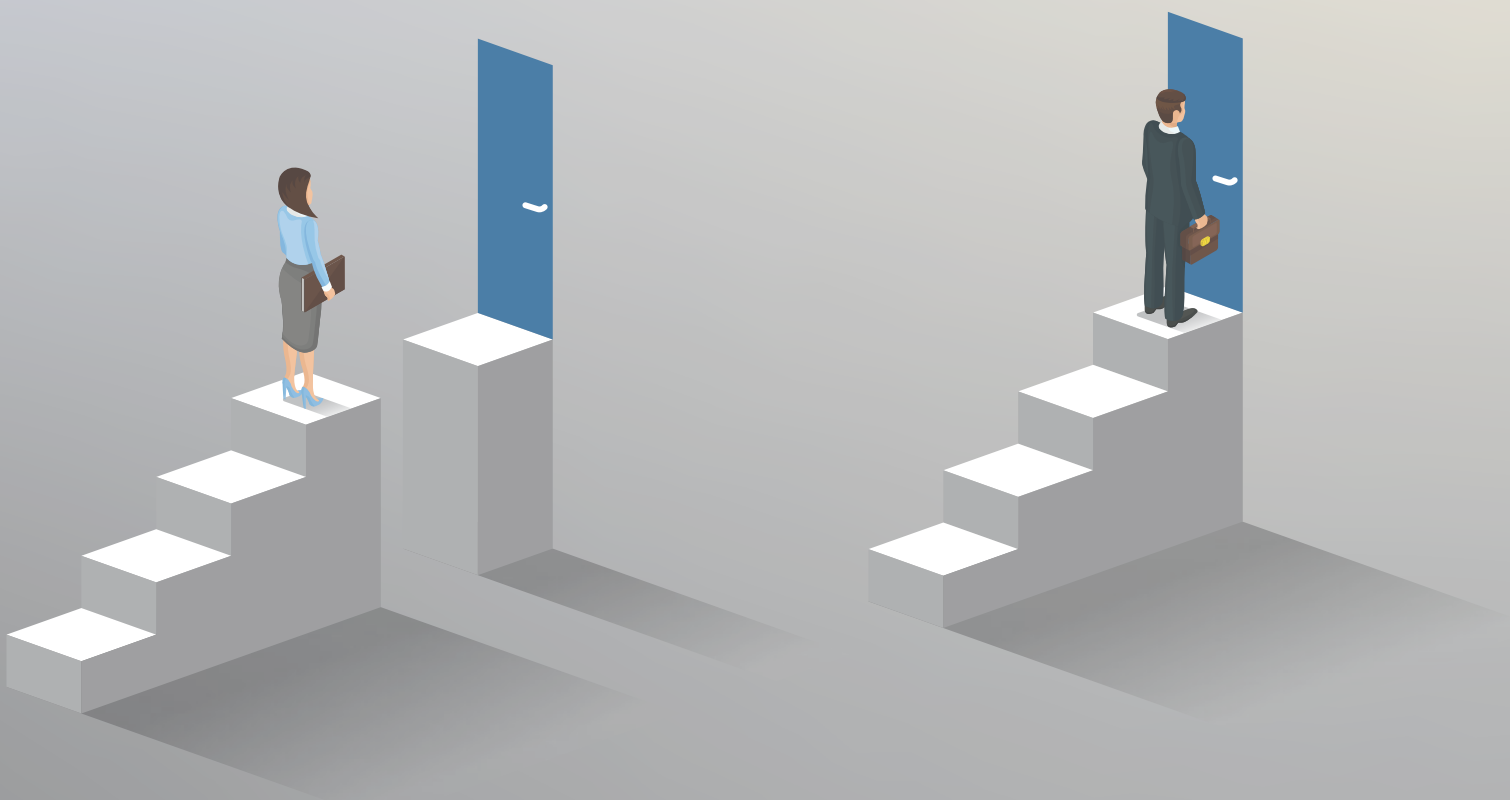




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# Women in science: developments and recommendations



