

Dear colleagues,

This time an editorial is devoted not only to a new issue of our Journal, but also to a new rubric of urgent interviews, which we are pleased to launch. INEOS RAS is a crossroads for many scientific avenues and a lot of prominent researchers come in here. It would be remiss not to take an advantage of their presence for making public their opinions about current states of the Russian and global science. Our first interview was conducted with Prof. Dr. Martin Möller, a head of the Laboratory of Smart Materials of INEOS RAS, who is nominated for foreign membership in the Russian Academy of Sciences. Already being a member of the International Advisory Board of INEOS OPEN, he kindly agreed to open a new rubric. The topical issue of our conversation was *the reorganization of the academy of sciences: how does it work?*

First, let me introduce our colleague—Prof. Dr. Martin Möller ([CV](#)). He leads the megagrant "Self-Healing Materials Based on Nanostructured Polymers and Polymer Composites".

The conversation involved also Dr. Aleksandra Bystrova, who I asked to provide explanations on statistics and formalities that arose during the discussion.

Nevertheless, I started the interview with a question about membership in the Russian Academy of Sciences, rather than the reorganization issues. This question afforded a curious prolog to the main topic.

AM: You, a world-renowned scientist, stand for membership in the Russian Academy of Sciences, although this title does not make money or privileges.

MM: It would be a great honor for me to become a member of a highly regarded organization such as the Russian Academy of Sciences, and thereby, to make a contribution to enhancing its authority and further prosperity. During my whole scientific carrier, I was very interested in the research of my Russian colleagues. Collaborations with them were always mutually beneficial and facilitated progress in the field which we developed—the polymer science, in the broadest sense of this term.

In Science Russia is one of the leading nations in the world. Fundamental discoveries and many developments of world-changing impact have their origin in Russian laboratories and research institutions. At the same time, there is a broad agreement that Russia depends in a fundamental manner on the performance and creativity of its scientific organizations as the grass roots for future technological and industrial developments as well as for other societal progress.

Irrespective of political changes and economic turbulences during the last 100 years, Russian scientists could perpetuate the highest standards. One of the major reasons why this has been possible is certainly the cultural and social esteem of the highest standards and requirements in education. Demanding and challenging education sustained and promoted by dedicated teachers and scholars foster exceptional talents, whether it is in music, literature, science, and engineering.

Lately Russia has undergone major activities to hedge and to improve this position and in particular to evolve its organization of science and education further and to promote internationalization in science. This is also a consequence of a certain change of paradigm in science organization, while in the last century disciplinary expertise and individual competence were dominant in scientific achievements, there is now an increasing demand on convergence where experts from different fields collaborate to attack very interdisciplinary questions, *e.g.*, in biomedical materials and tissue engineering.

This has raised a number of questions such as research ability of universities in order to unify research and education, the future organization of the Russian Academy of Sciences and its research institutes as well as the interplay of fundamental and applied research in publically funded research and public private partnerships. So far, the most significant changes that have been implemented regard a significant shift from institutional funding to project-based funding.

This improves the competition for the most excellent and creative concepts, but it also created new challenges for the research institutions in order to pursue long term strategic goals and to ensure continuity of their personal and scientific competence. Like in any transformation, there is a need to balance promotion of the new structures and to preserve valuable skills and competences.

AM: Five years of reorganizations in our Academy convinced us that a reform is really worth pursuing, but nothing like the current one...The goals and objectives as well as their realization steps were not clearly defined. The target parameters were not formulated. The Academy's opinion about the methods for realization of its reorganization was ignored. The reform was carried out like the October Revolution: unexpectedly and incompetently. This reminds me an old soviet joke:

– Look, grandma, what do you think, the Revolution was carried out by Bolsheviks or scientists?

– Bolsheviks, my dear, Bolsheviks...scientists would have firstly tried on dogs.

Meanwhile, there are very similar precedents in the world. The Academy of Sciences of the German Democratic Republic (GDR), which was created based on the model of the Academy of Sciences of USSR, also required reorganization: it also must have been adopted for a capitalist system. Let's just talk about it. Some statistics for the beginning.

AB: The Academy of Sciences of GDR was founded in 1946. In the 1980s, it consisted of 60 institutes with about 24,000 employees (including 10,000 scientific staff). After the assessment procedure, performed by the Scientific Council (Wissenschaftsrat, WR), 21 institutes were preserved and reorganized into the corresponding successors, 28 institutes were divided into several organizations, 5 institutes were integrated into the existing research centers, and 6 institutes were disbanded.

