B 4 THE ROLE OF WOMEN IN THE INNOVATION PROCESS

B 4–1 MAKING USE OF GERMANY'S INNOVATION POTENTIAL THROUGH GREATER INVOLVEMENT OF WOMEN IN THE INNOVATION SYSTEM

Women are underrepresented in the German innovation system. Compared to men, women are less often enrolled in STEM (Science, Technology, Engineering, and Mathematics) degrees and are also less active in the field of research and development (R&D). This imbalance is particularly pronounced in leadership positions in industry and research. And in Germany, these gender specific differences are especially striking.[420]

Considerable innovation potential is thus squandered; innovation potential that Germany in particular depends on as an innovation-based country:

- Germany underexploits the potential of well-educated women. Especially in light of the foreseeable shortages of skilled labour, Germany can no longer afford this.
- The potential that emerges from the diversity of team members is not exploited. Groups that are heterogeneous in their demographic or cultural composition tend to display a more creative approach to problem solving than homogeneous groups.[421]

In its Annual Report 2013, the Expert Commission already pointed out that demographic change is going to systematically alter the size and age structure of Germany's labour force in the long run. In the future, the number of qualified workers will decrease, in STEM professions in particular. This will lead to a bottleneck in the innovative capacity and competitiveness of German companies and Germany as a business location. Therefore, it will be increasingly important to make better use of the skills and innovative potential of women; a potential that continues to be underexploited to date. Against this background, the educational expansion of the last decades can be regarded as highly successful: today, more women than men obtain a university degree. Yet, female students systematically opt for different fields of study than male students. Female students only rarely choose a STEM subject; and especially engineering courses are frequently being neglected. What is more, the increasing success of women in the education system does not result in similar subsequent success in the labour market. Instead, Germany loses the potential of the ever-growing number of highly qualified women in the transition to the labour market and in the subsequent career progression.[422]

Integrating highly qualified women into the innovation process will not only lead to quantitative effects; an increased diversity among staff will also result in qualitative effects. The heterogeneity of a group – in this case a company's or an institution's staff – in terms of gender, ethnic background, age, religion, origin, etc., and the associated different life experience and know-how of the individual group members result in multiple perspectives and ideas, which, in turn, may contribute to new problem-solving strategies. If a given issue is viewed from different perspectives, this means that traditional views can be challenged and complemented by aspects that might have been previously disregarded. The interplay of different types of know-how and qualifications, experience and skill sets stimulates creativity and innovation in both processes and products. Moreover, the heterogeneity of a group facilitates the understanding of different client groups and their product-related needs and allows for the adjustment of business strategies according to these needs.

Empirical studies suggest that a more balanced ratio between men and women has a positive effect on several corporate performance figures. Companies with mixed teams and women in executive roles perform better in terms of sales, revenue, clients and profit.[423] Particularly, studies suggest that women are valuable in executive roles in those cases where the corporate strategy is innovation-based.[424] Women have a positive effect on innovation activities and the success of newly established enterprises.[425]

In addition, a greater participation of women in the innovation process also results in new forms of innovations. An expert group established by the European Commission has developed the term "gendered innovations" to describe this phenomenon. The concept of gendered innovations goes beyond the participation of women in innovation processes or in teams. "Gendered innovations" means that

aspects of sex and gender are incorporated into basic and applied research to ensure scientific quality and excellence and to develop more targeted solutions. In this context, sex refers to the biological distinction between men and women, whereas gender refers to the socio-cultural role of women and men in society. While e.g. the development of efficient medications can be improved by considering sex, socio-cultural aspects play an important role e.g. for optimising public transport systems for different user groups, or for developing customer-oriented software solutions.[426]

B 4–2 ACADEMIC AND LABOUR MARKET SUCCESS OF WOMEN IN THE SCIENCE SYSTEM

Selection of field of study and academic success in STEM subjects

In Germany, an average of about 25 percent of female first-year students opt for STEM subjects, as opposed to 50 percent of male first-year students. Within the STEM subjects group, the share of female students varies greatly: in 2012, the share of women among first year students in biology and mathematics courses was 63.4 and 50.5 percent, respectively. Only 23.1 percent of female first-year students took up a course in engineering, and a mere 12.6 percent opted for a course in electrical engineering.[427]

With regard to the share of students graduating from engineering degree courses, Germany is lagging considerably behind when compared with other OECD countries. In 2011, 22 percent of engineering graduates in Germany were female, while frontrunners such as Iceland and Greece recorded a 40 percent share. Italy and Spain, with 33 and 32 percent respectively, also display a relatively high share of female engineering graduates, and the same goes for the Scandinavian countries of Denmark and Sweden with 32 and 30 percent, respectively.[428]

Higher share of women in engineering in Germany's new federal states

A comparison of the share of women in technical degree courses in Germany's new and old federal states shows that cultural differences from the pre-reunification era are still having an effect today. It is still the case that in the new federal states more women graduate from engineering degree courses than in the old federal states.

The GDR government systematically directed university entrants into technical degree courses as a means of promoting technical research and innovation. Based on measures such as the "mobilisation of women for engineering education" new target groups were developed from the mid-1950s. In 1986, the share of women among students in technical degree courses amounted to approximately 30 percent.[429]

In the mid-1950s, the Federal Republic of Germany also began to focus more on the small number of engineering students. To address this issue, attempts were made to recruit new target groups for engineering degree courses, among them women and pupils with non-academic backgrounds. In spite of these efforts, by 1989, the share of female students and graduates in engineering had only reached 12.3 percent and 10.6 percent, respectively.[430]

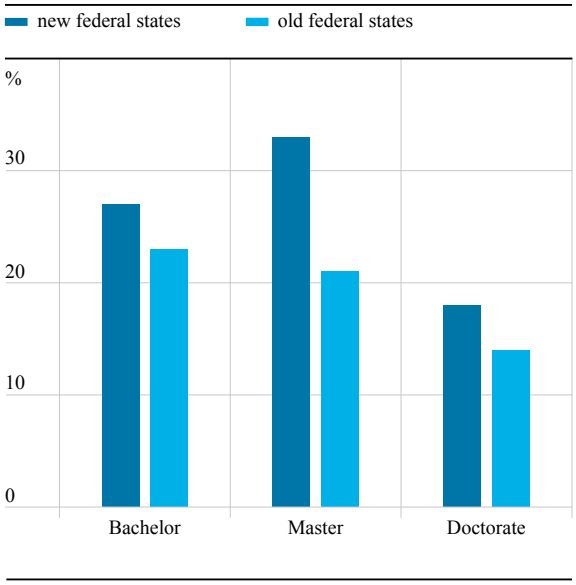
After the reunification of Germany a systematic decrease in the share of female engineers in the new federal states was initially observed, i.e. the levels were gradually aligned with those of the old federal states. Yet, when comparing the percentage distribution of graduates (bachelor, master, doctorate), it can be observed that even today, differences in German-German history have an impact on the participation of women in engineering sciences. In a 2010 comparison of the new and old federal states, the new federal states recorded significantly higher shares of women across all three degree levels (cf. Figure 31).[431]

Underrepresentation of women in STEM subjects increases in career progression

The problem of underrepresentation is systematically exacerbated in the further employment and career progression. Figure 32 shows the academic career paths of men and women across different fields of the STEM subjects group. It can be clearly seen that at the top of the career ladder the share of men far exceeds that of women. Remarkably, this is the case even in the fields of medicine and biology – fields in which the number of female first-year students significantly exceeds that of male students.

