

**Statement of the German Science Council on the
Hermann von Helmholtz Association of
German Research Centres**

Executive summary

In December 1996, the Federal Chancellor and the state prime ministers decided to commission studies to evaluate all jointly funded research institutions. In this context, the Science Council undertook to carry out a system evaluation of the Hermann von Helmholtz Association of German Research Centres (HGF) in June 1999. Thus system evaluations have now been carried out for all major research organisations jointly funded by the Federal Government and the *Länder*, namely HGF, Fraunhofer Society (FhG), *Deutsche Forschungsgemeinschaft* (DFG), Max Planck Society (MPG) and Blue List/ *Wissenschaftsgemeinschaft Gottfried Wilhelm Leibniz* (WGL).

The Helmholtz Association comprises 16 research centres working in various fields of research, each pursuing very different aims. It is the Science Council's view that, notwithstanding the HGF's heterogeneous structure, it is necessary to adopt an analytical approach to the fundamental principles of large-scale research in order to identify systemic deficits and thus reach conclusions on structural aspects and produce generally applicable recommendations. Here the concept of system evaluation clearly contrasts with the traditional approach to analysing and managing large-scale research, where the main focus was on the work of individual research centres. However, the heterogeneous nature of the HGF will make it necessary to adjust any recommendations to the specific circumstances of each individual case.

The working group of the Science Council which prepared the present statement brought together scientists from Germany, Israel, Switzerland and the US representing university and non-university research institutions as well as industry, and it also included a number of administrative experts.

The Science Council adopted this statement in Berlin on 19 January 2001.

The Hermann von Helmholtz Association of German Research Centres (HGF) currently consists of a group of 16 national research centres covering a broad spectrum of technical, natural science and biomedical basic and preventive research extending to pre-industrial development activities. 90 per cent of the cost of running the HGF Centres is defrayed by the Federal Government, with the remaining 10 per cent coming from the *Länder* hosting the centres. The first institutions, most of them founded in the 1950s, all came from the field of nuclear physics. After a period of re-orientation and the foundation of new establishments in other fields of science, the Federal Government's funding programmes with a focus on substantive aspects and aspects of technology development were put on a sound institutional basis. The organisation of the national research centres under the umbrella of the HGF took place in 1995. The HGF considers it its task to pursue "long-term research objectives of the state and of society as an autonomous scientific body".

The HGF's budget has a volume of DM 4 billion a year. Approximately one sixth of this amount comes from third parties, of which again one third is provided by the private sector. Thus the expenditure of the HGF corresponds to roughly one quarter of the statistically recorded R&D expenditure of all higher education institutions. The HGF receives slightly over 10 per cent of public funding for research in Germany.

The Science Council acknowledges the important contribution of large-scale research to the German science system. Nevertheless, it sees significant potential for making even better use of the HGF's ample resources. For this purpose, the Science Council believes it necessary to enhance the strengths of the HGF by focusing its work on high-profile activities and by improving internal coordination processes. For this to be achieved, the Science Council recommends fundamental changes to the structures and processes used for strategic decision making concerning the work of the HGF.

The core element of the HGF's profile is its orientation towards specific problems. Its approach of pursuing political objectives, defined on a highly aggregated level highly

aggregated political objectives contrasts sharply with the work of institutions such as the Max Planck Institutes and the universities, where priorities are set individually and without a thematic delimitation.

One important aspect of the HGF's work is its long-term character, which requires a solid infrastructure. The capacities of the HGF centres, which are extraordinary in terms of both quantity and the number of disciplinary fields, are beneficial for working on complex issues. Exploiting these advantages to the full by optimising internal co-ordination processes is an essential task for the HGF.

One of the HGF's central strengths lies in its work with large-scale facilities, which is a significant asset boosting the internationalisation of German scientific institutions as well as Germany's standing in international research altogether. The Science Council recommends as a rule entrusting HGF with responsibility for all new large-scale facilities of national importance.¹

The HGF also provides a broad range of services for scientific institutions and at the interface between science and politics, for example with its project managing agencies or its activities in the field of technology assessment, thus contributing to the overall performance of the German science system, helping politicians to make informed decisions and intensifying the dialogue between scientists and the general public. This asset should be further exploited and developed in future.

