



At the European Parliament in Brussels, the European Platform of Women Scientists is calling for binding gender targets.

Only wholesale reform will bring equality

Providing equal opportunities for women in science requires change at every level, argue **Brigitte Mühlenbruch** and **Maren A. Jochimsen**.

Gender-equality policy in science at European regional and national level has come a long way, thanks to more than 20 years of efforts by women scientists and far-sighted politicians. Yet progress is slow. The pipeline is still leaking and female researchers still hit glass ceilings.

In 2007, in the 27 countries that comprise the European Union (EU), women scientists accounted for 38% of active researchers and only 19% of full professors, on average¹. In 2009, 45% of doctorates were awarded to female students². Although the number of women PhD graduates is growing — up by an average of 4.9% per year between 2004 and 2009, compared with 3.2% for men² — this is not enough to suggest that science's

gender imbalance is self-correcting.

When it comes to women in decision-making positions in science and research, Europe is a long way from its 2001 target of 40%. With the exception of Sweden, Finland and Norway, women in Europe are still significantly under-represented on the boards of research institutions, funding organizations, scientific councils and academies, and are rarely found among the heads of higher-education institutions in the majority of European countries². In short, Europe could do better.



WOMEN IN SCIENCE

The gender gap and how to close it
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The persistent gender gap has prompted great changes in equal-opportunities strategies at European and member-state level, particularly since the launch of the EU's Women and Science activities in 1998. At first, policy concentrated on individual programmes to equip women scientists with the necessary soft skills to advance, such as networking, mentoring, stipends, training and the provision of role models. These remain indispensable instruments for encouraging individuals.

However, impediments to women scientists have deep institutional roots. The lack of full female participation in academic careers is often a systemic consequence of the culture and organization of higher-

education institutions. Consequently, attention is shifting in the EU to encouraging structural changes in research organizations. Measures include increasing diversity in recruitment; introducing promotion and retention policies; updating management and research-assessment standards; developing course content to successfully attract women as well as men; policies for dual-career couples; and schemes that allow women to return to work after career breaks³.

To achieve lasting equality, science needs a culture that is sensitive to gender and diversity in all its endeavours: individual and social, structural, institutional and political. We need transparency, accountability and monitoring in decision-making, evaluation, recruitment, attribution and funding. We need to secure the interest and collaboration of highly qualified women and men by offering predictable academic careers, attractive working places and conditions that enable work and life to be reconciled⁴.

Furthermore, we need to agree that gender is indispensable to research itself. For example, given that there are important sex differences in responses to many drugs and therapies, the underrepresentation of women in clinical trials must be fixed. This applies to animal studies too: laboratory experiments in mice predominantly use male animals, limiting what can be inferred from findings. Gender should be addressed from proposals to papers and beyond⁵.

BEST PRACTICE

Changing the academic culture will take a mixture of voluntary commitments and binding regulations — all backed up by funding. Here we describe some examples of measures that are having good effects and that should be replicated elsewhere.

In 2008, the member organizations of the German Research Foundation (DFG; Germany's largest research-funding body) committed to a set of structural and personal guidelines called Research-Oriented Standards on Gender Equality. These call on member institutions to make gender equality integral to management, human resources, organizational development, strategy and content, resource allocation and quality-assurance procedures. The standards also demand that institutions publish data on gender equality at all organizational levels and academic career stages. The guidelines require that institutions design procedures in a transparent, structured and formal manner, that they counter outdated gender stereotypes, accommodate individual life plans and empower men and women to combine family life and academic careers.

Responsibility for implementing the standards lies with each member institution, and the DFG uses incentives and evaluation

reports to ensure adherence. To help, the foundation also provides an online toolbox of practical examples (see go.nature.com/dojcsz; in German). Implementing the standards is voluntary but is a condition of DFG funding.

These standards have led to progress. For example, most DFG member institutions now have flexible working schedules, childcare facilities and other family services. Most member universities have implemented transparent, structured and formalized procedures for the unbiased evaluation of scientific quality and the hiring of professors. Other positive developments include the endeavour to replace stipends, especially PhD grants, with employment contracts that include social-security benefits.

The University of Duisburg-Essen, where one of us (M.A.J.) manages the Essen College of Gender Studies, is particularly notable for its pro-women activities. These include a university-wide mentoring system; a nationwide network on university course development and teaching for sharing expertise in gender issues; and an online portal of gender information for staff. The institution even has a vice-rector for diversity management — the first post of its kind at a German university.

