



Oliver Kraft, vice president for research at Karlsruhe Institute of Technology. The institute was formed as a result of Germany's Excellence Initiative.

GERMANY

Equality or excellence

Germany's Excellence Initiative was highly debated. With its successor approved, scientists are asking whether equality and scientific freedom can be preserved in a world of competition.

BY ANJA KRIEGER

The agreement was signed just in time for a football game. On June 16, the ministers of Germany's 16 states and Chancellor Angela Merkel came together to debate one of the most important questions for the future of Germany's research community: whether to continue a multibillion-euro programme to promote top-notch research at German universities, known as the Excellence Initiative.

Olaf Scholz, the mayor of Hamburg, had caused turmoil when he threatened to veto the vote to pass the programme's successor, the Excellence Strategy. The first iteration of the programme saw a total of 14 German universities receive additional funding for their 'future concepts' strategies — plans to strengthen the institutes' research profiles — but none were located in Hamburg. Scholz argued that continuing the programme as it was could lead to some institutions being continuously funded regardless of their achievements, while others had little chance to rise up. In the end, the ministers came to a compromise. When the programme begins in 2019, 11 universities will be chosen as planned. But the new agreement includes the option to add four further institutions in 2025. It was signed just in time for the ministers to watch the country's footballers draw against Poland in the European Championship match.

The debate over the programme is just one example of the challenges that surround science funding. The debate has raised fundamental questions about whether the country — conventionally egalitarian in its research and education landscape — should establish a top league of universities. And, if it does, will it still be possible to provide equal opportunities for German scientists?

COMPETING FOR TALENT

Over the past decade, Germany's federal government has given out €4.6 billion (US\$5 billion) to the Excellence Initiative, divided into three projects: research clusters, graduate schools and institutional future concepts. This third line of funding is considered the most prestigious, and recipients — currently 11 universities — are given excellence status. As a group, the 'elite' institutions receive on average €400 million per year. Not a huge sum when you consider that in 2013 alone German universities spent a combined €9.8 billion on research and development, more than twice the sum the Excellence Initiative will distribute over the course of its 12 years. The initiative has not raised university budgets to the levels of universities such as Harvard or Stanford — institutions that inspired the programme, according to politician Edelgard Bulmahn, who designed the initiative between 2003 and 2005 while serving as Germany's Federal

Minister of Education and Research.

At the time, "it became challenging to keep our excellent young scientists at universities in Germany," Bulmahn recalls. Since the 1990s, German universities had experienced a brain drain, with thousands of researchers leaving the country. Many went to the United States, where academic pay was higher, and universities had higher budgets, offering better conditions for research and teaching. A dramatic demonstration of this exodus is the fact that the four German scientists who won a Nobel prize between 1998 and 2001 were working in the United States at the time of the award.

But German universities also faced increasing competition from organizations on their home turf. Many scientists decided to work at renowned independent research centres such as the Max Planck Society and the Fraunhofer Society. The close contact between university researcher and student that had become the hallmark of German science since the nineteenth century was now in danger. Bulmahn decided that German universities needed a call to action. Leading universities should become beacons of science, or the country would struggle to keep up with growing international competition.

The 2005 Excellence Initiative prompted some universities to make big changes. The University of Karlsruhe, for example, merged with the Research Centre of

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Karlsruhe to establish the Karlsruhe Institute of Technology (KIT) when the institutes won a Future Concept award in 2006. But the newly formed organization failed to hold on to its elite status in 2012.

Despite the ups and downs, KIT's vice-president for research, Oliver Kraft, thinks that the programme "had very positive effects on the German science system". Nanotechnology and solar-cell research at KIT, in particular, benefited from the funds, he says.

For biochemist Ulrike Beisiegel, president of the University of Göttingen, the initiative was a major incentive for more interdisciplinary collaboration between the university's scientists. "It enabled us to emphatically say, now you have to work together," Beisiegel says. Göttingen's scientists, she says, were not only motivated by the money, but also by the reputation connected to the excellence title.

FAIR ARGUMENT

But the German science community does not speak with one voice. Some researchers think that the programme has made things worse. Earlier this year, a group of academics posted a petition online, which collected a few thousand signatures against the federal programme. The Excellence Initiative, the petitioners warned, seemed to be a path to transforming the country's system of higher education "in problematic ways". Intensifying the inequalities between German universities would "harm research and teaching". The petition called for a "fair system" that would preserve the "high level of teaching in all locations".