FIG 31 **Share of female graduates in engineering sciences in 2010** (figures in percent)

DATA DOWNLOAD



Source: Ihsen et al. 2014.

While the gender ratio is at least balanced during the doctoral phase, a dramatic shift to the detriment of women can be observed at the professorial level. The problem of utilising the potential of women takes quite a different shape in the field of life sciences than in the engineering sciences. While the latter fail to attract sufficient numbers of female students, life sciences are losing a large share of female graduates in the course of their career. While this gap has closed somewhat in all subject areas in the last decade, differences continue to be pronounced – especially at the highest career levels. This widening gap can also be observed in similar forms in other countries.

B 4–3 WOMEN IN LEADERSHIP POSITIONS IN ACADEMIA

In Germany, the share of female professors was at 19.2 percent in 2010 (6.5 percent in 1992) across all subject groups. The higher the remuneration group, the lower the share of women. In 2010, the share of women in W1 professorship positions (junior professorships) was at 37.8 percent, the C2 positions (permanent and temporary) at 21.1 percent, the C3/W2 positions at 20.1 percent and C4/W3 positions at a mere 14.6 percent.[432]

In recent years, however, the representation of women in appointment procedures has undergone a positive development. Between 1997 and 2011 the share of female applicants for professorships increased from 12.9 to 23.7 percent. Appointments of female professors increased from 16.9 percent to 26.8 percent, and the number of nominated female professors went up from 15.7 to 26.7 percent.[433] Furthermore, the share of women in leadership positions in universities has more than doubled, with an increase of 9.8 percent to 20.7 percent between 1996 and 2011.[434]

Table 12 shows the share of women in scientific leadership positions in international comparison. In Germany, the share of women at the highest academic level (the equivalent of C4/W3 professorships in Germany) was at 14.6 percent in 2010. With a share of 9.8 percent, female representation is significantly lower in natural sciences, and also in engineering sciences (5.9 percent). Although in these subject groups the comparison countries also recorded a lower share when compared with the average percentage for all subjects, female representation in Germany is still very low by international standards, and even features at the bottom of the list in the engineering sciences.

Female representation disappointing even after the launch of the DFG cascade model

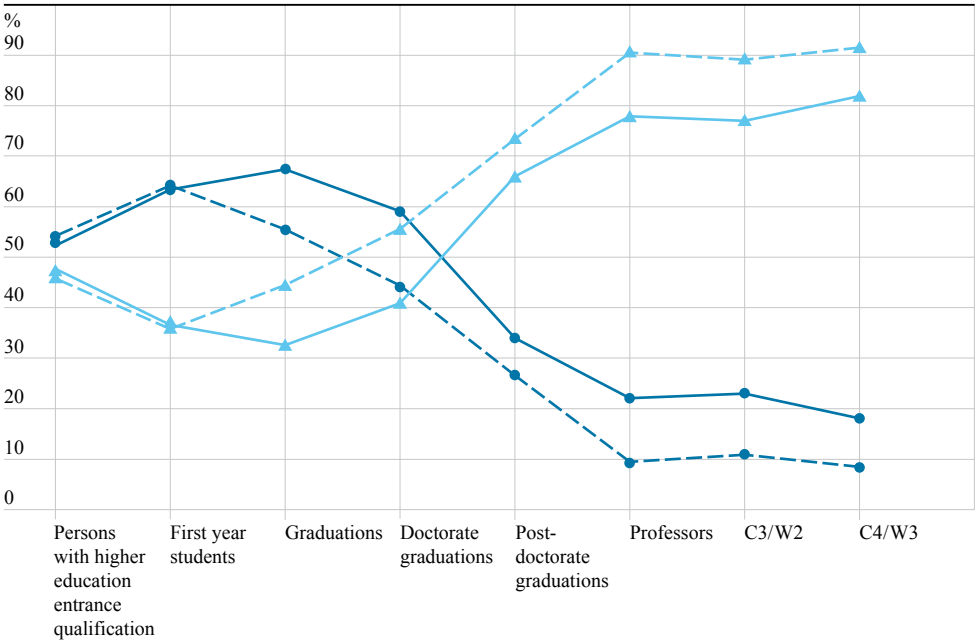
In 2008, the German Research Foundation (DFG) adopted research-oriented standards on gender equality. The aim has been to significantly increase the share of women at all stages of the scientific career. The guiding principle of this approach is the "cascade model". According to this model, the share of female scientists of a certain qualification level has to be raised to the share of female scientists in the qualification level directly below.[435] Table 13 shows the initial values, the target values, and the current situation in terms of the representation of women in professorships at the elite universities.

The development of the share of women at the various career stages has fallen short of the DFG's expectations. On 3 July 2013, the DFG's general assembly therefore adopted a package of measures, placing even stronger emphasis on the numerical development in the share of female scientists. The implementation of the gender equality standards

FIG 32 **Share of women at different career stages in academia 2000 to 2012** (figures in percent)