At European level, the European Research Council (ERC) published a gender-equality plan in 2011 (ref. 6). Each process within the ERC — from advertising to grant signing — is designed to give equal opportunities to men and women (see page 39). Among other measures, the ERC sets goals for and monitors the gender balance of its panels of peer reviewers on the basis of information from relevant scientific

communities and its pool of applicants. If a goal is not reached this must be reported, with an analysis of how the situation can be improved⁶. The ERC also commits to challenging potential sources of gender bias in the evaluation process, for example by publishing men and women's submission rates, success rates and granted amounts. The council offers gender-equality training to ERC scientific officers and discusses gender awareness with evaluation panels, highlighting how they should evaluate career breaks and unconventional research career paths⁶.

MEASURES OF MERIT

Other gratifying recent measures include a 2011 recommendation by the European Science Foundation (ESF) for its member organizations to attain a gender ratio of at least 40% women among grant reviewers. When selecting experts, the ESF also encourages the consideration of individual non-standard career paths affected by changes or interruptions caused by professional mobility or family reasons⁷. Among university associations at European level, the League of European Research Universities took the lead in mapping out what universities and their affiliated institutions can do to bring about change⁸.

Germany's Programme for Women Professors, launched in 2007, is an exemplary blend of state prescription and voluntary institutional commitment. The programme funds universities for appointing women to the rank of full tenured professor. To be selected, a university must produce a coherent gender-equality plan. So far, the programme has led to more than 260 new female professorships at 109 universities



A chemistry student at Germany's University of Duisburg-Essen, notable for its pro-women activities.

(see go.nature.com/imunpf; in German). It has also funded measures such as increasing the number of women in decision-making positions, providing career development for young female researchers and boosting the proportion of women in disciplines that have low female participation, such as engineering, computer science and physics.

Although voluntary targets can achieve much, binding regulations are the only way to effect change in some cases. Quotas, as contested as they are, are another way to counter the under-representation of women scientists in decision-making positions in research organizations. In the Nordic countries and Austria, for example, quotas of at least 40% of each gender are mandated in the administrative parts of research organizations.

From this year, the German Leibniz Association, a high-profile umbrella organization of 86 non-university research institutions, has become one of the first research organizations to introduce binding, merit-based quotas to encourage equal opportunities. The quotas use a 'cascade model': each level of university hierarchy in each discipline must, by 2017, reach at least the same proportion of women as is present at the level below. Such flexible quotas are sensitive to varying numbers of men and women in different scientific disciplines.

BEYOND ACADEMIA

The structural measures outlined above should be applied to other leading institutions, such as academic publishers, which should publicize the number of female editors and reviewers (see page 47). More women scientists should be invited to write editorials, reviews and survey articles. Journals and funding agencies should mandate that researchers account for gender in experiments and that they disaggregate gender data in all submitted and accepted papers where relevant, and in clinical trials and cohort studies as a matter of routine. The *Canadian Medical Association Journal* and the *Journal of the American College of Cardiology* already follow such good practice, and *Nature* and *The Lancet* are considering adopting similar policies^{9,10}.

Against this background, the European Platform of Women Scientists, which represents more than 12,000 female researchers in Europe and beyond, has urged the European Commission (EC) to do six things with respect to Horizon 2020, the upcoming EU Framework Programme for Research and Innovation⁵.

First, the EC needs to introduce binding gender-evaluation criteria in EU

research-funding programmes. Second, it should set targets for the participation of women in EU-funded research projects at all levels (young and senior scientists, project leaders, consortium managers) at the proposal stage, sanctioning missed targets and publishing results. Third, the EC needs to set indicators for gender sensitivity in the research design of proposed projects. Fourth, it should extend the 40% target for women's participation beyond advisory groups and evaluators' panels to all structures related to Horizon 2020 — including the ERC, Joint Research Centre, European Institute of Innovation and Technology, steering and expert groups and the like. Fifth, it needs to train evaluators in gender issues. Finally, the EC must increase funding for research into improving societal structures as part of its innovation strategy (see go.nature.com/y7vygb).

Motivation and participation are the basis of high-quality results in research — not biased evaluation criteria, job insecurity and glass ceilings. An academic culture that is transparent, democratic and sensitive to gender and diversity will benefit all scientists. Much has been achieved; a lot remains to be done. ■

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