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Uwe Schimank: Transformation of Research Systems in Central and Eastern Europe: A Coincidence of Opportunities and Trouble.

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• ABSTRACT

This paper analyzes the transformation of research systems in Central and Eastern Europe as a coincidence of opportunities and trouble. Political rebuilding has brought opportunities for the greater self-regulation of research which has been demanded by many researchers. But an appropriate institutional rebuilding of the research system is strongly restricted by sharply reduced resources, and by political pressure towards research orientated to short-term applications in industry. These factors have shaped the dynamics of the transformation of research systems in the post-communist countries and have led, so far, to rather unsatisfactory outcomes. This paper gives an overview of these developments, emphasizing the similarities between the different countries.

Transformation of Research Systems in Central and Eastern Europe: A Coincidence of Opportunities and Trouble

Uwe Schimank

The transformation of research systems in the former communist countries of Central and Eastern Europe is deeply embedded in these countries' political and economic transformations. Opportunities for a major rebuilding of the research system opened up as a consequence of political transformation — namely, the demise of the communist party's absolute rule of society. These opportunities, in turn, have allowed researchers the public expression and the pursuit of goals whose common denominator has been a greater self-regulation of scientific research according to its own criteria and logic. The idea of scientific self-regulation is not only a constitutive normative principle of modern science but also expresses for research actors — individual researchers as well as research institutes — a very common general interest of societal actors: in particular, the interest to maintain and, if possible, expand their autonomy.

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But the opportunities finally to realize these goals after many decades of political domination of research have been severely restricted by the effects of economic transformation. Economic crisis has deepened, and this has brought about a dramatic fiscal crisis of the state. In this situation, the political priorities for spending these reduced financial resources have shifted towards social and economic policy. Research actors have mainly had to face indifference to their needs on the side of policy-makers. As a consequence, finances available for research have been cut back strongly, and the whole research system has had to suffer severe losses. To compensate for these losses, at least partly, many researchers and institutes have shifted their work towards contract research for industry and, moreover, away from research into other kinds of activities by which some money could be earned. Such urgencies clearly go against any drive towards a more autonomous scientific selection of research topics and types of research. In addition, if the new political actors have been interested in research policy at all, they have pressed research strongly to contribute to economic recovery. Research institutes are supposed to concentrate on research with an immediate innovation potential for industry. These political pressures have also been detrimental to research actors' goals.

This bundle of opportunities, goals and restrictions is basically similar in all post-communist countries, and this allows us to construct a theoretical 'ideal-type' of the transformation dynamics of these countries' research systems. This 'ideal-type' deliberately ignores differences between the national transformations in favour of a clear explication of their common features. This is a necessary first step to a deeper analytical understanding of these complex social processes. Only against the background of such an 'ideal-type' can the national peculiarities be properly assessed.

Accordingly, the following analysis tries to reconstruct the *ideal-typical transformation dynamics of the research system of a post-communist country*. The empirical basis for this attempt are mainly country reports which were worked out according to a common analytical frame.¹ This makes them especially suitable for a comparative analysis. Nevertheless, it must be emphasized that available empirical information is fragmentary and not always reliable. As a consequence, the following analysis is sometimes a walk on thin ice.

Theoretically, the perspective of a *political sociology of science*

is adopted: this focuses on political action as providing opportunities and creating trouble for research. The starting point is that research actors — individual researchers as well as research teams and research institutes — have to engage in various activities whose principal aim is to ensure the continuation of their research activities.² Although such research-related activities are also addressed to other significant groups, political actors form a very important target. This perspective stresses the vital interests of research actors in coming to terms with political actors, and the importance of the ability of research actors to influence political actors. As such, it is obviously a good starting point for analyzing the transformation dynamics of a post-communist research system.

Analytically, this approach adopts the viewpoint of research actors.³ They assess political action with regard to its intended or unintended consequences on their own research conditions. A particular political action may turn out to offer research actors opportunities to maintain or even improve their research conditions; alternatively, it may turn out to be troublesome in the sense of worsening research conditions, or at least threatening to do so. Both possibilities have been illustrated abundantly by empirical cases from western countries. For several decades after World War II, the ability and willingness of research groups, scientific communities or research institutes to take advantage of opportunities presented by political actors dominated the attention of science studies.⁴ This can be explained by the fact that for research policy this was a period of affluence as well as a period of trust in the societal benefits of research. At the end of the 1970s, however, a period of scarcity and distrust began, the latter originating in challenges to the belief in a harmonious concurrence of science's pursuit of knowledge and its societal usefulness. On the one hand, the risks of science to society have become more evident. Prominent examples are the controversies about the use of nuclear energy or biotechnology. On the other hand, societal demand for scientific knowledge has grown to an extent which is not served voluntarily by research actors who, therefore, have to be pressed increasingly to pay attention to extra-scientific criteria of relevance. The debates about technology transfer from academic science to industry testify to this. In addition, the funding of research by the state has become more precarious. For all these reasons, research policy has clearly turned out to be more troublesome to research, by a sequence of resource cutbacks,

intensification of regulations and an increased emphasis on societal instrumentalization of research. Focusing on these phenomena, an analytical perspective of 'coping with trouble' was recently developed by Uwe Schimank and Andreas Stucke.⁵