Biology

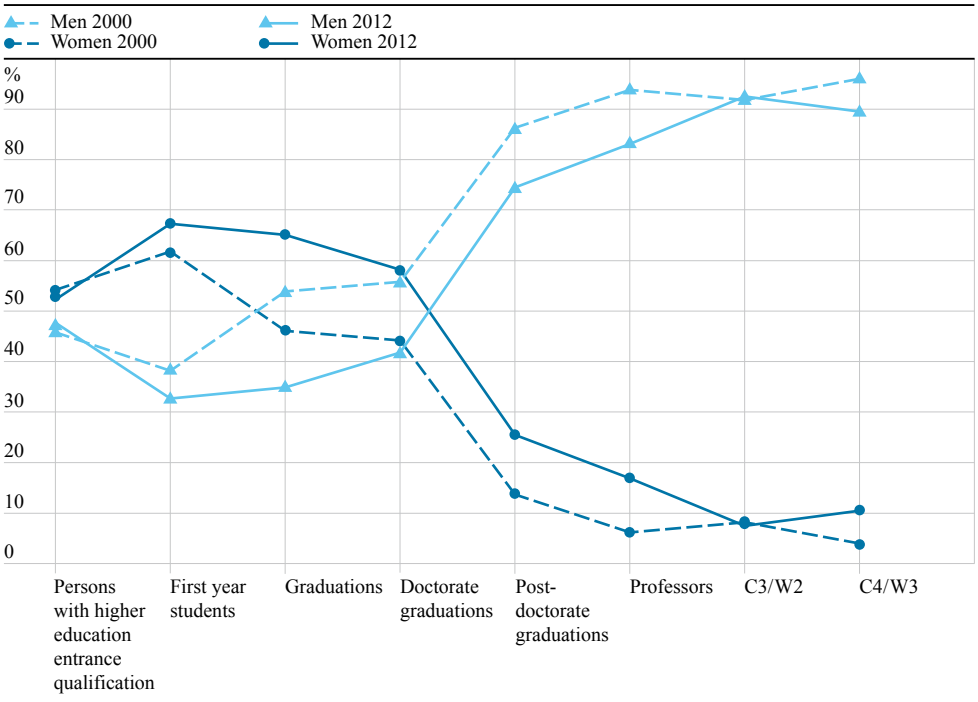
DATA DOWNLOAD



Source: Statistisches Bundesamt.

Human medicine, health sciences

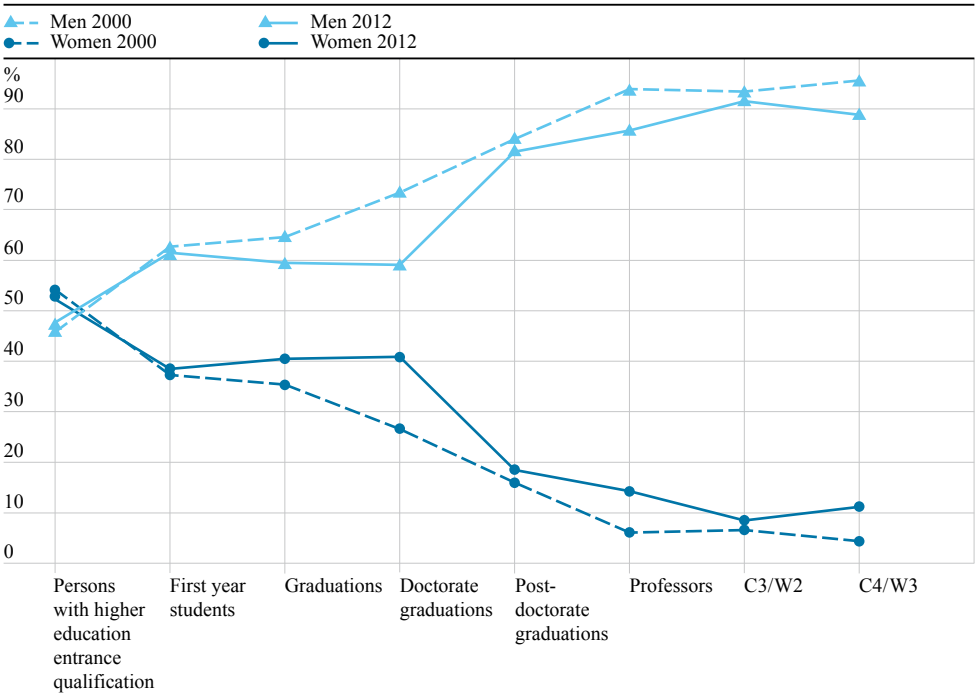
DATA DOWNLOAD



Source: Statistisches Bundesamt.

Mathematics and natural sciences

DATA DOWNLOAD



Source: Statistisches Bundesamt.

Engineering sciences

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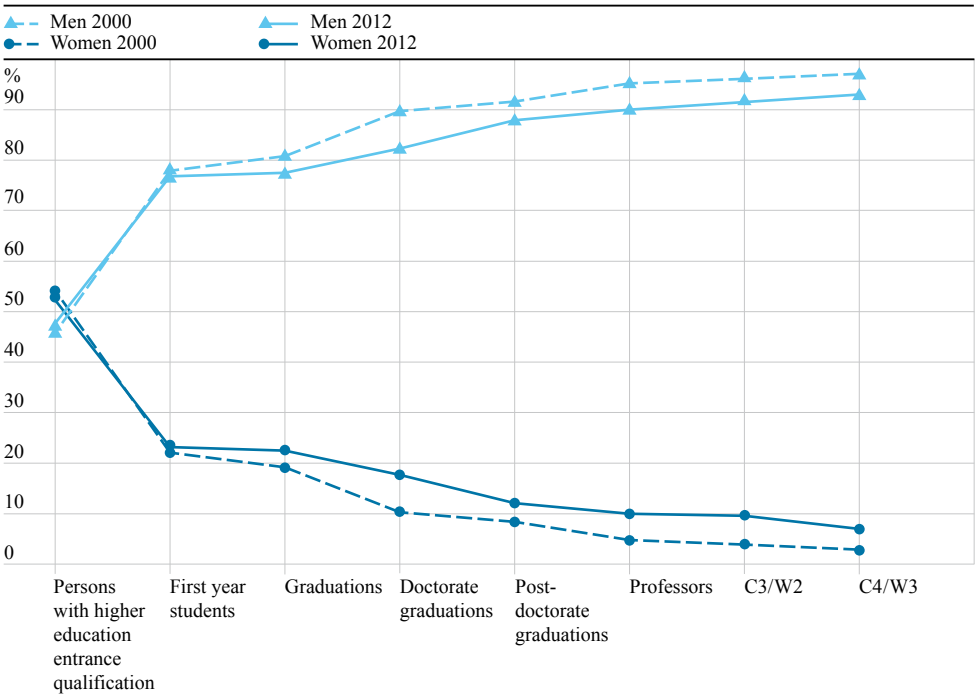

Source: Statistisches Bundesamt.