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# **Women in science: developments and recommendations**



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# 1 Women in science

Men continue to dominate German science and research, and women are significantly underrepresented in leadership positions. Apart from the North Rhine-Westphalia Academy of Sciences and Arts, not a single scientific academy is headed by a woman.<sup>1</sup> Among the non-university research institutions – including the Max Planck Society (Max-Planck-Gesellschaft, MPG), the Helmholtz Association, the Fraunhofer Association and the Leibniz Association – only the latter has a female president (since 2022). Just a quarter of all universities and other institutions of higher education are run by women. Significantly fewer women are appointed to high-ranking professorships, with their percentage in almost all disciplines still well below the percentage of women studying for degrees and doctorates.

This is not only an issue of equality, it also jeopardises the future viability of German science and research. Science only harms itself by forgoing women's creativity: both on the international stage and in competition with the non-academic labour market for excellent personnel. Diversity increases success – this is true too for science and research.<sup>2</sup>

There are several dimensions to diversity: ethnicity and nationality, age, social background and gender. The fact that gender is not only conceived and experienced in a binary way has been a frequent subject of discussion over the last few years. Many people identify neither as women nor men and thus experience various disadvantages.<sup>3</sup> These disadvantages partially overlap with the personal discrimination and structural exclusion that women are generally exposed to in the academic system and that are the focus of this statement.

A working group of the Leopoldina used an in-depth and differentiated approach to investigate the underrepresentation of women in German science and research. Its members hail from various scientific disciplines, and some of them have been working on gender policy inequalities and discrimination for decades.<sup>4</sup>

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1 Last verified July 2022; in contrast, Die Junge Akademie, funded by the Berlin-Brandenburg Academy of Sciences and Humanities (Berlin-Brandenburgische Akademie der Wissenschaften, BBAW) and the German National Academy of Sciences Leopoldina, has been mindful of ensuring balanced gender representation among spokespersons since its founding.

2 Woolley et al. 2010.

3 Very little data exists on the career opportunities of non-binary persons in science and research. A better data base and more thorough scientific investigation is needed to be able to assess discrimination against them in the workplace.

4 This statement is not a reflection of Gender Studies, which is much more comprehensive in terms of subject matter. Please refer to the literature from the very dynamic field of gender-specific university research for more detailed observations on, for example, university development and gender equality policy, the economisation of science and universities, the increasing precariousness of academic work and employment, measurement and excellence dynamics in academia, or institutional sexism and the effects of sexual violence in academia.

The working group brought together experiences and insights regarding gender distribution at various levels of the academic hierarchy and processed suitable statistical material where available. It also enlisted the expertise of institutions promoting research, and of foreign universities and commercial enterprises.<sup>5</sup> This revealed an overall picture that makes it possible to differentiate between general trends and the particularities of academic life and to provide recommendations aimed at specific structures and functions of the academic system.

The statement begins with a review of the situation. It outlines the historical development of gender equality, identifies failures and problems, and highlights where progress has already been made.

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<sup>5</sup> Looking abroad serves to identify best practices and to learn from the experiences of others. A dedicated comparative perspective was beyond what the working group were able to achieve in the scope of their work.

## 2 Past

Women and science – for a long time the two did not go hand in hand. The modern university, founded in Germany in the early 19th century, was initially a purely male domain, both in terms of students as well as professors. Women began to call for their right to university study in 1860, which they were finally granted in Prussia in 1908. In 1921, following a long struggle and many humiliations, they received the right to undertake the habilitation. Thus, the path to professorship was open to women, but few pursued it – even female students felt that the societal disadvantages of being an “educated female” [“Gelehrte Weiber”] were too great.

In 1933 the National Socialists imposed a numerus clausus on gender: Just 10 percent of newly graduated students were allowed to be women. At the beginning of the 1950s the proportion of women among students at universities in the Federal Republic of Germany was still only 17 percent, and 25 percent in the GDR. Not until the education campaign in the 1960s did things start to improve significantly. Now, just as many women as men study, though they specialize in different areas.