As already indicated, the transformation dynamics of a post-communist research system have evidently offered good opportunities to get rid of some institutional structures which had previously restrained the self-regulation of research. But there has been massive trouble as well. A *coincidence of opportunities and trouble* seems to be characteristic of the transformation of research systems in Central and Eastern Europe. With this as an orienting idea, the following investigation of empirical evidence proceeds in four steps. First, the goals for institutional rebuilding which many research actors have held are clarified, and cleavages among research actors with regard to these goals are identified. Second, the scarcity of resources for research which soon became apparent (and has intensified since) is dealt with as a restriction on institutional rebuilding. Third, political concern to instrumentalize research for economic recovery is analyzed as another restriction, or as a deformation of institutional rebuilding. Fourth, some measures of institutional rebuilding that have nevertheless been achieved are outlined.

Goals of Institutional Rebuilding

When the rule of the communist party was overthrown, research actors were suddenly confronted with opportunities to rebuild the institutional structure of the research system. These opportunities revived desires which had been suppressed for decades. The resulting new goals correspond to the differentiation of modern society, as it is realized in the advanced capitalist societies, into highly autonomous sub-systems. Like other sub-systems in communist society, such as education, economy or health care, research was under the command of the political system. This resulted in a 'blunted differentiation' of communist societies.⁶ In this (essentially functionalist) analysis, the specific logics of action of societal sub-systems could not develop according to their inherent potentialities because they were all restrained by the political logic of action. This was a logical consequence of a comprehensively planned society, as it was envisioned by socialist

ideology. Moreover, the societal dominance of the political subsystem was necessary to maintain the communist party's rule throughout society. When the transformation of post-communist society in general oriented itself to the western model, research actors in particular naturally aspired to the kind of level of self-regulation that is realized in western research systems.

Research actors' goals of institutional rebuilding focused on three central issues. The first and most important one was to abolish the massive political interventions into individuals' research autonomy and careers. Researchers were subject to manifold restrictions on participation in worldwide scientific communication. These ranged from prohibitions on attending conferences or cooperating with other researchers abroad, to elaborate procedures for permission to publish one's own research results.⁷ Such intensive political control necessitated rigid hierarchies within research institutes. Accordingly, decisions about scientific careers were heavily biased politically — the higher someone was on the career ladder, the more so. All these political intrusions into research were legitimized by a doctrine which lifted the communist party into the role of the omniscient architect of socialist society. To get rid of such political interventions, in the view of many researchers, required an institutionalization of the fundamental individual rights of scientific autonomy, according to the western model.

The second issue concerned the strong political pressure on research organizations to concentrate on producing knowledge with extra-scientific utility. Yearly and five-year plans stipulated the specific research topics an institute had to address. Until the middle of the 1970s, the party nevertheless allowed research institutes considerable self-determination over their research agenda. But when the economic situation deteriorated during the 1980s, the demands on research to contribute to economic recovery became more imperative. Such pressure was supported by official socialist ideology, which saw research primarily as a decisive productive force. In opposition to this one-dimensional view of research policy, after the Party's collapse, researchers asserted the legitimacy of curiosity-driven basic research.

The third issue for many researchers was the privileged position of the national academy as the centre of the research system. This was an outcome of the centralist tendency inherent in the party's concern to stay in control of the whole society, and rationally to

plan all societal processes. The national scientific élite was heavily concentrated in the academy, whose research infrastructure was much better than elsewhere.⁸ Moreover, with no ministry of research existing in most communist countries, the academy had considerable influence and competence in research policy: consequently, it was also able to stabilize its position by political means. The other side of this coin was the neglect of university research. Universities were primarily conceived of as educational organizations with research, at best, as a side-involvement. This situation aroused dissatisfaction, expressed in demands to strengthen the status of, and the capacities for, research at universities.

