of cluster-building will be continued in one way or another. Other important funding programs for clusters are provided by the BMBF, by some ministries at the state level for which the LOEWE program of Hessen is a remarkable example (Wissenschaftsrat 2013), by the VolkswagenStiftung, and last but not least by several programs of the EU – not only the series of framework programs but also the »corporate-action flagships« two or three of which are in preparation and which are truly »mega clusters« (Hertel 2012: 14) because each of them will consist of more than 200 projects located all over Europe and collaborating with each other in research about innovative challenges like »graphene«. Some research fields have a long tradition of such »mega clusters« – such as particle physics where huge experimental designs at international centers as CERN can only be realised through the cooperation of thousands of researchers from all over the world (Knorr 1999).

This list is supposed to just give a broad impression and is not complete. Similar kinds of clusters can be found in other countries although it seems that the variety of clusters is especially large in Germany. Some important features of clusters beyond the already mentioned defining characteristics are:

*Aims:* Especially two general research purposes are pursued by cluster-building. One is the collective coordination of research work, the other is the collective organization of doctoral training.

*Cognitive scope:* There are clusters which are located just within one discipline or even sub-discipline such as atomic physics; but more common are interdisciplinary clusters which sometimes integrate even disciplines from different fields of science such as the natural sciences and the humanities.

*Organizational base:* Clusters may exist within one university but can also consist of an inter-organizational network.

*Kinds of organizations:* Besides universities other state-funded research institutes such as – in Germany – Max Planck institutes or Helmholtz centers as well as industrial firms can be part of the organizational base of a cluster.

*Financing:* As a rule, clusters are financed not only by the basic funds of a university but to a large extent by extra money coming for a specified time period from a funding agency or the state. This means that if no fresh money can be acquired the cluster ends.

*Work mode:* Not just as a consequence of the time limitation of funding research work in a cluster is project-based.<sup>6</sup> A cluster consists of a multitude of projects in each of which research proceeds in pre-conceived steps according to a time-frame of milestones towards a pre-conceived final product – the answer to a cognitive problem which was formulated at the beginning.

*Reputation:* Some of the types of formal clusters are extremely prestigious. The »Sonderforschungsbereiche« funded by the DFG and the recent »excellence clusters« funded by the »excellence initiative« are the most prominent cases.

Equipped with these descriptive and analytical clarifications we now can turn to the question why there has been such a rush of cluster-building in recent years. As we will show this tendency cannot be seen in isolation from two other dynamics of the university system.

## Why? Perspectives on Cluster-building

When we compare the perspectives of the university leadership and the individual researchers on research clusters we find considerable differences which often amount to disagreements. Quite generally empirical evidence suggests that attitudes towards recent higher education reforms differ considerably between university leadership and individual researchers (Bogumil et al. 2013). When it comes to cluster-building university leaderships are quite unequivocally in favour of cluster-building while the researchers are much more ambivalent.

Starting with the researcher's perspective we find a public discourse that is dominated by rather general and categorical statements on the pros and cons of research clusters. As a German professor of engineering stated with utter conviction: »In the global context the engineering sciences have a large responsibility for answering decisive questions of life: energy, food, health,

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<sup>6</sup> See Torka (2009) for a general exposition of this work mode of research.

environment, information, housing, traffic. [...] Insofar it is absolutely clear: The Herculean tasks of the engineering sciences demand powerful research associations.« (Schmitz 2012: 16; our translation).

However, we can also find statements that point in the opposite direction. They sometimes use a very drastic language like the German professor of Indology Walter Slaje who quotes polemically from a German dictionary that »cluster« means »pathological cell tumour« and denounces cluster-building as »enforced networking« and a »renaissance of the communist collectives of scientists« (2008: 149, 152; our translation). Although this may be an extreme position it expresses a widespread anxiety among researchers from the humanities and parts of the social sciences. In this view cluster-building has become a fatal obsession of policy-makers and university leaders who enforce this fixed idea in a »one size fits all« approach. There is some evidence that even part of the elites of the humanities and social sciences share a positive view on clusters and – from the perspective of the cluster opponents – are disloyal to their own discipline’s research culture.<sup>7</sup> A very traditional individualistic understanding of scientific autonomy is upheld against this perceived tendency by the discipline’s rank-and-file members.

To some extent these two voices certainly reflect differences between scientific fields. Indeed there obviously are disciplines with a considerable tradition of more hierarchically integrated research such as medicine, the engineering, and some of the natural sciences while others, especially the humanities, are traditionally based on a highly individualized research organization and share a corresponding self-conception. Clearly the latter disciplines have a more reserved attitude towards cluster-building.