However, women remain significantly underrepresented among researchers and professors. The new women’s movement of the 1970s first brought attention to this situation. It demanded that more female professors be appointed to universities, and expected the range of scientific subjects to be expanded in turn. After all, the humanities, the social and life sciences and human medicine often limit teaching and research to male-oriented content and references, with severe consequences for the life situations and health of women.<sup>6</sup>

Feminist criticism of science and research primarily driven by men and from a male perspective did not go unheard: Some universities introduced *Frauenprofessuren* (female professorships) and encouraged women’s and gender studies. The German government and federal states presented a “women’s programme” for academia. The low number, in comparison to US and UK universities, of female scientists was considered not only an issue of equality but increasingly a competitive disadvantage, and, especially in the STEM subjects, a burden for Germany as a centre of commerce and industry.

Scientific organisations have been voicing their recommendations for equal opportunities since the late 1990s.<sup>7</sup> In 2008 the member universities of the German Research Foundation (Deutsche Forschungsgemeinschaft, DFG) pledged to maintain research-oriented gender equality standards and to report on these. At the same time,

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<sup>6</sup> The gaps and distortions that were linked to this reduction are explained by Hausen and Nowotny 1986; Wobbe 2002 et al.

<sup>7</sup> Wissenschaftsrat 1998; 2007b. In 2006 the Alliance of Science Organisations in Germany (DFG, Fraunhofer Association, Helmholtz Association, Leibniz Association, German Rectors’ Conference (HRK), MPG and The German Science and Humanities Council) started the “campaign for equal opportunities” (Wissenschaftsrat 2007a).



political pressure on non-university research institutions to take up measures to “guarantee more equal opportunities and family-friendly structures and processes” and to document these results increased. This monitoring resulted in extensive numerical material, which The German Science and Humanities Council (Wissenschaftsrat) processed in 2012.<sup>8</sup> The findings can be summarised as follows.

- Although more than 51 percent of all degrees and over 44 percent of doctorates were completed by women in 2010, their share at the habilitation level reached barely 25 percent and less than 15 percent in terms of C4/W3 professors. Looking at the scientific career ladder it becomes evident that the gap between the number of women and men grows wider at every career stage.
- This was especially true for disciplines in which female students and doctorate students were present in large numbers. In contrast, engineering sciences recorded a relatively constant – and constantly low – percentage of women at all study and career levels.
- The percentage of women in a leadership position as C4/W3 professors rose between 2006 and 2010 from 11 percent to almost 15 percent. Non-university research institutions also saw an increase, albeit a small one.

The German Science and Humanities Council believes that progress is moving too slowly and too hesitantly. It has called for “more ambitious milestones” and recommended the formulation of concrete, verifiable goals for equality policy. There should also be financial incentives to achieve these goals.<sup>9</sup>

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<sup>8</sup> Wissenschaftsrat 2012.

<sup>9</sup> Wissenschaftsrat 2012, p. 17, 20 f., 39.

### 3 Present

Where do we stand today? New data from the Joint Science Conference (Gemeinsame Wissenschaftskonferenz, GWK)<sup>10</sup> show that while the means and measures implemented so far may have improved the situation, they are not sufficient to put women and men on an equal footing in science and research.