Only with regard to the second issue was there strong unanimity among research actors. Even those researchers who did applied research — including development work — and were convinced of its merit felt that the political pressure towards immediately useful technological knowledge had become too strong. By contrast, the third issue produced a clear-cut cleavage among research actors. It came as no surprise that the universities were in favour of strengthening their research capacity, whereas the academies opposed this. Their opposition was not always open. It became especially strong when political measures in favour of the universities' research capacity were immediately disadvantageous to an academy's research capacity — for instance, if the public research budget was shifted towards the universities. But even if an academy's research capacity was not reduced by measures which improved the research capacity of universities, the relative position of the former, its established superiority, was threatened, at least in the long run. Thus the academies have always interpreted this issue as a challenge which endangered their position.

Finally, from the first issue emerged a latent conflict of interests among different groups of researchers. This has become the strongest endogenous force shaping the dynamics of the research system's transformation. Four kinds of researchers can be distinguished according to their formal status and their professional self-confidence:⁹

— high status, low professional self-confidence: those scientific leaders — often directors of institutes or departments — who had built their careers primarily as 'party favourites';

— high status, high professional self-confidence: those scientific

leaders who had made their careers primarily by scientific achievements and had confined their political involvement with the party to the minimum necessary for eligibility for senior positions;

— low status, high professional self-confidence: those scientific workers who were scientifically ambitious and considered themselves as potential high performers, provided they were no longer hindered by political interferences;

— low status, low professional self-confidence: those security-oriented scientific workers who were content with the position they had reached because it provided them at least a shelter from tough competition for scientific status.

The combination of these two characteristics of a particular researcher shaped his or her interests strongly.¹⁰ In communist society, a stable coalition existed between the 'party favourites' among the scientific leaders and the security-oriented scientific workers. This coalition of those researchers with low professional self-confidence was bolstered by the communist party, which took care to ensure that enough 'party favourites' were elected as directors so that even those directors who were not 'party favourites', but were chosen for their scientific abilities, knew that they had no chance of openly opposing this arrangement. All that the scientific achievers among the leaders could do was to provide some of their ambitious scientific workers individually with somewhat better than normal research opportunities.

The transformation saw an open uprising of the scientifically ambitious, allied with the scientific achievers among the leaders. After the breakdown of communist party rule, the collective force of these 'reformers' could no longer be stopped by forces outside the research system. But it still might have been stopped by the old coalition of researchers with low professional self-confidence, which was oriented towards the status quo. That this did not happen immediately was due to the fact that outside as well as inside the research system the demands of the 'reformers' could not be challenged, for normative reasons. Scientific competition which rewards those researchers who perform best, and so improves the overall performance of the research system, is an ideal against which nobody could then speak out openly — especially against the background of a communist society which was perceived to have collapsed precisely because of its inefficiencies and ineffectiveness, and the widely shared prospect of

adopting the western model of society because of its efficiency and effectiveness. At least rhetorically, even 'party favourites' and security-oriented research workers were bound to agree with the demands of the 'reformers'.

In sum, each of the three issues initially opened a window of opportunity for a far-reaching institutional rebuilding of the research system. The first two issues found strong support among researchers, and the third one at least challenged the foundation of the academy's former position. However, great expectations soon changed into a bleak reality, with even bleaker prospects for the future. Opportunities to attain a much higher level of scientific self-regulation were quickly overshadowed (and partly superseded) by trouble caused by the scarcity of resources for research, and by new attempts to instrumentalize it for economic recovery. As a result, the interests of many research actors changed, and their original goals of institutional rebuilding have often not been pursued with the same vigour as they were immediately after the collapse of the old regime.

Scarcity of Resources

In the 1980s, the growing economic problems of the communist countries had already brought about an increasing scarcity of resources for research. Although, rhetorically, research was declared to be an indispensable need for overcoming these economic difficulties, in fact, even before the collapse of communist society, research was losing priority in the allocation of the state budget. Afterwards, when the extent of the economic crisis became visible, the scarcity of resources for research got worse. The branch institutes, including the branch academies,¹¹ have been struck particularly hard by resource losses, but the universities and the national academy have also suffered considerably. The research sector as a whole has had to endure cutbacks which would be unthinkable in contemporary western countries. From 1989/90 to 1992/93, the reduction of the total personnel in the research system varied roughly between 20% and 60%, and the reduction of active researchers between 10% and 40%, in the different countries. These are considerable differences, which will not be discussed here. But even in those countries where the losses have been comparatively small, they have amounted to a heavy

burden on most research institutes. Many have had to cope with losses of at least one third of their finances and personnel within a few years; some institutes' losses have been as high as nine-tenths — not to mention those which were closed altogether.

In these circumstances, survival has become the paramount consideration of most researchers and institutes. Many research actors have had no realistic chances of pursuing any active coping strategies but have been forced into a situation of helpless suffering — especially in the branch sector of the research system. The branch institutes, as well as the research departments of firms, have experienced an almost total drop in demand for research from industry, and have hardly been able to find alternative customers for their work. At best, coping strategies for branch institutes have involved trying to find some other work with which to earn money — for instance, offering testing or constructing services, or even buildings or offices for rent. Other research actors have had some hope of waiting for better times. This was the case particularly in the universities, which were able to devote themselves to teaching, and thus legitimize their resource needs.