TAB 12 **Share of women in academic leadership positions in 2010**
(figures in percent)

DATA DOWNLOAD

	AT	CH	DE	FI	FR	GB	IT	NL	SE	US
Share of women in…										
professorship roles (2002)	17.4 (9.5)	25.9 (11.0)	14.6 (8.0)	24.2 (19.9)	18.7 (17.3)	17.5 (15.1)	20.1 (15.6)	13.1 (8.2)	20.0 (14.0)	21.9 (–)
professorship roles in natural sciences	7.6	11.8	9.8	11.8	–	9.0	19.8	8.5	14.3	21.2
professorship roles in engineering sciences	7.7	15.2	5.9	7.4	–	7.0	9.5	6.8	10.1	7.7
university leadership positions	16.2	15.8	11.7	25.0	6.5	–	23.4	13.6	26.9	29.0
scientific committees	31	21	21	45	27	31	17	29	49	–

Source: European Commission 2013b; NSF 2013.

TAB 13 **Target quotas and current share of women at the elite universities**
(figures in percent)

DATA DOWNLOAD

	C4/W3 professorships		
University	**Current situation 2008/2009**	**Set target 2013** [1]	**Situation 2012**
RWTH Aachen University	3	–	9
Freie Universität Berlin	20	22	25
Humboldt-Universität zu Berlin[3]	19.3	15.1	18.3
University of Bremen[3]	19	21–25	21
Dresden University of Technology[3]	5.6	10	5.9
University of Freiburg[2]	10	25	17
University of Göttingen[2]	13	17	17
Heidelberg University	11.5	–	14.8
Karlsruhe Institute of Technology[2]	10[4]	13[4]	10[4]
University of Cologne[3]	15.2	–	17.4
University of Konstanz	17	30	23
Ludwig Maximilian University of Munich	9.8	16	14.8
Munich University of Technology	8	15	10
University of Tübingen[3]	12[4]	17[4]	17[4]

[1] The targets for 2013 were first set in 2009, providing for possible adjustment in 2011.
[2] Funded for Future Concepts only in the first round of the Excellence Initiative 2007–2012.
[3] Funded for Future Concepts only in the second round of the Excellence Initiative from 2012.
[4] Total number pf C3/W2 and C4/W3 professorships.
Source: Final reports on DFG's Research-Oriented Standards on Gender Equality

Target quotas and current share of women in non-university research institutions TAB 14
(figures in percent)

DATA DOWNLOAD

Fraunhofer-Gesellschaft		Actual quota 2012	Target quota 2017
Stage 1	Leadership level 1 (directing staff of Institute)	5	11
Stage 2	Leadership level 2 (heads of departments and teams)	14	16
Stage 3	Scientists (below leadership level 2)	23	26

Helmholtz-Gemeinschaft		Actual quota 2012	Target quota 2018
Stage 1	W3 professorships	11	14
Stage 2	W2 professorships	15	20
Stage 3	Heads of working groups (below W2 level)	18	22
Stage 4	Academic staff with an unlimited contract of employment (below heads of working groups; above doctoral candidates)	16	18
Stage 5	Academic staff with a limited contract of employment (below heads of working groups; above doctoral candidates)	29	34
Stage 6	Doctoral candidates	43	43

Max-Planck-Gesellschaft		Actual quota 2012	Target quota 2017
Stage 1	W3 professorships	8.7	13.7
Stage 2	W2 professorships	27.4	32.4
Stage 3	Academic staff employed as per collective agreement	28.3	33.3

Leibniz-Gemeinschaft		Actual quota 2012	Target quota 2017
Stage 1	W3 professorships	12.1	13.5
Stage 2	W2 professorships	17.9	23.1

Source: GWK 2013.

is supposed to be linked more closely with the funding process, i.e. all funding applications for research consortia are required to specify the number of female scientists to be involved on each of the qualification stages. In addition, all tertiary education institutions are required to supply quantitative information on gender equality on an annual basis.[436]

The Federal Government's Pact for Research and Innovation requested from non-university research institutions to specify flexible target quotas according to the cascade model of research-oriented standards on gender equality. In 2012, they responded to this request and declared individual target quotas for different career levels for the year 2017. These are summarised in Table 14.[437]

It is yet too early to assess whether the research organisations are taking sufficient action to achieve these goals. However, the Expert Commission feels that the objectives of the non-university research organisations – and those of the tertiary education institutions – are generally lacking ambition when measured against the cascade model. Based on that, the target shares of the different levels should be closer to the actual shares of the qualification levels below. Here, the opportunity to publicly commit to increasing the participation of women in the German science system was missed.

WOMEN IN LEADERSHIP POSITIONS IN THE PRIVATE AND PUBLIC SECTORS B 4–4

More women achieve leadership positions in the new federal states

Differences in German-German history are evident not only in engineering but also in the share of women in leadership positions. In the new federal

states this share is higher than in the old federal states (cf. Figure 33). Arguably, this is due to the fact that prior to Germany's reunification, women traditionally played a more prominent role on the labour market in the new federal states, and still do so today. Even today, childcare infrastructure is further developed in the new federal states, and employment rates of mothers and the share of women in full-time employment are also higher.[438] In the new federal states, between 35 and 44 percent of mothers with a child under the age of three are economically active. In the old federal states, this ratio is only between 28 and 34 percent.[439]

In recent years, the share of women in the top management level of companies with 500 or more employees has increased considerably. These companies previously recorded the lowest share of women in executive roles. In these companies, the share of women at the top management level increased from 9 percent in 2008 to 19 percent in 2012. This increase is primarily attributable to changes that have taken place in the old federal states. Between 2008 and 2012, the share of women at the top management level increased from 8 percent to 23 percent in the old federal states and is now higher than the value of the new federal states, where the share remained unchanged with 17 percent.[440]

Share of women in leadership positions in 2012 FIG 33
(private sector, figures in percent)

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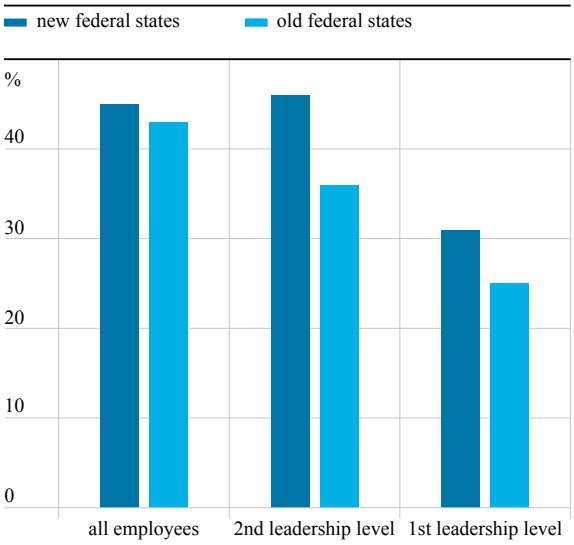

Source: own depiction based on Kohaut and Möller 2013.