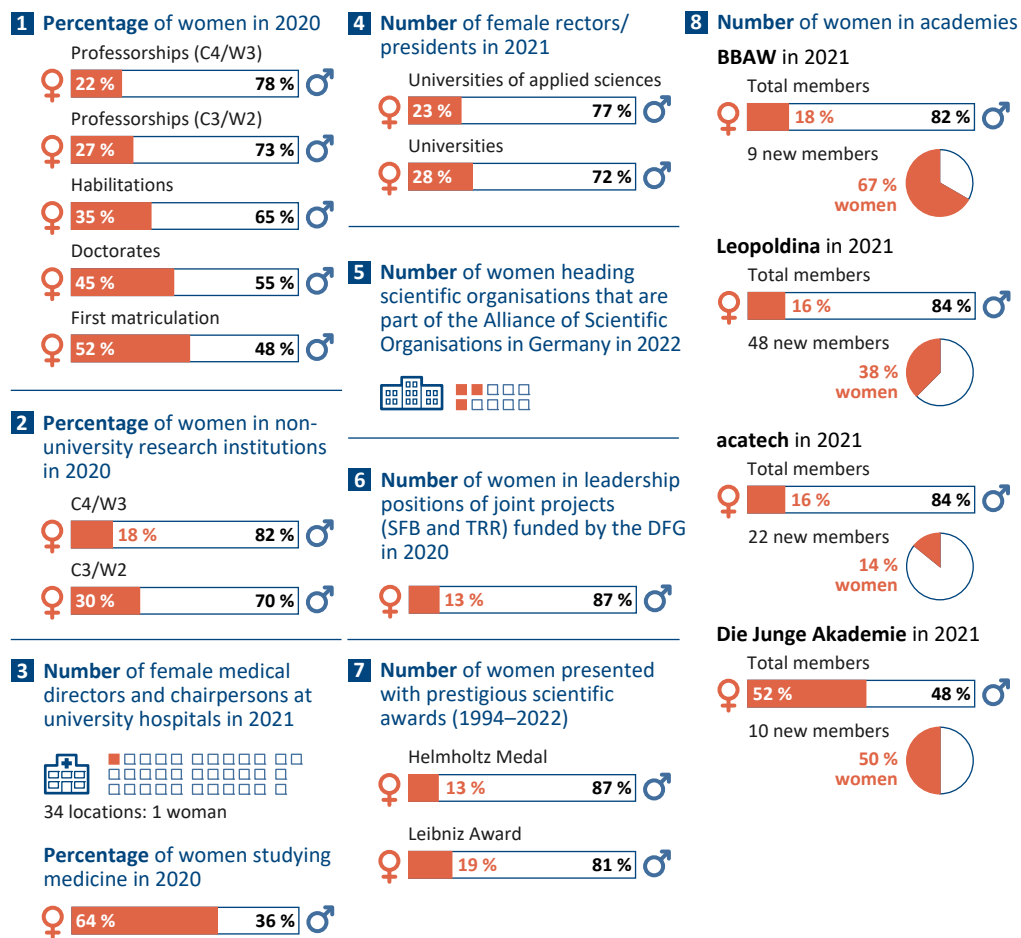


Figure 1: Current data on percentage of women in German science and research.<sup>11</sup>

<sup>10</sup> GWK 2021c.

<sup>11</sup> 1.1 and 1.2: GWK 2021c / 1.3: own survey; Destatis 2022 / 1.4: Roessler 2021 / 1.5: own survey / 1.6: DFG 2022b / 1.7: DFG 2022a; BBAW 2022 / 1.8: own survey.

Although the data material of the GWK is insufficiently differentiated, it does show that the dominance of men in scientific leadership positions is still very pronounced and that men are more often given awards and on average better paid for their work.<sup>12</sup>