Prospects for active coping have been best in the academy. The following kinds of coping strategies were possible, and have been pursued with varying success:

— Necessary steps to reduce costs have been implemented so as to give priority to job security. First of all, investments have been stopped; then operating costs have been decreased to a minimum; then salaries of personnel have been reduced and paid belatedly: only after all this turned out to be insufficient have personnel been reduced.

— In part, the reduction of personnel has simply occurred as a result of individual decisions to leave. This has been easier for some groups of personnel than for others. Non-researchers have often had better chances on the labour market than researchers, and younger people better than older. But these differential individual chances to cope by 'exit' have generally been inversely related to differential capacities to cope by 'voice'.¹² Older researchers who have had the lowest 'exit' chances have often been the most senior, and therefore the most influential in organizational decision-making about who must leave and who may stay. Consequently, their coping has often been to the disadvantage of other kinds of personnel, who it might be said

have been 'pushed' out as much as they have 'opted' out of research.

— Cutbacks of resources have usually been divided proportionately among departments, institutes or research groups. This has reflected an implicit mutual non-aggression pact between risk-averse research actors who are dependent upon each other — at least in the sense that it is very probable that the others can and will sanction those who make claims that they should be spared their share of the collective resource losses. By this coping pattern, research actors have at least achieved an 'avoidance of mutual harm'.¹³

— Finally, research actors have attempted to compensate for their resource losses by the acquisition of additional resources elsewhere. Individual researchers have often taken up additional jobs or have tried to mobilize funds from western sources — governments or private foundations. Contract research for government agencies or industrial firms — often foreign ones — has been another way in which research actors have tried to earn some additional money. Unfortunately, the need to engage in these acquisitive activities has been growing faster than the pool of resources available. Thus the aggregate effect of these coping practices has been an increasingly ruinous competition among research actors, with each of them getting less and less, with decreasing chances of success, from an ever-increasing effort.

The main effects of resource scarcity on the transformation dynamics have been twofold. First, this trouble, coupled with the respective coping activities, has been to the disadvantage of research in several respects. Although no statistical data are available, it can be assumed that the research capacity has shrunk — notably because of reduced personpower, but also of the reduced attention the remaining researchers are able to pay to research activities. Research has also reportedly become less productive because one of the most important prerequisites of scientific creativity — a constant input of well-trained talented young researchers with new ideas — is no longer fulfilled. Finally, because of the insecurities of resource provision, and the necessity to acquire additional resources from various sources, especially by contracts, it seems likely that research has become increasingly geared to meeting the short-term demands of customers — a shift especially harmful to long-term basic research.

To date, nobody can say how strong these dysfunctional tendencies have become. Many observers are convinced that, despite noisy lamentations from the affected research actors, the reduction of research capacity may even have a beneficial side because, before the transformation, research institutes were simply over-staffed, to hide unemployment. But the risk involved in these tendencies is that there are no alarm signals to ring when the situation becomes disastrous. That post-communist countries are about to ruin their research base — which had already been brought to the brink of ruin — does not hurt any politician or firm now. All these tendencies may go on unnoticed, except by those immediately affected, the researchers: they are not able to stop them, for a long while; and their serious consequences become apparent only when it is much too late to do anything about them.

Secondly, coping with resource scarcity has occupied the attention of most research actors completely (or almost completely), and this has been to the disadvantage of institutional rebuilding. With regard to the first issue mentioned above — instituting individual research autonomy — the trouble has created a ‘high cost situation’,¹⁴ in which defending the status quo (even if it is strongly disliked) against a strong threat is clearly more urgent than trying to improve the status quo. This awareness of ‘First things first!’ has been not just a matter of actors’ limited capacity simultaneously to pursue two entirely different interests: even ‘reformers’ have had to realize that it is most probably the wrong time for a far-reaching institutional rebuilding. This explains in part why so many ‘party favourites’ among the scientific leaders have stayed in office. Of course, they have implicitly promised the security-oriented researchers to do their best to keep up the old order within the institutes: this traditional tacit coalition of those with low professional self-confidence has thus been preserved. But even scientifically ambitious, reform-oriented researchers have often had to support ‘party favourites’ because their experience and connections have seemed to be urgently needed for the difficult task of political lobbying and acquiring additional resources.