General attitudes towards research clusters as they are reflected in these statements may of course influence individual researchers’ decisions to participate in concrete research arrangements or not. Still, the decisions of most researchers on concrete cluster-building activities are contingent upon how they expect to be affected by them. These »floating voters« can have various kinds of reasons for or against clusters. In many sub-fields of the natural and the social sciences both individual work and engagement in clusters can be equally attractive with regard to curiosity as well as to reputation. Here,

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<sup>7</sup> Schiene and Schimank (2007) show that the reports written by groups of reputed disciplinary experts about the state of their disciplines at Lower Saxonian universities for the evaluation agency WKN resound with recommendations of cluster-building regardless of the discipline.

where researchers have a choice financial incentives and the scientific prestige of at least certain types of clusters can be quite appealing.

Furthermore, scientists may use clusters as a means of putting forward their own research agendas vis-à-vis their colleagues. What actually comes out of such efforts, however, may deviate more or less from these researchers' initial ideas because they usually are not able to dictate their approach on all others. The constraints associated with the need to adjust their own research agenda to the cluster agenda may be even greater for those who are asked to participate in a cluster. In this situation one researcher observed »that my research program has slowly fallen apart.« (Fischer 2012: 28f; our translation) So there is an inevitable trade-off that researchers involved cannot maximize their own individual performance because cluster-building requires from an individual researcher that he adapts his research line to what fits best into the cluster; and this may not always be the subjectively most promising alternative with respect to his own capabilities or the research frontiers in his field.

Generally, the need for coordination within clusters is at odds with the value of scientific autonomy which is highly institutionalized within the academic profession. Scientists tend to insist on their individual right to choose research topics, theories, and methods autonomously and defend their »occupational control« (Child, Fulk 1982) against external pressures. Pretensions for professional autonomy can be justified functionally to some extent and are also supported by powerful ideologies (Musselin 2007). Even when this striving for autonomy does not lead to a straightforward rejection of clusters it certainly increases the »costs« of cluster-building on the part of the researchers.<sup>8</sup>

This finally holds true for the high transaction costs in terms of coordination and bureaucracy as well which seem daunting to many researchers. Everybody is aware that cluster-building is accompanied by certain transaction costs of meeting, negotiating, coordinating, collective decision-making, etc. But in most cases it turns out that the rise of these transaction costs was very much underestimated. This is especially relevant because these costs have to be paid to a high degree by high performers. For most leaders of clusters –

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8 Again individual scientific autonomy is valued differently across disciplinary fields. A professor of philosophy with considerable experience as a science manager points into this direction: »The subject of research today is no longer the researcher but the research institution. Behind this development there is an industrial view of science. Only the humanities have preserved a memory of the individual subject doing research being the subject of research.« (Mittelstraß 2012: 60; our translation).

often top researchers in the cluster's field – doing their own research becomes a marginal part of their work (Gerhards 2010: 125f). They virtually turn into administrators, networkers, and politicians.

With regard to the attitudes of university leadership the picture is much less ambiguous. University leaderships are decidedly in favour of cluster-building; and this is a consequence of two other transformations which have provided these actors with a new self-understanding of their role. The first is the transformation of universities into actors. This is a shift of the dominant institutional model of the organization in the higher education system. With the term model we refer to a set of cognitive and normative expectations that define what an organization is, what it could be, what it should be, and what reasonably can be expected from it (Meier 2012a). These models are not necessarily accurate descriptions of actual structures, they are often rather fictional in character. But they provide reforming efforts with orientation and legitimacy. And they certainly legitimize certain structural constellations and elements. The dominant organizational model in German higher education is nowadays that of an actor. Universities are increasingly treated as autonomous and unified entities that control their internal processes, act in pursuit of self-formulated though highly scripted goals, and can legitimately be held accountable for what they do (Meier 2009; Krücken, Meier 2006).

As organizations German universities traditionally had only a very limited leeway between a strong academic profession and highly regulative ministries of science. Today, universities are increasingly entitled, enabled, and expected to actively engage in what they can legitimately consider to be their own affairs. Though this transformation is basically cultural this does not imply the absence of coercion. The ministries of science in particular do not only use their regulative power to make new university laws but also their power as financiers of the universities to press for this new view of universities.

This whole development brings about the elaboration of more complex formal structures, the concentration of strategic resources (Whitley 2008), and the establishment of a broad range of explicit organizational policies. As part of this development the role of the university leadership that acts on behalf of the organization has changed considerably. While German university presidents traditionally used to occupy a weak and rather ceremonial position they now are formally empowered and gain new competences. Correspondingly the rights of academic self-governance that traditionally presented the views of the academic profession and especially the professors as the »academic oligarchy« (Clark 1983) have been cut back. What is central

for our argument: We notice the expectation that leadership should actively engage in the development of research profiles, which is basically a new thing for German universities.