- The percentage of female professors (C4/W3) rose between 2009 and 2020 by only 9 percentage points, to 22 percent. In 2020 it was at 27 percent among C3/W2 professors. At the same time the percentage of women among doctoral and habilitation students rose to 45 percent and 35 percent respectively.<sup>13</sup>
- In 2020 the number of women in scientific leadership positions (C4/W3) in non-university research institutions was just under 18 percent.<sup>14</sup>
- Since October 2021, there has been a leading female medical director and chairperson at only one of 34 university hospitals – despite the fact that 64 percent of students are female and that parity has been achieved in terms of doctoral graduates and, aside from some discipline-specific exceptions, in further specialist medical training.<sup>15</sup>
- The number of female rectors and presidents is still only at 23 percent at technical colleges and 28 percent at universities, despite rising by around 10 percentage points since 2010.<sup>16</sup>
- Women head only one in ten scientific organisations that are part of the Alliance (German Research Foundation, The German Science and Humanities Council, Leibniz Association).<sup>17</sup>
- In the prestigious joint projects (Collaborative Research Centre [Sonderforschungsbereich, SFB], Transregio [TRR]) funded by the DFG, the percentage of women among the spokespersons was barely 14 percent in the last decade. Among the PIs (Principal Investigators) 15 percent (SFB) and 11 percent (TRR) were women.<sup>18</sup>
- In terms of the leadership of independent research groups, the MPG was almost able to reach parity in terms of the proportion of women and men in the last years. In other research organisations the percentage of women in 2020 was again under 40 percent, and in the DFG's Emmy Noether research groups it was only 25 percent.<sup>19</sup>
- Female scientists are also much less likely than male scientists to be considered for academic awards. Between 1994 and 2022, the Helmholtz Medal of the Berlin-Brandenburg Academy of Sciences and Humanities (BBAW) was only twice awarded to a

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12 Burkhardt et al. 2019; Kortendiek 2019; Kortendiek et al. 2019.

13 GWK 2021c.

14 Ibid.

15 University hospitals with a central administration or a leading medical director at one or more locations are included, but hospital associations are not.

16 Roessler 2021.

17 As of July 2022.

18 DFG 2022b.

19 GWK 2021a, p. 108; GWK 2021b, p. 112.

woman, i.e. in 13 percent of cases. In the same time frame, the Leibniz Award from the DFG presented 62 out of 320 prizes to women, i.e. 19 percent. However, this is primarily a reflection of the public pressure that followed the scandal in 2015, when not a single woman received an award, which led to wide protest. Since then the percentage of women has noticeably increased.<sup>20</sup>

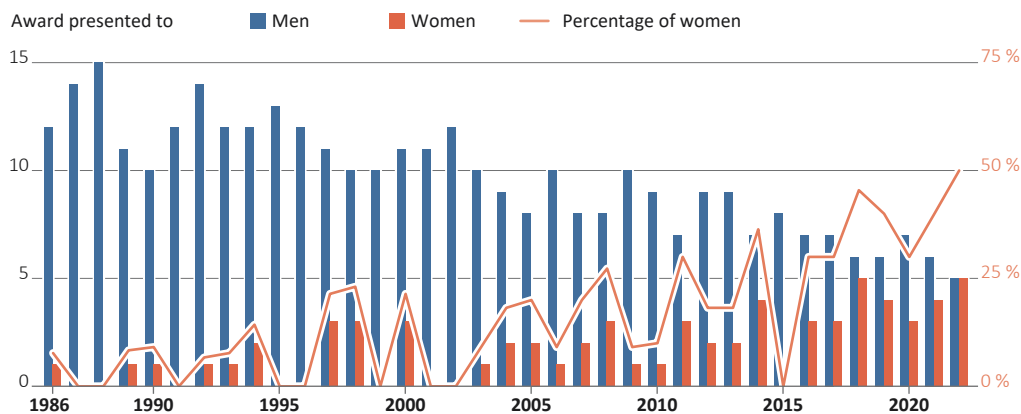


Figure 2: Leibniz Awards 1986–2022.<sup>21</sup>

- The North Rhine-Westphalia Academy of Sciences and Arts has been run by a woman since 2022 – it is the only academy headed by a woman. Women are significantly underrepresented among academy members too. In the BBAW, the percentage of women in 2021 was just under 18 percent, in the Leopoldina, 16 percent (in 2000, it was only 2.6 percent!). In light of this situation, both academies have implemented appointment strategies that have significantly increased the percentage of women among newly selected members.<sup>22</sup>

Feminist protest and the gender equality policy that has been pursued since the 1990s have doubtlessly led to progress: Today, women enjoy more representation at all levels of the hierarchy of science and research. Women have almost caught up to men when it comes to doctorates, the prerequisite for an academic or scientific career. Yet there is still cause for concern: Will this continue to the next level to the same degree and at the same pace? As before, many more women than men leave academia after they obtain their doctorate. They represent barely a third of those who have recently completed a habilitation and this underrepresentation increases with every career stage.