The scarcity of resources has also impeded the strengthening of university research in comparison to the academy. First, the fact that the universities have been able to persist with teaching has blunted the urgency of their demands. Moreover, without an increase of resources, strengthening university research could only

have been achieved by a massive redistribution of resources. But redistributive measures will obviously face the strongest resistance from those who have to give away a significant amount of their resources — and the more so, the more losses they had to suffer anyway. Academies were surely determined to defend their privileges. In doing this, academies could even argue on normative grounds that they deserve the most resources because they produce most of the best research — a claim which nobody could deny. Thus, in the conflict of interest between academies and universities, the former have been able to turn the ‘reformers’ own arguments against them. In contrast, with abundant resources, the universities could have got more without taking away anything from the academies.

To sum up, scarcity of resources has limited institutional rebuilding with regard to instituting individual research autonomy, and to strengthening university research. Turning now to the issue of a stronger emphasis on curiosity-driven basic research, it is clear that this specific goal of institutional rebuilding has not gained a hearing because of the scarcity of resources, in combination with political attempts to use research as an instrument of economic recovery.

Political Pressures

The attitude towards research of the new political actors — individual politicians, as well as political parties — has been predominantly one of indifference. The needs of research and issues of research policy ‘are often left aside, ignored by politicians whose understandable position is that “today we are fighting for the bread of the people, for the survival of the nation, and science and technology can wait a little”’.¹⁵ As already described, this neglect has manifested itself in a scarcity of resources. In all countries, public expenditure for research decreased faster than the decline in the total state budget. Where political actors have shown some interest in research at all, this interest has been chiefly motivated by the hope that research might help the country out of the economic crisis. Consequently, these political actors, as the communists before them, have pursued research which offers an immediate innovation potential for industry.

This interest has manifested itself mainly in political rhetoric.

Research actors have been reproved that, in these challenging times, it is their overriding duty to make their contribution to the overall national effort to 'save the country'. Such bold rhetoric is symptomatic of 'politics as symbolic action',¹⁶ when policy-makers are unable or unwilling to decide upon and implement political measures. This has been predominantly the case here, too. Still, some measures have been associated with this goal of research policy. The most prominent have been: the establishment of funding agencies for technical research, financed by special taxes from industry; the differential allocation of institutional funding to branch institutes according to the amount they earn by research contracts from industry; support for commercial research institutes, especially if they have split from branch institutes or from institutes of the academy; and the establishment of science parks in the neighbourhood of applied institutes of the academy or branch institutes.¹⁷ However, bearing in mind the paucity of the state's resources, all these measures have been motivated more by the hope of shifting the financial support of research to industry and other customers than by any clear goals of research policy. Lack of resources, moreover, has by itself been the most effective measure of a research policy aimed at intensifying technology transfer to industry. For, as already mentioned, one of the effects of this resource scarcity on research institutes has been to force them into a frantic search for research contracts.

The fundamental problem which such direct and indirect political efforts to orientate research towards application have had to face has become evident very quickly. Quite simply, there has been almost no industrial demand for applied research. Firms cannot afford to invest in research, even though the medium- and long-term usefulness of doing this has been evident to them. In the very difficult economic circumstances which virtually all firms have to cope with, they have adopted an extremely short-term perspective on investment. What does not pay almost immediately is wasted, even if it may significantly increase the long-term survival chances of the firm. In this conflict of interest between survival today and survival tomorrow, the latter has to be sacrificed — and this means that, among other things, research is sacrificed.¹⁸ This, however, amounts to the fact that research has been unable to demonstrate its usefulness with regard to exactly those goals which research policy has cared about most. Paradoxically, the desolate

economic situation has prevented the research system from complying with a research policy which has been conceived to make research contribute to economic recovery.

Although for this reason their chances to acquire research contracts have been very small, research actors have nevertheless had to try; and this means that they have had to invest a lot of time and effort in acquisitive activities. Even more, to appear attractive to potential industrial customers, research institutes have had to shift their research agenda towards short-term application-oriented research work. This has brought about a growing neglect of more basic-oriented research. Even basic research with a clear (though relatively long-term) application orientation has been abandoned, in an often futile attempt to acquire research contracts. These developments have definitely clashed with the desire of researchers and research institutes to strengthen basic research. Thus, with regard to the crucial issue of institutional rebuilding, research actors have mostly failed. Scarcity of resources has forced them to ignore their own preferences for more basic research in favour of such kinds of applied research with which they have hoped — most often in vain — to earn some desperately needed money.

These phenomena highlight again the embeddedness of the transformation of the research systems of post-communist societies in these societies' economic transformation. Economic recovery has proved to be a necessary, although not sufficient, condition of attaining the far-reaching aims of institutional rebuilding which many research actors originally sought. This applies to all three issues — not only to better prospects for doing basic research, but also to strengthening university research and to expanded individual autonomy in pursuit of research interests and careers. The desired increase in self-regulation of research in these three respects depends on economic recovery, because only then will opportunities for institutional rebuilding not be almost totally overshadowed by massive trouble from scarcity of resources, and from political pressure for short-term applied research. Since economic recovery is beyond the scope of research actors' influence, to realize their long-cherished desires they can do little else but wait and hope for better times. Meanwhile, they have a lot to do just to survive — and for many of them even this has turned out to be impossible, despite their utmost efforts.