Voluntary commitment has shown only little effect

In May 2010, the Government Commission "German Corporate Governance Code"[441] amended their guidelines, including the requirement for listed companies to adequately provide for women when filling management positions and when appointing executive board and non-executive board members. According to the Code, the target of the non-executive board and the status of implementation shall be published in each company's corporate governance report.[442]

A recent study[443] examines whether the DAX companies have met the requirements laid down in the German Corporate Governance Code in their 2010 corporate reports and whether changes can be observed in comparison to the previous year. It turns out that all of the companies have indeed made qualitative statements on the topic of women in executive roles. Yet, only 21 companies have provided concrete quantitative information on the intended share of women on their non-executive boards, and only 15 companies have specified the year by which the target is to be achieved.

In Germany, the share of women on non-executive boards of DAX, MDAX, SDAX and TecDAX companies increased from 10 percent to 17.4 percent between 2011 and 2013. With an increase from 3 percent in 2011 to 8.2 percent in 2013, the share of women in non-executive boards appointed by shareholders has considerably improved recently. Yet, when measured in absolute terms, it is still at a very low level. Traditionally, more women are appointed to non-executive boards in Germany as employee representatives. Already in 2011, their share in relation to the overall non-executive board was 7.8 percent and increased only slightly to 9.2 percent by 2013. The share of women on executive boards was at 6.1 percent in 2013. The ratio thus doubled, starting from a very low level of 3 percent in 2011.[444]

Not only in Germany, but also in other European countries, women are clearly underrepresented in the highest decision-making bodies (cf. Figure 34). On average, women only had a 14 percent share within the EU-27 in 2012. With a value of 16 percent, Germany was above average, but well behind the

Share of women in the highest decision-making committees of the largest listed companies in Europe in 2012 (figures in percent)

FIG 34

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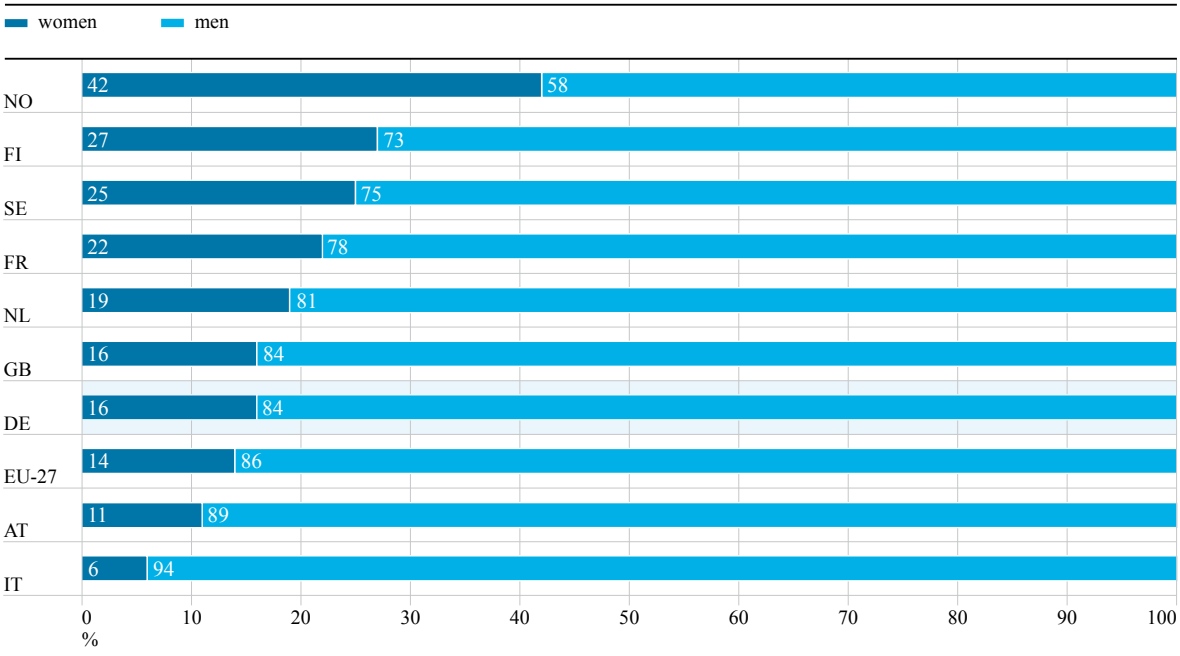


Source: own depiction based on Holst et al. 2012.

Scandinavian countries of Norway (42 percent), Finland (27 percent) and Sweden (26 percent), as well as France (22 percent) and the Netherlands (19 percent). The high share recorded in Norway is the result of a targeted policy (cf. Box 14).

Recent legislative initiatives in Germany and Europe

In the course of the coalition negotiations in Germany, the involved parties have agreed to introduce a quota for women on non-executive boards of German companies. In particular, it was agreed that from 2016 non-executive boards of fully co-determined and listed companies shall exhibit a gender quota of at least 30 percent. In the event that this quota is not achieved, the respective chairs of the underrepresented sex shall remain vacant.[445]

The Expert Commission welcomes this initiative, but points to the scope of interpretation entailed in the wording.[446]

At the same time it should be noted that the share of women on executive boards is still significantly lower than on non-executive boards (6.1 percent as opposed to 17.4 percent). While the legislator can influence the representation of women on non-executive boards, this cannot be done at executive board level. Here, the companies themselves are required to take action – especially since the way to the non-executive board often leads through an executive position. Thus, to increase the number of qualified and experienced women on non-executive boards, increased representation of women on executive boards is urgently needed. In light of this, the insufficient results of the DAX companies' voluntary commitment are all the more worrying.

The issue has also gained momentum at EU level. In November 2013, the European Parliament voted for an EU Directive according to which companies listed on stock exchanges within the EU must exhibit a female share of at least 40 percent on their non-executive boards by 2020. If a company fails to achieve this quota, it is required to specify the reasons and give proof of measures by which the objectives shall be met in the future. Furthermore,

BOX 14

Norway: the effects of a mandatory quota for women on non-executive boards

In 2003 Norway enforced a law stipulating a mandatory 40 percent quota for women on non-executive boards of listed companies by July 2005 – starting from a 9 percent share in 2003. Since these requirements were not met, the government enforced another law in 2006, which then provided for a transitional period of two years and the dissolution of a company in case of failure to meet the required quota. All of the listed companies finally met the quota in April 2008. Recent studies[447] report both negative and positive effects on the respective companies' share prices following an increase in the share of women – depending on the age and experience of the respective women on the non-executive board and the resulting information gap between the non-executive board and the executive board. This means that negative price movements were largely attributable to the fact that, on average, the new female non-executive board members were younger and less experienced than their male counterparts. Another study shows that redundancies were lower in companies affected by the quota system and these companies therefore recorded lower short-term profits due to higher labour costs.[448] Information on long-term profits is not available.