Profile-building is now a key word in the German higher education discourse (Meier, Schimank 2002; 2010; Meier 2012b; Rogge et al. 2013). This idea has basically two implications. First, it is seen as the organization's responsibility to engage in and to show commitment to the advancement of research. University leaderships in Germany are broadly accepting this mission and are taking the role of profile-builders. Secondly, profile-building implies a specification of how high quality research looks like. In this view the research quality of an organization is not only the aggregate of the qualities of the individual researchers but an emergent property of integrated activities. The whole is more than its parts (Schiene, Schimank 2007). At this point clusters become central. As coordinated larger scale research units they are perceived as markers and accepted proofs of a research profile and of high quality research. This of course holds particularly true for prestigious third-party-funded clusters like excellence clusters.

So the attitude of university leadership to cluster-building is shaped by new conceptions of research quality and of organizational performance of universities. However, cluster-building also serves some additional and somewhat more »material« interests of university leaderships: Considering the funding environment we see that there is much to win in terms of financial resources but also in terms of visibility and prestige. The financial resources are highly connected to the specific institutional form of third-party funding in coordinated programs and so the interest in clusters is above all an interest in this kind of funding. Even though not any kind of cluster-building is directly heading at coordinated programs in many cases the assumption that it will eventually lay the foundation for a future participation in such programs will play an important role. In the view of the university leadership third party funding is on the one hand a relevant means that allows for high quality research and in some cases just extra-money desperately needed to compensate for stagnating or even declining basic funding.<sup>9</sup> On the other hand it has become an end in itself. Successful acquisition of funding became

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<sup>9</sup> This has the implication that some kinds of clusters are uninteresting to university leadership because they are dispersed over many organizations so that only little money comes to their own university. This is the case for the DFG's »priority programs« or international research networks financed within the EU framework programs where usually there is not more than one project per university.

a broadly accepted indicator of research strength (see for example the *Funding Atlas* of the DFG formerly referred to as *funding-ranking*). Clusters also add to the visibility of a university's research which is essential in order to impress relevant audiences like science ministries, evaluators, funding agencies, etc.; it is a »status symbol« (Fischer 2012: 28; our translation).<sup>10</sup>

An additional motive may be considered with respect to organizational leadership as well: A small number of large-scale research units fit into the leadership's span of control whereas a »flea circus« of literally hundreds of individual research agendas confronts leaders with an unmanageable complexity. Thus, although we will see that clusters do generate specific problems to university management for good reasons university leadership is indeed quite unequivocally committed to clusters.

So the overall picture of the motivation underlying the cluster-building dynamics at German universities shows that these dynamics are strongly championed by university leaders whereas among researchers attitudes are more diverse and ambivalent. Now we have to ask: What kinds of activities do these attitudes initiate, and what effects does the interplay of these activities of the various actors involved have? So we have to analyze the constellations of cluster-building which can be divided in two phases: first the creation of a new cluster and secondly the handling of an existing cluster.

## How? Part 1: Creation of a Cluster

Our basic hypothesis with regard to the creation of a cluster is that university leadership displays only limited capabilities of top-down steering but may play a significant role in the advancement of bottom-up-initiatives.

There are several reasons why top-down steering within universities is difficult to do. In legal terms an individual professor's right to decide autonomously what and how to teach and research cannot be disregarded; in Germany it is even constitutionally granted. Moreover, professors usually cannot be dismissed, and German universities can hardly offer any additional intra-organizational career-opportunities to tenured professors (Hüther,

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<sup>10</sup> For researchers, too, of course. Still these attractors are somewhat more ambivalent for the researchers than for the leadership because it is the individual reputation that ranks highest in a researcher's preference order.

Krücken 2012).<sup>11</sup> Thus, university leadership lacks important threats and incentives to motivate professors to engage in cluster-building. Additionally, steering research activities in general and cluster-building in particular is also very difficult to accomplish technically. It is not only the general problem of organizing professionals (Mintzberg 1983) but also specific characteristics of research work that contribute to this situation: the well-known difficulties of prescribing appropriate means for solving unknown problems (Gläser 2006; Musselin 2007).