Achievements of the 'Reformers'

Up to now, the analysis has plainly amounted to a story of decline. Although this is most of the truth, it is not all of it. Opportunities for institutional rebuilding to increase the self-regulation of research have not been totally eliminated by the massive trouble described above. In order to give a more balanced analysis, this final section examines what the 'reformers' have already achieved. Three major achievements will be pointed out: they are all important prerequisites of scientific self-regulation, as western experience has shown.¹⁹ Although each of these achievements is unfinished and, by itself, insufficient, they are nevertheless promising starting points for continued institutional rebuilding.

The first achievement consisted in the institutionalization of basic legal rights of autonomy for individual researchers, and of new statutes for research institutes which enlarged both their autonomy from the state and the internal autonomy of their sub-units. Although passing the relevant bills often took a rather long time, this was due more to the indifference of politicians for matters of research policy, than to any political resistance to these legal changes. The normative irrefutability of demands for the self-regulation of research sufficed to overcome very strong interests against them. As described, within the research system, not only the 'political favourites' among scientific leaders, but also the security-oriented researchers, were secretly against these changes because they endangered their positions. Moreover, political actors were at least ambivalent because they would have to give up rights to intervene in research which could be seen as especially valuable for intensified political pressures. Nevertheless, neither those research actors nor the politicians could openly oppose the passing of these bills — at least not for these reasons.

Many 'political favourites' have remained in office as directors of research institutes. This might be interpreted as evidence for the failure of transformation. Indeed, as already mentioned, to some extent the survival of 'party favourites' in their leadership positions must be explained by the fact that even 'reformers' have had to support them, because they realized that their own survival as researchers has been at stake. On the other hand, it seems that the directors' power *vis-à-vis* departments, research groups and individual researchers have been significantly reduced. The directors can no longer determine who works on which research topics,

who cooperates with whom, or who can or cannot publish something in which journals. Most importantly, neither are they pressed to such action by an almighty political party, nor are they backed by it if they behave in such ways for their own reasons. Thus, even the remaining 'party favourites' are able to, and have to, adapt their leadership behaviour to a proper respect for their researchers' individual autonomy. And sooner or later the 'party favourites' may simply die out: the old ones will retire and, hopefully, no new ones will succeed them. Of course, this prospect for the future will be realized only if the political transformation moves on towards democratization.

Moreover, out of the necessity to cope with the scarcity of resources by acquiring additional funds on their own, many researchers and research groups have already emerged with a growing financial independence from their institutes and directors. This points to the second achievement — namely, the institutionalization of funding agencies which distribute research grants on the basis of competitive applications, and procedures of peer review. Only by allocating a substantial part of the resources in this way, instead of a complete institutional financing of research, can scarce resources be redistributed according to scientific quality — provided peer review functions effectively. As yet this has to be seriously questioned because, in closely-knit and often rather small scientific communities, implicit non-aggression pacts emerge quickly. This is expressed, for example, in a pointed comment on the Hungarian experience so far: 'Everyone knows everyone in the peer review system. . . . Year by year no one loses resources and no one gains better position'.²⁰ Anecdotal evidence suggests that, from time to time, tacit coalitions of 'party favourites' have formed in the peer review process, serving themselves to the disadvantage of others. However, despite the continuing existence of considerable distortions in the new funding mechanisms,²¹ their expansion is a critical factor for the self-regulation of the research system. Of exceptional importance are special funding agencies for basic research, because they can at least partially counterbalance tendencies to neglect this type of research. Meanwhile all post-communist countries have established funding agencies specifically devoted to curiosity-driven basic research. Already, in some countries, a substantial fraction of the available resources is distributed by such funding agencies — about 40% in the Czech Republic, for instance.²² In other countries the share of these

agencies is still very small. For example, to date the Russian funding agency for basic research provides only 3% of the resources spent for this type of research.²³

The third achievement has been the establishment of research ministries. Only a few countries had such ministries before their transformation. One consequence of this institutional change is that the academies have lost their former political influence and can no longer use it to protect their privileges, especially against the universities. This has made it easier to improve the legal status of university research: this is a precondition for an eventual redistribution of resources from the academies to the universities.