The Academic Institutes then gave rise to 3 research centers and 9 satellite laboratories of the Helmholtz-Association (Helmholtz-Gemeinschaft), 27 new institutes and 4 satellite institutions of the Leibniz-Association (Leibniz-Gemeinschaft), 17 institutes of the Fraunhofer-Society (Fraunhofer-Gesellschaft), 2 new institutes of the Max-Planck-Society (Max-Planck-Gesellschaft), 3 federal institutes and 4 satellite laboratories, as well as 6 research organizations supported by the federal states—58 institutes and 17 branches in total. From the viewpoint of both institutes and their staffs, the greatest part of the academic institutes was merged with the Leibniz-Association, known then as the Blue List (Blaue Liste).

AM: That means that nothing was missed in the scientific household of GDR. The institutes fit into a federal scientific structure and now serve effectively and redound to the scientific fame of Germany. But the devil is in the detail: how the evaluation was conducted, who rendered the decisions, which rights were given to the reorganized structures. Prof. Möller was at the scene of these reforms. So, how was it?

MM: First of all it should be noted that our challenge was much easier. In the Federal Republic of Germany (FRG), we could rely on a well-established, internationally competitive structure of the national research system, which then was the template for, in our opinion, the ascendant stage of the development. Politically, it was clear that we had to assess the institutions and to integrate the research activities and potential into the existing structures, preserving the creative potential of the institutes and researchers as much as possible. We proceeded from the premise that the Academy of Sciences of GDR is one of the most valuable assets of German reunification.

Here it might be interesting to analyze the changes of the science system that have been implied in Germany when the scientific research institutions of the former German Democratic Republic were integrated into a science organization that evolved from the Federal Republic of Germany. While research in GDR was organized based on the archetype of the Academy of

Sciences of USSR with right to give PhD degrees, the science organization of the Federal Republic was always based on a duality, where educational tasks were given exclusively to the universities (such as granting a PhD degree or other academic diploma) while non-university research was limited to tasks that could not be fulfilled easily within the organization of the universities (principle of subsidiarity). In coarse grain, promoting excellence exclusively is the task of the Max-Planck-Society, applied research to serve industry is the task of the Fraunhofer-Society, Scientific Infrastructure is the task of the Helmholtz-Association, and the mission of the Leibniz-Association¹ is application-directed fundamental research with special societal relevance such as in economics, information, communication and didactics, cultural heritage and natural history as well as environmental and natural sciences.

Around this set-up, the Federal Republic provided over and established an exemplary system to ensure an efficient interplay between funding decisions and continuous evaluation of the performance and success of the research institutions. Key elements of the evaluation are the principle of subsidiarity and scientific excellence on one side and the societal relevance on the other side. Within the framework of the budgets provided by legislation, decisions on the detailed investment in science are always prepared by a scientific evaluation and in many cases are finalized by councils that comprise scientists as well as policymakers with equal rights. This consensus-directed governance ensures a balance of administrative, political and scientific needs, taking into account that the progress of science is itself science driven.

On the national level such decisions are made by Wissenschaftsrat (WR, www.wissenschaftsrat.de) as the scientific council and the Gemeinsame Wissenschaftskonferenz (GWK, www.gwk-bonn.de) as the council of the science ministers of 16 German states and the Federal Minister of Education and Science. In short, WR prepares a scientific recommendation based on careful peer-to-peer evaluation and GWK takes the final decision based on this recommendation. All decisions, recommendations as well as the outcome of the evaluations are documented and published.² In special cases, like monitoring the success of a specific action, GWK orders special evaluations by especially set up commissions.

AM: Let me try to make sense of my understanding of all this. The science management structure in Germany is long-established and has proven its efficiency. It is headed by the Joint Science Conference (GWK) that includes the representatives from all states and the federal government. This committee draws decisions on the budget distribution between different scientific associations and societies. It also approves causes for creation, transformation, or disbanding of institutes in the country. But all these solutions are made only after a reasonable cause of the Scientific Council (WR), which consists of active scientists who represent the main organizations of the scientific structure of the country. 24 members of this committee are approved by the German President from the candidates nominated by scientific societies and universities. The President personally adds 8 other members to this list, which represent most distinguished people from politics, industry and non-governmental organizations. This committee performs a constant monitoring (activity assessment) of scientific organizations at different levels. The committee has all the required powers to conduct inspections and is fully

¹ Originally, the Blue List comprised a number of research institutes that were of significant national interest but did not really fit into the schemes of Max-Planck-Society, Fraunhofer-Society and Helmholtz-Association. Only in 1997 this group of nationally funded institutes formed the Leibniz-Association, after the number of research institutes has grown from 47 before the unification to 81 after the unification. Presently the Leibniz-Association comprises 93 independent institutes. The Max-Planck-Society lists 84 institutes and facilities, the Fraunhofer-Society—74, and the Helmholtz-Association—19 research centers.