The experience gained in Norway illustrates the necessity for companies to engage in developing qualified staff potential for female non-executive board members at an early stage.

penalties may be incurred in cases where companies fail to introduce suitable recruitment processes. Another suggested sanction would be to exclude non-compliant companies from public tenders. For the Directive to enter into force it has to be adopted by the Council of Ministers.[449]

Women in leadership positions in the public sector

Germany's public sector features a higher share of women in leading positions in comparison to the private sector. This applies to the top level in particular (38 percent as opposed to 26 percent). However, in interpreting this gap, it must be taken into account that the share of women of all employees is also significantly higher in the public sector (60 percent as opposed to 43 percent in the private sector). Measured by their share of employment, women at the top level are (under)represented to approximately the same extent in the private sector and the public sector.[450]

MANIFOLD REASONS FOR LOW PARTICIPATION OF WOMEN

B 4–5

School, course selection and studies[451]

The course for different study choices is already set during school and preschool years. Gender-specific differences in children's relationship to science and technology cannot be observed during infancy. Also, in primary school, the performance of girls and boys in mathematics is approximately the same. Yet, already in early childhood, the interest of boys and girls in natural sciences and engineering is fostered differently. It is only with the adoption of the female gender role during puberty that girls' interest in mathematics and science decreases as this is in conflict with common female role models.

Boys' and girls' differences in assessing their own mathematical and technical skills are much larger than their actual performance differences. Girls perceive their own performance as lower than what their actual results suggest. This perception affects their educational and professional pathways, since a positive assessment of one's own technical skills is an important prerequisite for choosing an advanced course or a degree programme in a STEM subject.

In addition to schooling and the encouragement or discouragement on the part of the teachers, a person's family and social environment are considered as key factors for the decision to take up a STEM degree course. Another important factor are female role models in STEM fields of study or STEM professions.

The design of degree courses also plays an important role: female students are more likely to take up an engineering course if it is clear that the course is interdisciplinary and application-oriented.

Already the course specialisation marks an important step towards future career development. The fact that women are only rarely represented at the highest stages of the career level – i.e. as executive board members and chairs of executive boards – is partially attributable to times of absence from the labour market and decisions in favour of the family. Yet, another important factor are the areas of work women tend to choose: senior managers from the fields of HR, research and development and IT are less frequently promoted to CEO than senior managers from sales, production or finance. Women in executive roles, however, are most frequently found in HR.[452]

Difficulties in reconciling work and family life

In the male-dominated STEM professions it is particularly difficult to reconcile work and family life.[453] The professional culture is based on permanent availability and long periods of attendance.[454] Generally, leadership positions are not only characterised by full-time employment but often involve extra time. In fact, both men and women in leadership positions perceive their working days as being too long: the desired working hours are well below the actual hours worked.[455]

Furthermore, a study on Germany clearly confirms the link between childcare infrastructure and the employment of mothers. In 1996, the introduction of the legal right to a nursery school place for three-year-old children in Germany resulted in the fact that more mothers took up employment.[456] In the United States it has been demonstrated that a non-family-friendly work environment lowers the labour force participation of mothers.[457]

The effects of other measures aiming to promote the reconciliation of work and family life are less clear. A study on the relationship between family-friendly policies and the labour market participation of women in the United States suggests ambivalent effects. Although measures such as part-time work or parental leave facilitate the (re)entry of women into the labour market, they also entail the risk that women will decide against full-time or senior positions, thereby sacrificing career opportunities.[458]

The effects of part-time employment on women's labour force participation rates and career opportunities need to be considered separately. Part-time work often impedes career advancement as leadership positions are usually designed as full-time activities. Thus, Germany and Austria for instance, both of which feature a relatively high share of women in part-time jobs, record a high labour force participation of women. However, in both countries the share of women in leadership positions is low. It appears that Sweden has been more successful in solving this issue: while Sweden displays a high part-time rate, both labour participation and the share of women in leadership positions are relatively high.[459] These differing career structures are certainly owing to the fact that a part-time job in Germany and Austria comprises a significantly lower average number of hours when compared to Sweden.[460] In Germany, part-time employment is largely understood as comprising half the number of hours than that of a full-time job – or even less. In Sweden, however, the average number of part-time working hours is one third higher. Further, it is of concern that a (gradual) upward adjustment is often difficult to achieve once working hours have been reduced to a part-time level. This makes it virtually impossible to advance on the career ladder. A more flexible approach is needed here: part-time models should allow for different numbers of hours, including near full-time employment, and provide more flexibility for both parents. This would be an important step towards improving the compatibility of career progress and family life.

In order to prevent part-time employment from representing a career obstacle, it will be important to overcome the paradigm according to which leadership positions can only be performed on a full-time basis, often incurring significant overtime.[461]

Stereotypes and lower tendency for competitive behaviour as career barriers

Informal, male-dominated networks strongly affect employees' career opportunities. Access to these networks is generally based on the feature of similarity. Decisions on promotions and recruitment are often made on the basis of similarity to prevailing stereotypes – and in the male-dominated boardroom these are male. This makes it difficult to overcome stereotypes,

and prevailing structures at management level and in promotions keep perpetuating themselves.[462]

Stereotypical role models represent another obstacle to the career progress of women. While the typical man is depicted as being assertive, achievement-oriented, competitive, independent and confident, the typical woman is considered to be accommodating, empathic, dependent, socially-minded and caring. These notions affect the evaluation of the performance and potential of women, since the characteristics of the typical man are fairly consistent with the stereotype of an executive. The characteristics of the typical woman, however, do not conform to the expectations of an executive. As a result, the leadership potential of women is considered to be less pronounced. What is more, the actual leadership behaviour of women is judged much more critically. The influence of prevailing stereotypes on women's career prospects has been confirmed by numerous empirical studies.[463]

A job application experiment for a scientific position in the fields of biology, chemistry and physics conducted in the United States clearly demonstrated the relevance of stereotypes.[464] As part of this experiment, professors were supplied with identical application documents. The male and female professors reviewing the applications assessed those with a female first name as less competent than those with a male first name. The experiment showed that women would be less frequently hired, would receive a lower starting salary and would receive less support in their career development. In Germany, a number of companies have introduced anonymised application procedures as part of a pilot project initiated by the Federal Anti-Discrimination Agency. This has helped reduce the scope of discrimination.[465]

However, not all job application, appointment and promotion procedures can be carried out anonymously. It is therefore essential to overcome prevailing stereotypes. Box 15 describes two projects where this has been accomplished successfully.