More generally, a research ministry might be very beneficial for the research system as a whole if it succeeds in overcoming the implicit mutual non-aggression pacts among research actors which have tended to preserve the status quo of resource distribution. This status quo involved a lot of outmoded research which had accumulated under communism because almost no research institute or department had been closed.²⁴ The other side of the coin is that innovative new research fields have tended to receive much less than they have needed. For research actors it is very difficult (and often nearly impossible) to break through these arrangements which maintain the status quo. But a research ministry, as an outside actor, may be able to achieve this by a more selective distribution of its resources. For example, in Russia in 1993, the ministry created the so-called 'State Scientific Centres' to give a small number of excellent and promising research groups and institutes preferential treatment. This was strongly opposed at first by the Russian Academy of Science; but the ministry had its way. Stripping the academy of its political competencies and giving them to a research ministry also emphasizes the differences between the political and the scientific logic of action. This increases the autonomy of research from politics — but, of course, the autonomy of politics from research as well. Scientific leaders are no longer supposed to act as spokespersons of (or even extensions of) politics within the research system.

Finally, the establishment of a research ministry improves the standing of research policy as a policy domain of its own. Other ministries always subordinate their sectoral research policy to their primary function. As a consequence, their tendency to press research towards short-term interests is stronger than in a research ministry, where a consideration of the long-term needs of research

— which include an appropriate share of curiosity-driven basic research — although by no means dominant, should be more marked. The new ministry's interest in stabilizing (and, if possible, expanding) its policy domain is another factor which might, over time, have beneficial side-effects on the autonomy of the research system. For instance, the ministry might obtain support from important research actors for the extension of its political domains by granting them further rights of self-regulation.

These three achievements suggest that it would be wrong to portray the transformation dynamics of research systems in post-communist Central and East European countries as merely a brief period of hope for far-reaching institutional rebuilding, but then just trouble, with no opportunities left. Instead, to conclude this overview of the similarities between these transformation dynamics in the different countries, the initial guiding idea can be underlined. Our understanding of the transformation dynamics is indeed much improved by viewing them as an *ongoing* interplay between coping with trouble, on the one hand, and taking advantage of opportunities, on the other. It is true that (as one observer puts it for Russia): 'the crisis and transition in the Russian S&T system has so far meant, in the first place, defensive adaptation to resource cuts and to a lesser degree an active and effective restructuration of the system'.²⁵ But there may be at least a chance that the balance between trouble and opportunities will shift over time to the latter.

• NOTES

1. For a full description of the methodology and results of this comparative survey, see the reports collected in Renate Mayntz et al. (eds), *Transformation der mittel- und osteuropäischen Wissenschaftssysteme* (Opladen: Leske & Budrich, forthcoming 1995). The evidence for claims made in this paper, where no specific references are given, will be found in this volume. Some background details are also contained in the Editorial Introduction to this Special Issue: see Katalin Balázs, Wendy Faulkner and Uwe Schimank, 'Transformation of the Research Systems of Post-Communist Central and Eastern Europe: An Introduction', *Social Studies of Science*, Vol. 25, No 4 (November 1995), 613–33, esp. 623–25. See also OECD, *Science and Technology Policy: Review and Outlook* (Paris: OECD, 1994), 285–306. For the special case of East Germany, see Mayntz, *Deutsche Forschung im Einigungsprozeß; Die Transformation der Akademie der Wissenschaften der*

DDR 1989 bis 1992 (Frankfurt-am-Main: Campus, 1994) and Mayntz (ed.), *Aufbruch und Reform von oben. Ostdeutsche Universitäten im Transformationsprozess* (Frankfurt-am-Main: Campus, 1994).

2. For research teams, this has been sketched out by Wolfgang Krohn and Guenther Kueppers in their 'self-organization' perspective on science: see W. Krohn and G. Kueppers, 'The Self-Organization of Science: Outline of a Theoretical Model', *Sociology of the Sciences Yearbook*, Vol. 14 (1990), 208–22.

3. This does not mean that the analysis shares (or even justifies) research actors' assessments of their relations to political actors. If research actors, for instance, condemn some political action as 'bad' for research, the analysis does not approve this condemnation. But, as a starting point, it uses the observation that researchers act on the basis of this particular judgement.

4. For a survey, see Sheila Jasanoff et al. (eds), *Handbook of Science and Technology Studies* (Thousand Oaks, CA, London & New Delhi: Sage Publications, 1994), esp. Part VII, 'Science, Technology, and the State', 527–670.

5. Uwe Schimank and Andreas Stucke (eds), *Coping with Trouble: How Science Reacts to Political Disturbances of Research Conditions* (Frankfurt-am-Main: Campus; New York: St Martin's Press, 1994). The case studies collected in this volume illustrate the range of possible 'trouble'.