² So far, GWK has published more than 62 documents on their decisions and recommendations on how to organize and to support science in Germany. The reports on all evaluations and scientific recommendations of WR are available online:
https://www.wissenschaftsrat.de/DE/Publikationen/publikationen_node.html.

responsible for the given recommendations. Four times a year they hold plenary meetings and draw solutions to the problems facing the country. To evaluate the institutes, the committee assigns a head of a special commission from its members who forms the commission at the own discretion, depending on the institute profile and its level; usually such a commission includes 7–10 scientific experts.

MM: That is largely correct.

AM: How this work is paid? Can you provide more details on the assessment procedures (inspections) of the institutes?

MM: As an organization, the Wissenschaftsrat provides administrative support and covers travel expenses, but the participation in the committee activities is an honorary task and does not get paid. Evaluations and the decisions about scientific recommendations are prepared according to the established guidelines in regulated procedures. In the case of an evaluation of an institute or research organization, the Wissenschaftsrat develops a questionnaire as the basis of a profile that is to be prepared by the institute, which includes all its activities and societal tasks. Presented are the main achievements, publications, performed projects, received awards, and so on. The questionnaire requests also a forecasting plan on further development of the institute. The profile prepared by the institute is edited and reviewed by the staff members of the WR, the institute can correct objective errors before the profile becomes the basis of the evaluation. The committee initiates a round of hearings and invites cooperating partners from other institutions and companies to hear their views about the institute. It also speaks with staffs of the institute departments (without heads of the departments). After these hearings and evaluation of the institute state, the committee makes a report according to the assessment and formulates recommendations for the Scientific Council (WR): whether the institute deserves further funding, what changes it should include in scientific plans and in research organization, which directions are worth particular attention.

AM: And what happens then?

MM: Based on the report from the visitation, the Scientific Council (WR) formulates and concludes a final scientific recommendation to the GWK: it depends on the assessment results. It can be both an increase in funding or recommendation for termination of the funding.

AM: Does it mean that the institute stops to exist?

MM: Not so fast: it will have three years with gradually reducing funding, eventually with the possibility to find a new functioning form without federal support.

AM: Was the same system applied to all the institutes of the Academy of Sciences of GDR?

MM: Exactly. This scheme is a single system for any scientific organization in Germany which has funding from a regular budget.

AM: From the outside perspective, the results are impressive. Almost all the institutes of the former Academy were preserved; they acquired different statuses which correspond to their profiles. All of them received federal funding and support from the state governments. Perhaps, the most important point is that the reorganization was carried out in a completely open and transparent way. Even now we can find the detailed reports on the performed assessment on the official websites of different agencies and commissions, which took part in the Academy's reorganization. In this respect, it is invaluable experience which can be very useful for any country in transition which aims to become a highly developed one.

MM: Germany did not try to conduct a demonstrative campaign; we just tried to retain all valuable and promising from the Academy of Sciences of GDR and what can be adapted to the existing system of science functioning in FRG. Yes, we managed to perform the reorganization in short-time framework (1.5–2 years), but we already had a practically implemented well-functioning model.

AM: What I like best about all this reform is the word "we". Indeed, the reorganization was actually carried out by scientists themselves, and carried out openly and publicly. Perhaps, this is the most important lesson which should be learnt. To sum up, the reorganization did not lead to a decrease of the number of Institutes, in fact their number substantially increased. They were integrated into the scientific structure of FRG and significantly strengthened it. And one more point, no managing institution, being involved into the science management process (GWK, WR, *etc.*), makes unilateral decisions. The final decisions always result from negotiations and agreements between all the mentioned agencies.

MM: In conclusion, I would like to emphasize that the Russian science management system is unique and quite differs from the German system. It would be a mistake to use our or any other experience to a full extent for reorganization of your system. You can take only separate approaches, including the most important one—transparency. As I have already mentioned, the system which existed in Russia have generated and still generates nowadays excellent scientific results, therefore, its reorganization should be carried out in a stepwise manner, carefully and with continuous discussions and coordination within the scientific communities. That is the only way, a gradual evolution, which can help the Russian science to keep and improve its rank in the global science. And of course, I wish it for Russia, scientific prosperity will not only help to serve societal needs in Russia, it will facilitate international networking and help to overcome the global challenges in a world with an increasing population.

AM: I would like to thank Prof. Möller for the interview, which is undoubtedly of particular interest for us, being continuously reformed. Judging by the concluding remarks, he looks at our reform with the much greater optimism and interest than we. There are many questions about the reorganization of a scientific system of GDR, which are beyond our discussion, for example, such a fundamental question as the cost of reorganization. However, these data cannot be evaluated within the scope of this discussion and are not easily available...so let us leave it for subsequent comprehension. I hope to continue this topic with more focus on our own reforms and its particular stages. An interested outside point of view seems to be very useful.

Sincerely yours,
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Prof., Full Member of RAS
Aziz M. Muzafarov