Tilman Reitz, a sociologist at Friedrich Schiller University Jena, is one of the petition's organizers. Reitz has noticed a shift in focus among his peers in the past few years. In particular, he says, research that is difficult to summarize in a grant proposal, but valuable nonetheless, is becoming harder to pursue. Whereas competitive grant funding is familiar to scientists in countries such as the United States, it is a new and disconcerting experience for many German researchers.

In 2014, a group of international experts — led by Dieter Imboden, an environmental scientist at the Swiss Federal Institute of Technology in Zurich and the former head of the Swiss National Science Foundation — were tasked with evaluating the Excellence Initiative. The group conducted interviews at German universities, and looked at data provided by previous reports from the German Research Foundation and the German Council of Science and Humanities.

In January the commission recommended the programme continue with an annual budget of at least €500 million. "At the universities that were involved, no matter whether they were successful or not, a pioneering spirit has developed," says Imboden.

Although the funds from the initiative were small, only about 3% of the total German university budget, the effects were visible. "The learning process at German universities is impressive," Imboden says. However, he concedes, ten years was too short a timescale to judge the programme's outcome "in a strictly statistical, scientific sense".

Over the past decade, German universities haven't risen much in international rankings, with the exception of the elite institute Ludwig Maximilian University of Munich, which entered the Times Higher Education top 30 in 2014. And according to a *Nature* report (*Nature* 525, 168–169; 2016), although research articles from German elite universities are cited more frequently now than they were a decade ago, the same is also true for five non-elite institutions.

To Reitz, singling out a small group of universities is a questionable exercise. Like many Germans, he values equality. Reitz thinks that German academia could provide an alternative model to the more stratified systems that have evolved in other countries. "There can be great, internationally acknowledged research at any university, and we could keep it this way," he says.

RIGHT MIX

When it comes to research, Germany is a considerable international force. The country counts more than 60 Nobel prizes in physics, chemistry and medicine. In the *Nature Index*, which monitors country and institution contributions to top journals, Germany ranks third after the United States and China. But only two of the top five German research institutions in the index are universities: Ludwig Maximilian University of Munich and Heidelberg University.

Imboden says that although a science-led economy doesn't necessarily need an elite cadre of top universities, it cannot do without world-class researchers. Germany has plenty of these, but they tend to be concentrated in non-university institutes such as the Max Planck Society.

A good university system is "a mix between what the US has and what Europe has", Imboden says. Ideally, he argues, the government provides a substantial amount of base funding, which is supplemented by resources awarded on a competitive basis.

The Excellence Initiative has injected a new dynamic into the German research system. To some, the competition brings motivation and change that has long been necessary. For others, it makes the science world more hostile and difficult. In particular, more time is spent writing grant

applications and less time is available to do research. Björn Brembs, a neurogeneticist who worked at one of the elite universities for ten years, says that the initiative has had a "detrimental effect" on Germany's university landscape.

The main winners, he says, have not been the scientists, but the universities' administrative staff. Brembs, who now works at the University of Regensburg, looked at data from the federal statistics registry, Destatis, between 2005 and 2012. He says that the number of full-time research and teaching staff has not risen in proportion with student numbers, but there was a much higher increase in permanent administrative positions. Meanwhile, the number of researchers on short-term contracts has increased. To Reitz, the Excellence Initiative is just the tip of the iceberg. As external funding becomes increasingly important for German universities, the obligation to raise funds in competition with other researchers has risen. But market logic won't improve research or education, he contends.

Bulmahn is proud of the programme's outcomes, however, boasting that it has "exceeded even my own expectations". Germany's universities are motivated to develop their own profile and goals, improve their governance and collaborate more closely with research institutes. It's "a cultural change at the universities that cannot be reduced only to competition," Bulmahn says.

Cornelia Quennet-Thielen, State Secretary at the Federal Ministry of Education and Research, is happy that the negotiations to continue the programme proved successful. She says that the Excellence Strategy will contribute to stronger research at universities; create better links with other universities and research organizations; and boost Germany's role as an internationally important scientific centre.

Reitz, however, thinks that this strategy is a veil that hides difficult truths. Funding a few universities at the top makes it "look like the system isn't generally under-financed". Although German university budgets, on a per student basis, are much lower than those of US universities, the country's funding is still above average, according to data from the Organisation for Economic Co-operation and Development.

It is still too soon to judge the outcome of the country's research revamp. And success is often in the eye of the beholder. Scientists and politicians differ in the value they place on equality and competition, and in their understanding of freedom and quality of science. The motor of science will continue to hum, but the tune is changing. ■

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