6. Paul Colomy, 'Revisions and Progress in Differentiation Theory', in Jeffrey C. Alexander and Colomy (eds), *Differentiation Theory and Social Change: Comparative and Historical Perspectives* (New York: Columbia University Press, 1990), 465–97, at 470.

7. It is true that 'the really active researchers . . . used to have a double structure of research thematics, one officially planned for them and the other, unofficial, reflecting their own personal research interests': see Erkki Kautonen, 'Science and Technology in Russia: Collapse or New Dynamics?', *Science Studies* (Finland), Vol. 4, No. 2 (1994), 23–36, at 29. But this informal 'under-life' of the official structures was, first, difficult to maintain, and often impossible; and, second, severely restricted by formal regulations.

8. Another reason for this was that the academy was a good place, from the party's viewpoint, for those able researchers who were critical intellectuals. At the academy, they were separated from students, and could not exert any 'bad influence' on them.

9. These categories arise from the research summarized in Mayntz et al. (eds), op. cit. note 1. For the sake of simplicity, these types represent only the extreme points of the two dimensions. Most real people are more moderate — which also means, less straightforward — than these analytical 'caricatures'.

10. See also the similar analytical approach of Simeonova, in this Special Issue, who identifies the interests of different groups within the scientific community which are strictly determined by their previous positions in the Bulgarian Academy of Sciences: see Kostadinka Simeonova, 'Radical and Defensive Strategies in the Democratization of the Bulgarian Academy of Sciences', *Social Studies of Science*, Vol. 25, No 4 (November 1995), 755–75, at 762.

11. For an explanation of these terms, see the Editorial Introduction to this Special Issue: Balázs et al., op. cit. note 1, 613–32.

12. To use the concepts of Albert O. Hirschman, *Exit, Voice, and Loyalty: Responses to Decline in Firms, Organizations, and States* (Cambridge: Cambridge University Press, 1970).

13. This is my translation of a phrase of Fritz Scharpf: see Fritz W. Scharpf, 'Politiknetzwerke als Steuerungsobjekte', in Hans-Ulrich Derlien et al. (eds), *Systemrationalität und Partialinteresse: Festschrift für Renate Mayntz* (Baden-Baden: Nomos, 1994), 381–408, at 389.

14. Spiro J. Latsis, 'Situational Determinism in Economics', *British Journal for the Philosophy of Science*, Vol. 23 (1972), 207–45.

15. Stoyan Denchev, 'Science and Technology in the New Bulgaria', *Technology in Society*, Vol. 15 (1993), 57–63, at 58–59.

16. Murray Edelman, *Politics as Symbolic Action: Mass Arousal and Acquiescence* (New York: Academic Press, 1971).

17. See also Balázs, in this Special Issue, for an extensive description and discussion of these emerging 'academy–industry linkages', with a somewhat more optimistic estimation: Katalin Balázs, 'Innovation Potential Embodied in Research Organizations in Central and Eastern Europe', *Social Studies of Science*, Vol. 25, No. 4 (November 1995), 655–83.

18. See also the case study of Hungary by Mosoni-Fried, in this Special Issue: Judith Mosoni-Fried, 'Industrial Research in Hungary: A Victim of Structural Change', *Social Studies of Science*, Vol. 25, No. 4 (November 1995), 777–803. 'Today's customers apply to the R&D companies mainly for services (various measurements, quality control, official quality certification, consulting, and so on.). Orders for developing unique machines, materials or technologies are rare occurrences' (794).

19. For reviews of this experience, see Jasanoff et al. (eds), op. cit. note 4. Of central importance here is the point (often implicit in this very extensive literature) that certain basic institutions of the research systems of western countries — legal rights, grant agencies, a differentiated research policy domain — are connected to these systems' effectiveness and efficiency.

20. György Darvas et al., 'Transformation of the Science and Technological Development System in Hungary', in Mayntz et al. (eds), op. cit. note 1, at 86 in 1994 mimeo draft.

21. In some countries, like the Czech Republic, such practices have been countered by a systematic inclusion of foreign scientists in the peer review.

22. Anton Filacek et al. (eds), 'Transformation des Wissenschaftssystems in der Tschechischen Republik', in Mayntz et al. (eds), op. cit. note 1.

23. Nadezhda Gaponenko et al., 'Transformation des Wissenschaftssystems in Rußland', in Mayntz et al. (eds), op. cit. note 1, at 159–60 in 1994 mimeo draft.

24. See also Gaponenko's paper in this Special Issue for this very problematic 'legacy' of communist research policy: Nadezhda Gaponenko, 'Transformation of the Research System in a Transitional Society: The Case of Russia', *Social Studies of Science*, Vol. 25, No. 4 (November 1995), 685–703.

25. Kaukonen, op. cit. note 7, 33.

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