As university leadership is usually lacking expert knowledge of its own on the research field in question it depends on hearing about good ideas from others. These may be researchers at the leadership's own university. Thus, one source of ideas for cluster-building is internal. A German university president emphasizes that »he has to pick up what the place offers, and just has to focus that.« (quoted by Kleimann 2013: 238; our translation). Another important resource of top-down initiatives is external advice by academic elites, e.g. by evaluation commissions. These may provide leaders with orientation and legitimacy in their reform efforts and exercise normative pressure on the researchers of the university to follow their advice (Meier, Schimank 2010).<sup>12</sup> Still an »idea« may be a good start but it is in itself not enough. To keep coordination and cooperation going it has to work out in the dynamics of the actual scientific activity. And anyway as actual cooperation cannot be enforced internal and external pressures may often lead to nothing more than ceremonial compliance on the level of formal structures that do not require any change of actual practices (Meyer, Rowan 1977). It was stated for the humanities for instance that »cooperative research consists of tied-together single texts« (Hirschi 2009) which suggests that a number of individual research activities can be ceremonially dressed as a cluster without any substantial coordination or cooperation. Such an outcome may be accepted

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11 The recent salary reform for professors introduced a performance-based salary component which is decided upon by university leadership for each individual case. In principle this could be used as an incentive for cluster-building; however, the possible salary increase is too small to be an effective inducement.

12 See also Kaufmann (2011: 163–171) for comparable ambitions of university leadership with regard to teaching, Laudel, Weyer (2013) for Dutch universities, and Musselin on »the use of external peer review as a management tool by academic leaders« (2013: 9) in French universities.

by university leadership as long as the fake cluster looks sincere to the leadership and other relevant audiences.<sup>13</sup> We have to bear in mind that research practices are difficult to observe, especially for non-experts. The acquisition of external funding involves, however, usually peer-review and it will thus be difficult to successfully apply for cluster-funding without displaying at least some level of positive coordination. Thus, when cluster-building requires external funding purely ceremonial activities are likely to be unmasked.

There is probably only one constellation where top-down cluster-building by university leadership assisted by external experts may be successful: When enough positions are open for which professors can be recruited who match the thematic orientation of the cluster.<sup>14</sup> This is a rare situation which may occur for example by coincidence when several professors retire at about the same time, or when the university gets these professorships dedicated to the conceived cluster from external sources. Under these circumstances it is possible to install a critical mass of new researchers who are likely to be devoted to the cluster. However, even in these cases the cluster's successful actual operation in terms of coordination and cooperation depends on its internal scientific dynamics and not on the power of the university leadership.

Most of the time top-down initiatives of cluster-building will fail – and as university leadership is aware of the fact that »leading the horses to water«<sup>15</sup> will not work it usually tries to go a different way (Rogge et al. 2013). This »softer« approach to steering is nicely expressed by the reflection from a German university manager: »But in the end you cannot decree research in a top-down process. Ultimately it is the scientists who are conducting the research. And from the rector's office you can only act as a catalyser and you can motivate.« So in this view basically a non-hierarchical mode of communication is essential for cluster-building as the same interviewee elaborated: »But this is in my view perhaps the most important thing: encouraging

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13 Moreover, leadership may hope that its patient and skilled »doubletalk« may transform even pure »talk« (Brunsson 1989) eventually into »action« (Schimank 2008).

14 See Meier, Schimank (2010) for such cases; Fischer (2012: 65) also reports about such a case at the University of Göttingen.

15 With this quotation from an Australian study Klaus Dörre and Matthias Neis (2010: 59) resume their German case studies about the »dilemma of the entrepreneurial university«.

colleagues, moderating who may sit together with whom and give some thought to something«.16

This is an expression of the collegial style of leadership with which university leaders partly still identify and partly have to pay tribute to because professors insist on it. A recent analysis of the leadership style of German university presidents under the changed rules of *New Public Management* points out that none of the interviewees ever tried to use the new formal powers rigorously in order to push through reforms (Bieletzki 2013). As one of the interviewees said: »Pushing ahead unilaterally is nonsense. Total nonsense. I don't believe there are presidents who push ahead unilaterally and are successful. [...] They always need combatants otherwise it doesn't work.« (Bieletzki 2013: 8; our translation) Thus, traditional collegiality is not simply replaced by hierarchy; instead both modes of coordination are blended in a new manner.17

Clark Kerr depicted the role of the US-American university president already in the 1960s with the statement that »he is mostly mediator.« Kerr later regretted he had used this term because he thought his readers misunderstood it as too weak a figure (Kerr 1977: 36 and 142). He insisted that the mediator is in fact powerful. And quite in this line we suggest that university leadership might get in an influential position in the process of cluster-building. More specifically, as far as there are incentives for and pressures on individual scientists to engage in cluster-building, the university leadership can often join forces with bottom-up initiatives. There are manifold possibilities for a blending of bottom-up and top-down activities based on the blending of collegiality and hierarchy. An German university president explains »there is no longer the one who says I do what the colleagues want, in principle the old model of the rectorate, nor the one who says I know the direction, and the others better come along« but the question is rather how can I reconcile top-down, bottom-up somehow. That's more the model now.« (quoted in Kleimann 2013: 12; our translation)

More specifically we can distinguish four ways how university leadership can combine its efforts with bottom-up initiatives of cluster-building:

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16 This voice from the field was collected in the research project »Management and Self-government of Universities: Comparison of Decision-making Processes and Consequences for Research« funded by the DFG from 2003 to 2009.