In addition to stereotypes, gender-specific characteristics also play a role in salary and career-related differences. In comparison to men, women often avoid competitive situations and engage in competitive behaviour less often.[466] They are also more reluctant with respect to salary negotiations. A field experiment in the United States demonstrated that, in cases where a job advertisement does not specify whether wages are negotiable, men are more likely to address this issue than women.[467]

SWEDEN – LEADING IN INNOVATION PERFORMANCE AND EQUALITY B 4–6

Sweden is a leading country in two areas: in terms of innovation performance and in terms of gender equality.[468] On the EU's Innovation Union Scoreboard, Sweden repeatedly assumes one of the top positions; in the most recent ranking it is even ranked first. Sweden records an above-average share of women among undergraduate and PhD students in engineering sciences, with a share that is well above that of Germany. Moreover, Sweden has been actively promoting gender equality for many years. These efforts have taken shape in numerous policy areas and have led to a high level of labour force participation of women.

Sweden particularly excels in terms of reconciling work and family life. In addition to an extensive range of public childcare facilities, Sweden has a parental leave model that provides incentives for integrating fathers into childcare. It includes an means-tested parental allowance (amounting to 80 percent of the last salary), a quota of parental leave days exclusively allocated to fathers (60 days), as well as a gender equality bonus, i.e. families that divide their parental leave on equal terms will receive an additional bonus. Besides this, the Swedish model is characterised by a high degree of flexibility as the duration of parental leave is calculated on the basis of days, and not on the basis of weeks or months.

The Swedish tax system is also designed to promote gender equality. As early as 1971, Sweden introduced individual taxation. In contrast to household-based taxation, individual taxation provides more incentives for both spouses to pursue employment. Yet, the Swedish tax system also contains tax allowances and transfer payments, e.g. for children or house building, that are calculated on the basis of the household income.

Working hours in Sweden's research system are also family-friendly, and working overtime is not very common. In contrast, Germany's and Austria's working

BOX 15

Ways of overcoming stereotypes

A project conducted in India illustrates the relevance of stereotypes and ways of challenging them. As part of a constitutional amendment, 30 percent of randomly selected villages had to allocate the position of chief councillor to a woman, i.e. only female candidates were allowed to apply. The subsequent elections – which did not provide for a gender quota – showed that those villages that had gained experience with female chief councillors would more frequently vote for women than those villages where previously only men had held leadership positions. The reason for this is that the perception of the competence of female politicians had altered. This example illustrates the role of stereotypes, but also the fact that stereotypes can be overcome. Prior to the introduction of the quota, voters had assessed the competence of female politicians as being significantly lower than that of male politicians – even though the basis for evaluation had been the same. However, once voters had gained experience with female politicians in leadership roles, they rectified their earlier assessment regarding the competence and effectiveness of female politicians. Moreover, notions of the role of women in the public and private sphere had changed. In addition, the gender quota also had a positive impact on girls' educational decisions: in those villages with a gender quota, girls were more likely to strive for professions that require training. Also, the parents of girls were more open to the idea of their daughter receiving further training.[469]

Stereotypes are by no means confined to developing countries or rural environments. At Harvard Business School it could be observed that female students were falling behind their male fellow students, despite having had the same test results prior to taking up their degree courses. Furthermore, Harvard Business School experienced major difficulties in appointing and retaining female professors. These issues were attributed to the school's extremely male-dominated environment, which made it difficult for women to assert themselves. To address these issues, in 2011, Harvard Business School launched a project that aimed to counteract the disadvantage faced by women. The project comprised a revision of the academic curriculum and aimed at challenging social rules and practices. For example, classes were recorded by stenographers in order to monitor whether grades were subject to gender bias. Furthermore, female students were provided with training courses on demeanour, language and learning behaviour. The success of these measures was confirmed with the graduation of the first cohort of students who had benefitted from these measures: women participated more actively in class, they achieved better grades, they received more academic awards, and the atmosphere was perceived as more agreeable.[470]

culture in the area of research is characterised by permanent availability and long working hours or attendance times, respectively. Only 5 percent of researchers in Sweden state that they work more than 41 hours per week – as opposed to 50 percent of researchers in Austria and 33 percent of researchers in Germany.[471]

Gender awareness is also promoted at corporate level: every three years, businesses are required to collect and analyse data on disparities in income between women and men. Companies with 25 or more employees are obliged to provide equality plans with information on clear timeframes and planned measures. Companies are required to issue regular reports explaining and evaluating the implementation of such measures.[472]

Equal opportunities constitute a key objective of the Swedish education policy, which aims to counteract gender-specific career and study choices. Measures include e.g. company visits or mandatory internships in occupational fields that do not comply with traditional gender-specific domains. Moreover, the Swedish education system continuously provides entry points for natural science/technical training pathways, e.g. in the form of special one-year courses in which the requirements for subsequent natural science/technical degree courses are taught. These offers are primarily taken up by young women and youths from socially disadvantaged groups. The entry points are considered to be the main reason why more female students – in relation to all students – choose a degree course in natural science/technical subjects when compared with other countries.

Overall, the example of Sweden demonstrates that one policy instrument alone does not suffice to successfully promote women. To achieve this, a comprehensive approach applied to manifold political and social domains is required.

B 4–7 RECOMMENDATIONS – IMPROVING THE STRUCTURAL FRAMEWORK

Greater participation of women in the innovation system will increase the innovative power of Germany as a business location. Both academic and industrial R&D will benefit from new ideas and different perspectives and approaches. Greater awareness of the different needs and preferences of customers and users – of which 50 percent are women – will facilitate the development of customised solutions and applications.

In order to make better use of this potential, the Expert Commission has identified a need for action in the following areas.

Attracting women and girls to natural sciences

The Expert Commission reiterates its recommendation from its previous Annual Report to put particular emphasis on the mathematical and technical education of girls at the school level. Schools need to foster an interest in and enthusiasm for mathematical and technical issues among female pupils, thereby creating an improved skill basis in order to facilitate the decision to enrol in engineering degree courses at a later stage. To achieve these goals, the government has to provide adequate resources for high-quality teaching in STEM subjects.[473] The Expert Commission would like to stress that investments in education need to be viewed in conjunction with Germany's innovative capacity.