With a staff of approx. 25,000, of which approx. 9,300 are scientists, the HGF is Germany's biggest employer in the area of non-university research, in spite of the fact that the number of established posts has been reduced considerably in the last few years; however, the number of employees has remained more or less constant due to an increase in the number of staff paid from third party funding. The Science Council welcomes the increase in flexibility and competitive spirit resulting from this development and encourages the HGF to continue this policy by fostering mobility,

¹ For example, facilities with an investment volume exceeding DM 50 million.

holding contests for vacancies and increasing the proportion of fixed-term employment contracts for scientists to a level between 30 and 50 per cent.

Furthermore, the HGF also complements the efforts of the universities to promote young scientists, not only in quantitative, but also in qualitative terms. The pressure of competition between universities and HGF, above all in disciplines affected by declining numbers of graduates, should be eased by pursuing common recruitment strategies, and fairness should be guaranteed by ensuring equal starting conditions concerning pay. Within the HGF, one suitable way of improving conditions for young scientists is to enhance independent work within the range of activities of the research centre concerned and to introduce exchange programmes, for example for acquiring experience in teaching or in industry. In the last few years, the HGF - albeit considerably later than many other scientific organisations - has launched important initiatives to achieve equal opportunities for women in science. The HGF should consistently continue these activities in order to take greater advantage in its work of the capabilities especially of women scientists.

Cooperation with higher education institutions plays a key role in the performance of the HGF and in making the best use of its resources for the benefit of the German science system as a whole. Since the adoption of the Science Council's recommendations concerning cooperation between higher education institutions and national research centres in 1991, this cooperation has been improved significantly. The best way of avoiding rivalry is for both sides to mutually agree their priorities in a complementary manner and to ensure that the results accomplished by jointly appointed scientists are not attributed solely to the HGF; instead, a fair share of the credit should be given to the universities involved in the individual case, entitling them to a tangible reward in terms of research appropriations. Where a higher education institution is in a position to fulfil a certain task, the HGF must not take advantage of its often superior resources to the detriment of that institution. In this spirit, the Science Council recommends creating more common facilities shared by the HGF and a university, preferably on the campus of that university. Cooperation with higher educa-

tion institutions must become an important criterion within the HGF in selecting the programme features to be funded.

In the history of large-scale research, cooperation with the private sector is a task that has been pursued with varying levels of commitment. For 1998, the HGF quotes 3,300 cooperation projects between its centres and the private sector, of which approximately 60 per cent produced revenue for the HGF. In addition, the HGF provides services (including contract work), issues licences and participates in new start-ups. In the last few years, the HGF has significantly increased the number of patents registered by its various centres and the revenue from licence agreements.

The Science Council endorses the HGF's position, according to which cooperation with the private sector is an integral part of preventive research and work within the HGF must be oriented in such a way that long-term strategic goals are pursued and at the same time future applications are provided for. However, the Science Council does not consider it the responsibility of a national research centre to carry out state-financed research for industry leading to marketable developments, thus relieving the private sector from risk-laden development projects, although the specific distribution of tasks in cooperation projects with small and medium-sized enterprises may be different from that in projects carried out with big industry. On the contrary, the research climate, which is already open for technology transfer and application, must be such as to encourage even more entrepreneurial thinking on the part of the staff, and the transfer of expert knowledge and technology should be intensified, as should the start-up of new businesses, through active cooperation between patent officers, scientists and business. Due to considerations of competitive law and science policy, it is imperative to ensure that the provision of knowledge is adequately remunerated.

The national research centres had a differentiated evaluation system in place at an unusually early stage. Nevertheless, certain deficits remain, mostly due to insufficient compliance with the principles established by the HGF itself. The Science Council recommends that future evaluations should take place beyond the level of the individual centres and be programme-specific, that a uniform approach to implementa-

tion be pursued and that a complete and systematic consideration of all defined criteria be guaranteed. Furthermore, it must be ensured that the expense incurred through the evaluation process remains within reasonable limits.

The HGF's performance is reflected, among other things, by the significant increase in the amount of funding obtained from third parties in the last few years. In particular, the HGF has been extraordinarily successful in competing for funds provided by the RTD Framework Programme of the EU, although it has played a less important role in coordinating European collaborative projects than could be expected.