17 See Kleimann (2013: 380–398) for further examples of such practices.

- It can trigger bottom-up initiatives that did not exist before by incentives. The result may be that one or more bottom-up initiatives come into existence.
- When at least one bottom-up initiative exists it can be picked up as a starting point for further activities. Picking up from several initiatives implies selecting some and neglecting others.
- University leadership can give various kinds of support to bottom-up initiatives it picked up.
- By giving support to a bottom-up initiative it can be influenced by university leadership. This may lead to a smaller or larger re-direction of the initiative in various respects.

To begin with, university leadership can stimulate the emergence of bottom-up initiatives. In order to achieve this no specific knowledge of promising starting points for such initiatives is necessary. A university president remarks that it is a very good strategy to give particular professors an understanding of the idea of profile building in a way »that they have the feeling [...] it is their own idea.« (quoted in Kleimann 2013: 419; our translation). In addition a completely »blind« leadership may also set incentives for bottom-up initiatives and wait what happens. Another university president said: »I can only try just as a conductor to orchestrate that a little bit.« (quoted by Kleimann 2013: 282; our translation) Still, when initiatives pop up university leadership has to find out whether they are sincere or ceremonial with the latter mainly interested in the financial support promised. Here again external experts may be crucial help for university leadership.

A very delicate situation arises in case more promising bottom-up initiatives of cluster-building exist than the university is able to support. Then university leadership has to decide which initiatives get priority and which have to be postponed or even cancelled. This is a hard decision as a university president states: »Now a point of intervention is naturally if we take such a completion as the excellence initiative where colleagues said »we would like to make an application for an excellence cluster«, then we said »no, you're not doing that because your chances are low and we can't submit ten applications.« (quoted by Kleimann 2013: 361; our translation). In some cases leadership may see itself as »tertius gaudens« (Simmel 1968: 89ff.) in such a situation; more often it is under heavy pressure from the different initiatives and in the worst case can lose its authority on all sides. However, the power to impede a cluster initiative is certainly one of the most important weapons

in the hand of the university leadership by which it can exert influence on cluster-building activities.

Researchers who are intending to build a cluster – either stimulated by university leadership or on their own initiative – are most probably looking for support by the university leadership. As a minimum requirement their initiative needs the formal consent of the university president to apply for third party funds; but often a more substantial support is necessary. Besides additional resources during the phase of conceiving and writing the often extensive application what is more important is the leadership's explicitly articulated decision to reserve certain internal resources of the university – especially staff appropriations – if the application for the cluster will be successful.<sup>18</sup> Only rarely these are additional resources provided for by the science ministry, for instance. Usually funds have to be collected through redistribution that is by taking them away from other parts of the university. This is naturally a source of conflict and university leaders must show their commitment – material as well as symbolic support – to a cluster initiative.

Because a bottom-up initiative needs this commitment of university leadership the latter can negotiate with the initiative about many specific features of the application. For instance leadership can suggest or even demand thematic shifts or the inclusion of other disciplines and their researchers into the cluster; it can insist on cooperation with other institutions, on stronger internationalization, or on add-ons such as special provisions for female doctoral students or the public dissemination of research results. In this way leadership can substantially contribute to the final shape of the cluster. Usually and for good reasons it will not interfere into the cluster's cognitive core; but its periphery may be an important ingredient of a cluster's profile, too.

So far we have discussed the relationship between university leadership and researchers who engage in cluster-building. However, this relationship is embedded in a larger constellation which also includes university groups that for one reason or another threaten to disturb or even block a cluster building process. Interfering factors may be competing cluster-building activities, groups that want to become part of a specific cluster, or groups that try to prevent a specific cluster-building. Perhaps »troublemakers« want to prevent any kind of cluster building because they fear that a new cluster will lead to an intra-university redistribution of resources and will outshine them.<sup>19</sup> The

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18 Kaufmann (2011: 115) refers to this new source of influence of university leadership.

19 As Laudel and Weyer point out for Dutch universities this fear is not without reason: »researchers in fields that are given a lower priority may feel unwelcome and threatened

university leadership's formal power will hardly suffice to stop troublemaking altogether. Even though ultimately troublemaking may not prevent cluster building it can very well lead to endless delays. In this situation it is usually the most efficient way to fight against such practices with bribery.