<sup>20</sup> DFG 2022a; BBAW 2022.

<sup>21</sup> DFG 2022a.

<sup>22</sup> Own surveys. In 2021 29 percent of new members of the BBAW were women; of the Leopoldina, 36 percent.

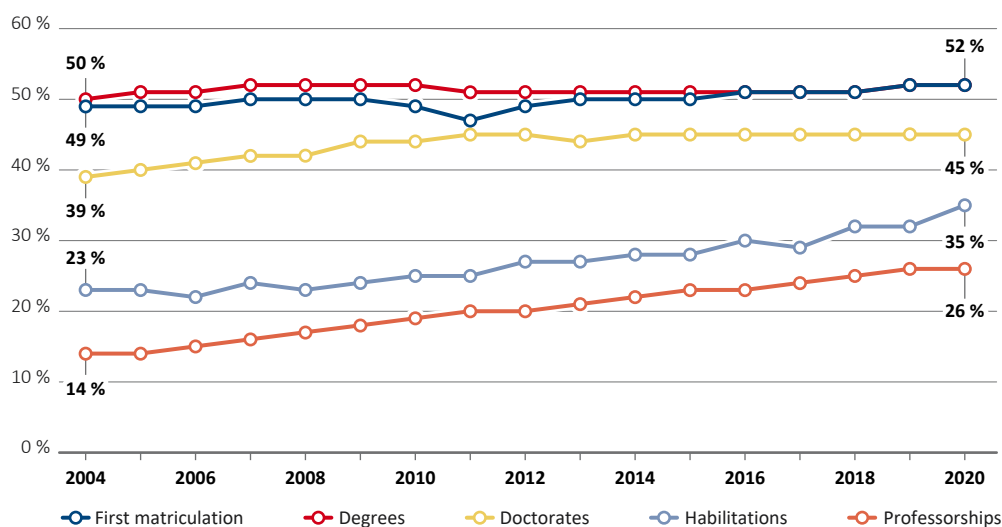


Figure 3: Development of the percentage of women at each academic qualification level from 2004–2020.<sup>23</sup>

Different trends can be observed in independent research groups and junior professorships. Since 2016 the percentage of women in group leadership has been between 30 and 48 percent. The percentage of women among the junior professorships created after 2000 was high from the start and has since reached 47 percent. Whether this development will include W3 professorships in the foreseeable future depends on whether university leadership and policy pursue gender equality goals, and how energetically they do so.<sup>24</sup>

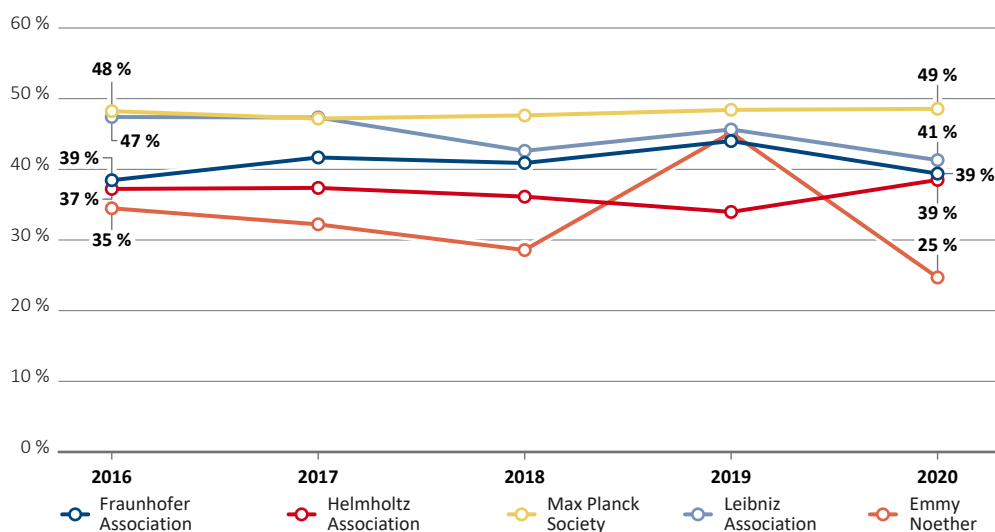


Figure 4: Percentage of research groups led by women 2016–2020.<sup>25</sup>

<sup>23</sup> Destatis 2021; 2022.