Bibliometric data as well as the attractiveness of the HGF for visiting scientists show that the HGF has well-founded research competence, which is, however, characterised by a high degree of heterogeneity.

It is the Science Council's view that the unused potential reflected by this heterogeneity can be primarily attributed to a lack of incentives for competition as well as a lack of coordination at all echelons of the HGF. When financing decisions are taken by the donors, the perspective adopted is primarily that of the research centre involved. In the scientific work itself, the level of cooperation between the various centres falls far short of what could be expected. Even within individual research centres, certain areas of work are carried out in isolation.

The Science Council believes that these deficits must be eliminated by consistent action.

The Science Council therefore welcomes the fact that, after an in-depth debate, the HGF and its donors have adopted the principle of programme-based finance, a system in which the donors stipulate certain framework requirements for a number of programme areas while the HGF centres work out proposals for translating these requirements into concrete programmes.

The Science Council believes that this procedure, if properly designed, can help to eliminate the above-mentioned deficits. At the same time, however, it is aware of the

risk that its inconsistent application would not produce the desired improvement, so that the more involved procedures could not be justified. The Science Council therefore formulates the following requirements with regard to programme-based finance:

- The keywords in defining the procedures must be more transparency, competition, cooperation and interdisciplinarity. There must be scope for new ideas and applied fundamental research.
- The requirements provided by the donors in the form of a definition of the programme areas must be adopted on the basis of a broad debate involving the scientific community, society and business. Methods of foresight are to be used as well. In this process, the Federal Government and the *Länder* should coordinate their efforts and make appropriate decisions with regard to the substance matter as well as to the HGF as a whole.
- The HGF's internal decision on whether to include a given contribution in the programme proposals requires a transparent procedure which should also include foresight processes.
- It should be ensured that the HGF presents its Senate with alternative proposals for implementation of the programmes that are in fact competing for the available budgetary resources.
- The selection procedures in the Senate must be such that they make cooperation with the HGF and beyond its confines an important competitive advantage. They must be transparent for the individual working groups at the centres.
- The possibility of "cross-subsidies" for working groups that were not successful in competition should be eliminated as far as possible. The concept of automatic entitlement is incompatible with the goals of the new financial reform.

- In the field of programme finance, the centres need non-earmarked funds for developing their core competences as well as for new activities. These non-earmarked funds should also ensure scope for research activities that are not planned in advance but are initiated by individual scientists.

- It is imperative that there is long-term reliability with regard to the operation of large-scale facilities, which often takes place in a context of international cooperation, and with regard to participation in international programmes, and decision-making procedures in financial matters must be made compatible with those applied at the international level.

- Strengthening the competitive elements will produce the desired benefits for the scientific community only if it goes hand in hand with more flexibility regarding management of financial resources. This involves defining the earmarking of funds in terms of substantive objectives, the option of carrying over parts of the budget to the following year and limiting the binding character of establishment plans.

In fulfilling their functions, the HGF centres greatly depend on the scientific infrastructure systems of the *Länder* - another reason why the *Länder* must continue to have a say in the management and financing of the centres.

The Science Council generally advocates the pursuit of science policy goals in research funding with an overall concept rather than with a multitude of isolated measures. This also applies to the financing of the HGF, where a distribution of resources to different "funds" should be avoided. However, the Senate should have the possibility to put out to tender once again any individual programme objectives that it feels have been inadequately addressed by the HGF and to allocate in this way the programme funds earmarked for these objectives.

In the future German science system, competition between comparable services must be ensured. Consequently, the Senate and the donors should allow "system-

wide" competition for objectives that are likely to be more effectively dealt with outside the realm of the HGF.

Programme-specific financing leads to an intensification of the substantive rather than regional orientation of the HGF. Therefore, responsibility for programme development and implementation controls should lie at a level beyond that of the research centres. The centres themselves will continue to be responsible for scientific competence and the technical infrastructure. In the long-term, all these functions will be largely performed by the individual centres again, as a result of the emergence of further centres with a clear-cut thematic definition. The new financing reform requires a decisive strengthening of the HGF as well as a President who is independent of the individual centres and has an adequately equipped secretariat. This in turn will have repercussions on the relationship between donors the HGF.