Accordingly university leadership has to reserve some resources for side payments by which troublemakers can be induced to drop their resistance. As a university president confesses: »You have to do something [...] to bribe. I did it myself, gave them money so that they kept their mouths shut.« (quoted by Kleimann 2013: 396; our translation) Such side payments may consist of some participation in the cluster typically only formally connected to its core activities but entitled to a portion of its resources. But there can also be many other kinds of side payments to a department not involved in the cluster or to older professors whose research drive has slowed down but who still occupy powerful positions in the university's academic self-governance.

Of course university leaderships will try to keep side payments at a minimum. However, when it is common knowledge within a university that its rector or president tends to deal with disturbances of his plans by side payments even actors who in fact are indifferent to a cluster building initiative may pretend that they feel affected and are inclined to mobilize resistance in order to make a profit from their acquiescence. Thus, on the one hand university leadership has to avoid the impression that it relies only and immediately on side payments because this would inflate the price which has to be paid for an undisturbed process. On the other hand side payments may be necessary to maintain a cluster building initiative's momentum against delays which otherwise may bring about that it dies away.

When a bottom-up initiative for a research cluster has been incited and nurtured by university leadership and when the resistance of others has been overcome the cluster has come into existence. What happens now? The problems which have to be dealt with are not overcome – on the contrary they may become even more difficult.

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[...] they know that their position becomes precarious whenever budget problems occur.« (2013: 18)

## How? Part 2: Handling a Cluster

Having successfully created a cluster, for instance a »Sonderforschungsbe-  
reich« of the DFG or an »excellence cluster« is certainly an achievement of  
university leadership. The university gains visibility, the »Matthew principle«  
(Merton 1985) shows its effects. Nevertheless handling an existing cluster  
brings about new problems four of which we want to highlight in the  
following: (a) managing a matrix structure, (b) negotiating inter-organiza-  
tional relationships, (c) avoiding to lose control, and (d) shutting down a  
cluster. These are not the usual problems which the management of a re-  
search organization or more specifically a university has to deal with again  
and again<sup>20</sup> but which arise when a research cluster becomes part of the exi-  
sting organizational structure.

### a) Managing a Matrix Structure

As soon as a cluster is established and works on a regular basis conflicts may  
arise from the fact that it is cross-linked with several or even all departments  
of the university (Rogge et al. 2013). These conflicts originate not only in the  
general violation of a department's vested interests by this new organiza-  
tional unit. There are also a number of specific reasons for disagreement. If  
for example a professorship has to be filled which formally belongs to a  
certain department and to the cluster at the same time the department usually  
tries to take care that its teaching requirements are not neglected whereas  
the cluster often has an interest to recruit someone with a highly specialized  
research profile. Both demands are legitimate but frequently cannot be re-  
conciled. For university leadership this poses the problem of managing a  
matrix structure.<sup>21</sup>

Conflicts like this may accumulate over time and lead to a strong polariza-  
tion between cluster and departments. In extreme cases the cluster may  
become the university's scapegoat which is made responsible for all kinds of

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20 See Mayntz (1985) for a collection of typical and unavoidable management problems the  
leaders of extra-university state-funded research organizations face.

21 This problem was prominent, for example, in the successful application proposal of the  
University of Bremen for the third funding line of the »excellence initiative« in 2012 where  
»institutional strategies« to maintain and enhance research excellence were supported. In  
the expert hearings the question how such a matrix structure can be governed came up  
again and again.

conflicts.<sup>22</sup> However, the fact that there is not just one issue of conflict but many such issues come up over time gives university leadership a chance to divide burdens more evenly among the parties. Today the cluster's interests may be pursued to the disadvantage of some departments but tomorrow it can be the other way round. Such a strategy of »turn-taking« has a chance of being perceived as a fair compromise so that it can pacify the conflictual atmosphere. However, there may be longer periods when the interests of one side should be given a consistent priority, and this may use up the patience of the others who have to make one concession after the other. The early phase of a cluster when it needs continually growing resources – which often have to be taken from the departments – is especially delicate in this respect. In an extreme case the cluster dynamic is stifled to a standstill with the final result of a permanently unfinished unit which eats up resources but does not contribute significantly to the university's visibility.

#### b) Negotiating Inter-organizational Relationships

A second problem which also results from tensions the cluster introduces into existing organizational arrangements is localized in inter-organizational relationships. This applies to those kinds of clusters which span the boundaries of one university and are partly located in one or more other organizations – other universities or extra-university research institutes in the same region. Examples are »cooperative research centers« where some of the projects are affiliated to a university while others are situated within a Max Planck institute or even more ambitious designs such as the »Karlsruhe Institute of Technology« (KIT) supported by the »excellence initiative« which is nothing less than a partial organizational fusion of the University of Karlsruhe and the Forschungszentrum Karlsruhe, one of the Helmholtz Centers.