<sup>24</sup> All figures according to GWK 2021c, p. 8; Löther 2021.

<sup>25</sup> GWK 2021a, p. 108; GWK 2021b, p. 112.

The effects that equality-oriented policy is able to generate are demonstrated in the fact that around 40 percent of all university appointments in 2020 were awarded to women; twenty years ago it was just 16 percent. 43 percent of appointments to W2 professorships went to women, while the percentage of women among W3 professorships was 35 percent (although only 25 percent of the applications came from women).<sup>26</sup>

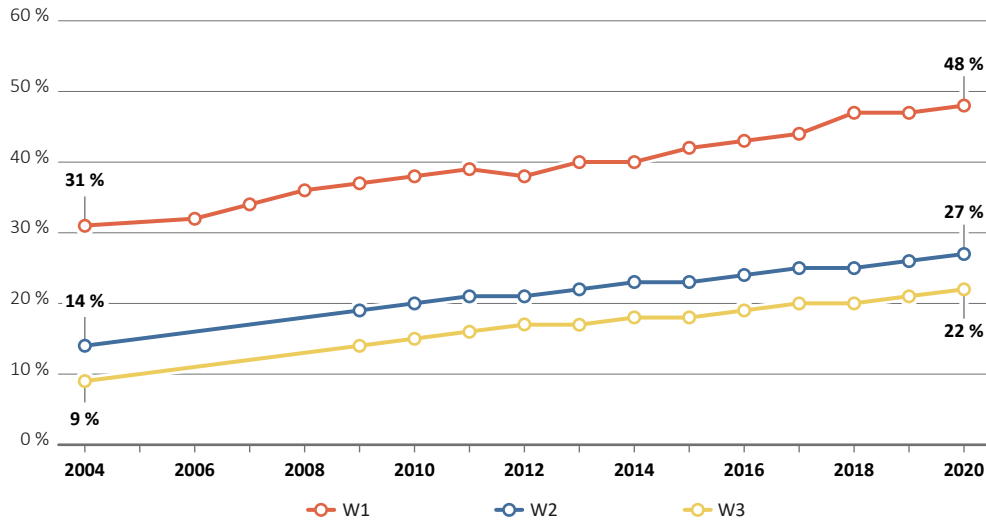


Figure 5: Development of the percentage of women in professorships, differentiated according to W1, W2 (incl. C3) and W3 (incl. C4).<sup>27</sup>

This development is accompanied by the *Professorinnenprogramm*<sup>28</sup> (Programme for Women Professors) of the German Federal Government and States as well as by the palpable pressure from society and politics to ensure parity between the genders in science and research regardless of specialist field.

Gender parity in German science and research remains a long way off. Some positive trends have actually weakened rather than strengthened in recent years. Concerning doctorates, the number of women rose quickly and continually between 1994 and 2009 and almost achieved parity. But progress stagnates when it comes to postdoc positions and habilitations. This limits the number of women that can be appointed and thwarts efforts being made to ensure that the presence and visibility of women in scientific leadership positions reflects their proportion in the population.

The structural and habitual factors standing in the way of this goal have been well researched. These include:

<sup>26</sup> GWK 2021c, Tab. 5.1, p. 2 and 3 of the tables enclosed.

<sup>27</sup> Destatis 2021.

<sup>28</sup> Despite justified criticism and a need for reform, the programme proved successful in its first two programme phases, contributing to the implementation of gender equality policy and a faster increase in the percentage of female professors than would have been expected without the programme. However there is still scope for action in scientific policy, as not all federal states have made use of the programme. Blome 2013, p. 136–143; Löther et al. 2017, p. 6; Zimmermann 2012.