In the field of life sciences, attempts to stir girls' interest in these fields of study have been successful. However, problems occur at higher career levels, which shall be addressed in the following.

Reconciling family and working life

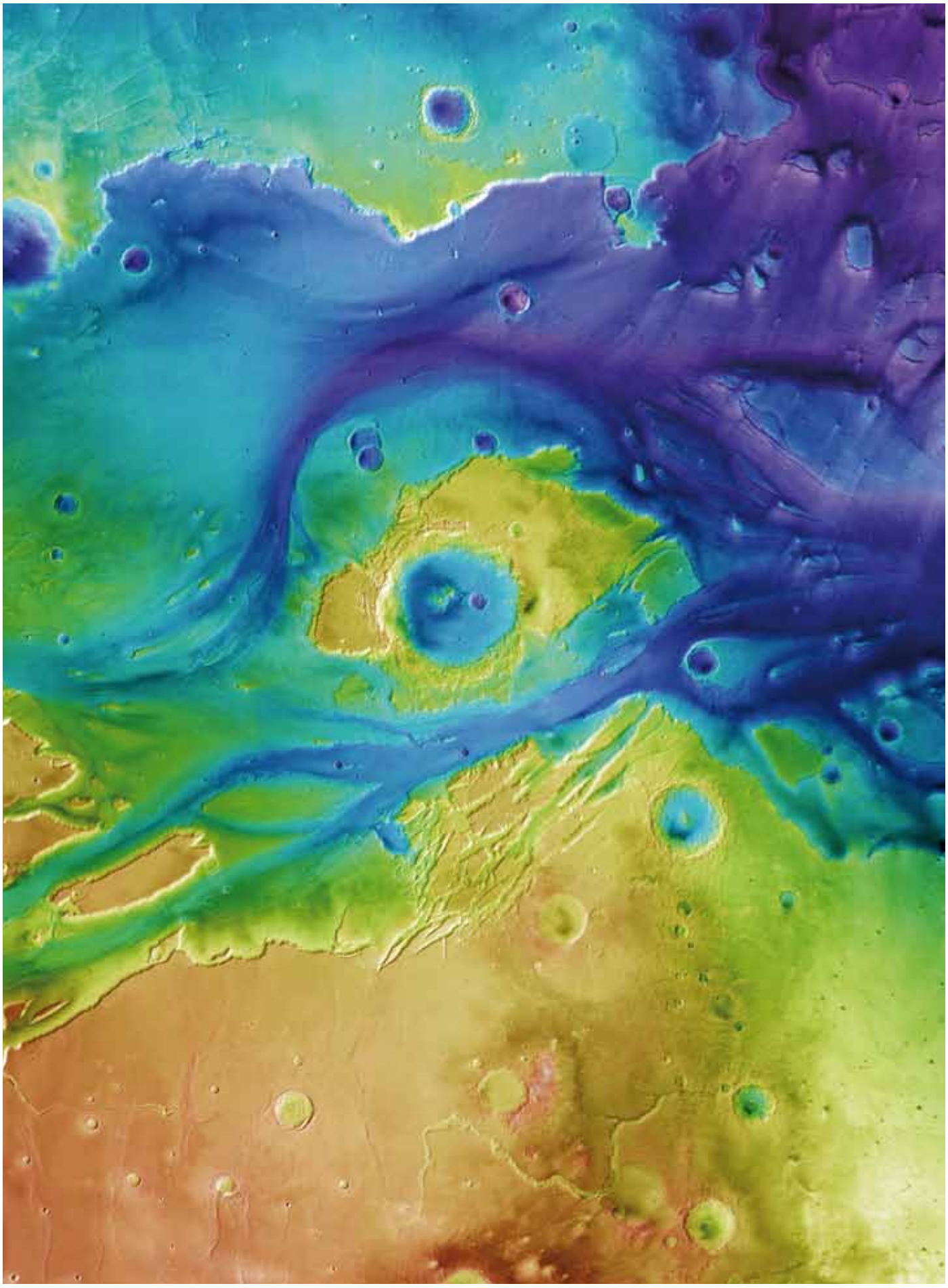
The Expert Commission recommends swiftly advancing the expansion of childcare facilities and all-day schooling in particular. This will make it less difficult for women to pursue employment and create necessary long-term incentives for making greater use of the labour force potential of women – also in engineering professions.[474]

The Expert Commission further recommends measures to support family-friendly working conditions at the corporate level. The Scandinavian countries can serve as a model in this respect. These countries perform very well in terms of distributing family work more evenly between men and women and in ensuring a high labour force participation of women – also in STEM professions and leadership positions.[475] In this context, decisive factors include flexible working time models, staggered hours of work, home office options as well as the departure from attendance as a performance indicator. Most notably, employees must be provided with more flexibility in terms of varying or increasing their working hours after a temporary period of part-time employment.

In the view of the Expert Commission, incentives for well-educated women to exit the labour market should be eliminated. These include incentives resulting from the tax system (spousal joint tax declarations, *Ehegattensplitting*) and the childcare allowance *(Betreuungsgeld)* that is currently in place.

Reducing stereotypes that hinder career progress

To overcome discrimination against women stemming from stereotypical gender roles, businesses and research institutions should establish internal processes to ensure that their recruitment and selection procedures, as well as their promotion decisions and decisions on filling leadership positions do not lead to unintended gender bias.[476] In this context, it is essential to standardise recruitment and promotion procedures, to ensure the anonymity of application documents and to regularly raise awareness among those in charge of HR decisions.[477] Public authorities could lead here by implementing relevant measures in public administration, while also working towards implementing such structures in the tertiary



Topography of the lower reaches of Kasei Valles.

Vertical plan view of the crater Becquerel.

education sector, at research institutions and in the private sector.

Target agreements and quotas

The Federal Government's coalition agreement provides for the introduction of a gender quota of 30 percent for non-executive boards of fully co-determined and listed companies. The Expert Commission welcomes this initiative. However, to ensure that quotas or target agreements are actually met, clear-cut penalties will have to be enforced in those cases where objectives are not achieved. This applies to target agreements for executive staff at companies and research institutions. If senior managers fail to recruit a sufficient number of women, this will have to affect their performance review and, ultimately, their financial compensation. In addition, legal regulations will have to provide for penalties, thereby setting sufficient incentives for companies to achieve the objectives.

While it is essential to increase the share of women on non-executive boards, increasing the share of women on executive boards should not be neglected either. As statutory enforcement options are lacking, increased participation of women on executive boards should be promoted within the framework of the Corporate Governance Code.

Finally, the Federal Government should also increase the share of women in leadership positions in public administration.