Such inter-organizationally based clusters raise additional management problems. On the one hand, they are very attractive because their visibility is likely to be higher than that of intra-university clusters, and such concerted efforts of several organizations to coordinate their research agendas within

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22 Even if a cluster belonged to just one department – which is not often the case – this type of conflict can arise because, for example, the above-mentioned tension between teaching requirements and research needs is not so much a conflict between disciplines but between organizational missions. Still, the matrix becomes more and more complicated with a multiplication of potential conflicts and veto points the more departments share a cluster.

the framework of a joint profile are the darlings of present day research policy. On the other hand, the drawbacks of such arrangements show up when they are implemented; and those who get acquainted with these problems first are not the organizational leaders who conceived the general scheme of the cluster but the researchers in their daily practices of coordination and cooperation. Different organizational rules and regulations sometimes collide over small issues such as the way how business travels are reimbursed but at other times also over more serious concerns, for instance the procedures of recruiting new professors, especially over who has the final decision and negotiates with selected candidates. In addition just as different departments that participate in an intra-organizationally based cluster have different interests so do the different organizations to which the inter-organizationally based cluster belongs. But in the first case there is a unified authority for conflict resolution at the top with university leadership whereas conflicts about inter-organizationally based clusters have to be negotiated between the leaderships of the different organizations.

Sometimes the cluster may get into the advantageous situation of profiting from the conflicts between the organizations in which it is located. This may happen when the organizations' disagreement leads to a mutually neutralizing of influence on the cluster so that its leaders and each of its researchers may gain additional autonomy. However, it seems to be more often the case that a cluster can become effectively blocked in its work by such unsolved disputes. This occurs especially when financial resources are at stake.

### c) Avoiding to lose Control

We come to another typical problem of handling a cluster: When it has worked successfully for a while, accompanied by growth which is financed by more basic funding from the university or by acquired third party funding, sooner or later and almost inevitably the university leadership will run into the danger of losing control over the cluster. This is the risk involved when a university leadership tries to support a cluster to become successful. When it finally has achieved success and is nationally or even internationally recognized for its »excellence« a turning-point is reached. There is a chance that this may turn out as a durable »win-win« constellation in which both university leadership and the cluster may benefit – as expected – from their joint effort. The university has got its flagship and the researchers involved have

got their highly improved research opportunities. However, cluster-building establishes a new and growing location of power within the university. Research groups, excellence clusters, interdisciplinary centres, graduate schools, etc. are not only highly independent of their university leadership – even more the latter becomes dependent upon these units' success in the acquisition of third-party funds. Instead of a unified university headed by a strong leadership a loose assembly of such largely independent power centers may result from cluster-building. An observer notes a »strange double authority structure« within a department: »There are deans who have something to say because they were elected and are responsible for many things but there are also cluster coordinators [...] who have something to say because they are winners and darlings of the university leadership.« (Frankfurter Allgemeine Zeitung, August 14, 2008) So the interests of the cluster more and more dominate the strategy of the university. In particular university leadership may be forced to allocate an increasing share of financial resources to the cluster because in the extreme case the university's reputation has become completely dependent upon the cluster's continuing success. But even if the cluster is able to acquire most of its resources without having to turn to university leadership the latter becomes dependent upon the cluster's ongoing success in the acquisition of third-party funds.

So the »power-dependence relation« (Emerson 1962) is likely to become reversed. Now the cluster can demand more and more concessions from university leadership – always legitimated by the joint interest to maintain and if possible enhance the cluster's status. Furthermore, this may result in a public image of the cluster outshining the university to which it belongs. At this point the university leadership may wonder whether this is still worth its price: The university contributes with a considerable effort – including internal conflicts which have to be pacified by side payments – to the cluster's success but the public attention has shifted entirely to the cluster. It is no longer the gem associated with its university but a stand-alone beauty.

Here university leadership has to maintain a delicate balance. On the one hand, it has to give the cluster enough room to move for its own development. If the cluster is too tightly coupled to the other organizational, especially the decision-making structures of the university there is a real danger that the established powerful actors, the departments in particular, will not allow the cluster's blossoming for reasons that range from rational considerations to jealousy. On the other hand, it has to be prevented that the cluster becomes so powerful that it is able to walk away from the university or to

dictate its demands on the university leadership. No matter how important and successful the cluster might be in realizing the interests associated with it from the side of university leadership it has to remain just a part of the whole.

Those researchers at a university who do not belong to a cluster have good reasons to worry about the time when its funding ceases. As long as it has worked successfully it is obvious that its continuation has high priority for the university leadership. An internal redistribution of basic funds is necessary to continue the cluster to the degree that no new third party funds can be acquired. Such concerns of non-cluster researchers are no particular problem – except for acts of resistance – if these other groups are low research performers; but this is not necessarily the case. If, however, strong individual researchers for instance in sociology are cut off from their modest resource base because they cannot compete with highly visible but mediocre clusters in nanotechnology this logic becomes obviously dysfunctional. This side of the picture is rarely discussed. However, a recent reflection on the first experiences from the »excellence initiative« notes that universities shall »disclose the costs of profile-building« especially with regard to »which disciplines are specifically supported to the disadvantage of which other disciplines« (BBAW 2010: 43; our translation).

#### d) Shutting down a Cluster

Now we come to a final problem of handling a cluster – final in the double sense of the word. At this point there is an almost inevitable strong conflict of interests between the cluster and university leadership. When the cluster has reached its zenith and further innovative ideas have been missed for quite a while university leadership must face the problem of its termination. Helmut Schelsky already saw as one of the tasks of »a far-sighted and skillful« university leadership »to terminate such centers of the university in due time and to establish new progressive ones in their place.« (1963: 314; our translation) But this is easier said than done. When the right moment has come to reallocate resources from an established cluster to a promising new bottom-up initiative the former is usually still quite influential within the university and often also outside. Its researchers may be well represented within the university's formal and informal decision-making structures as well as within the wider scientific community and the funding agencies; they may be part of the established mainstream which can defend its claims very well

by a variety of means. In particular the cluster can hide for quite some time that its best times are over; and it does this very authentically because its members probably really believe that they still have much to offer in the future.

Accordingly it is very difficult for university leadership to early enough detect that it should reallocate resources and even if this is realized and such attempts are made they are blamed immediately as illegitimate by the cluster and its supporters. To a certain extent it may help to fix the life-span of a cluster from the beginning and quite schematically as it is done with the »Sonderforschungsbereiche« of the DFG which end after twelve years at the latest no matter how innovative its potential might still be. Yet even with such deadlines many clusters are de facto established open-ended. For example the principal investigators of a »Sonderforschungsbereich« are likely to plan a successive cluster in the final phase of the existing one. Their university leadership expects this from them and they are supported to do this. As long as such new applications for third-party funding are successful new cohorts of researchers are recruited, and as long as the usual performance indicators do not show any alarming signs the chances are high that a cluster on a downward trend remains strong enough to outfight competitors within the university. It may be even supported by other actors within the university with whom it had many conflicts before but finally reached at least a tacit agreement of »live and let live!« They may reckon with the reliability of the status quo whereas the inevitable turmoil of terminating the old and building up a new cluster is highly uncertain. All in all it seems that rather exceptional opportunities are necessary for a university leadership to be able to terminate an established cluster at the right time. A long decline which eats up considerable financial resources that are lacking for the support of innovative new initiatives is more common.

These four typical problems of handling an existing cluster are a non-exhaustive list. For instance we have not mentioned all kinds of red tape. Still the problems described here show that the implementation of a cluster over time is costly for university leadership. Leading a university without clusters surely is an easier way to go. That university leaders nevertheless do almost anything to create clusters shows that the perceived benefits of having clusters outweigh these costs.

## Conclusion

It would be worthwhile to study the real – in contrast to the perceived – positive and negative effects of cluster-building for a particular university. This is the meso level of effects. In our analysis we briefly mentioned some micro level effects of engaging in cluster-building for individual researchers. But the most important level where effects of cluster-building have to be studied is the macro level. In other words: What does it mean for the performance of the national and global science system if cluster-building occurs in more and more scientific fields?

The prevalent cluster rhetoric provides us with a one-sided view which stresses the positive effects of cluster-building on scientific progress. It is even claimed that without cluster-building any further progress is hampered. Without denying the advantages of cluster-building in many research fields it has to be asked whether this is a universal recipe for further scientific progress and whether its benefits always outweigh the costs. To give an example of the issues that have to be reflected: The coordination of research work which constitutes clusters means a declining autonomy for the individual selection of research topics. This implies necessarily an overall declining diversity of topics and approaches in the cluster's field. To the degree that diversity is beneficial as a variation pool of the evolutionary progress of knowledge (Nowotny 1990) clusters may be detrimental because they narrow down perspectives by coordination of individual research lines even more so by research cooperation.

Let us repeat: This is not a plea against cluster-building and for individualistic research. We simply do not have enough empirically based knowledge about the macro effects of a proliferation of research clusters in more and more scientific fields. Speculations like the ones just mentioned have to be carefully investigated to find out whether they are true or not. We assume that such investigations might come to the overall conclusion that certain kinds of clusters in certain contexts and under certain conditions are highly functional for scientific progress but that there are other circumstances where cluster-building is detrimental to the knowledge production of science.

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