- an often more implicit than explicit bias that hinders the recruitment, appreciation and promotion of female scientists,<sup>29</sup> worsened by
- the dominance of men in leadership positions, institutional decision-making bodies and networks,
- a scientific culture that often places less value on willingness and ability to cooperate and more frequently rewards assertiveness in competitive situations,<sup>30</sup>
- a reputational imbalance in which women's research topics are less well regarded than those of men, creating a division that results in the achievements of women receiving worse evaluations,<sup>31</sup>
- a disproportionate burden on female scientists in terms of committee and commission work,<sup>32</sup>
- a lack of transparency in the development of the scientific career after the doctorate stage, which maximizes uncertainty and to a large extent inhibits longer-term planning,
- a lack of role models, which negatively affects women's self-confidence and motivation,<sup>33</sup>
- traditional roles in relationships: women continue to perform – and even more since the coronavirus pandemic – the majority of family work during the life phase in which the course for a scientific career is set.<sup>34</sup> In connection with insufficient infrastructure (childcare and care services for relatives), this not only reduces their resources in terms of time and mental performance, but also their geographic mobility.<sup>35</sup>

All of this contributes to the fact that young women significantly more often decide against continuing their scientific careers after the doctorate or the first postdoc.<sup>36</sup>

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<sup>29</sup> Bohnet 2016, esp. Chap. 1; Laursen and Austin 2020, esp. Chap. 3; Sagebiel 2018.

<sup>30</sup> Schlüter et al. 2020; Bosquet et al. 2013; van den Brink and Benschop 2012; Gneezy et al. 2003.

<sup>31</sup> Friebel et al. 2021; Steinþórsdóttir et al. 2020.

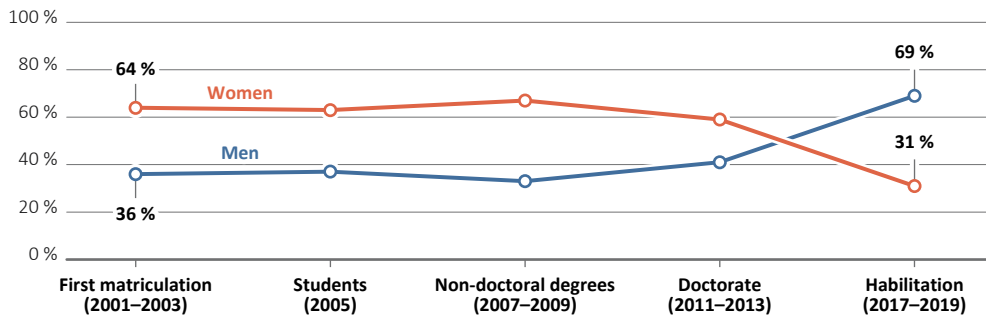
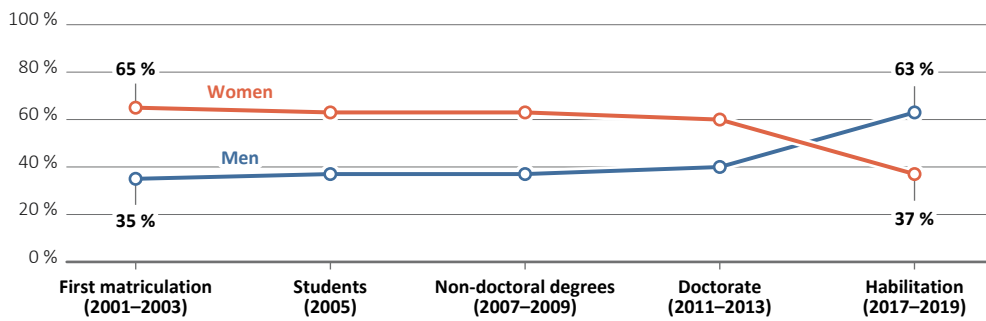
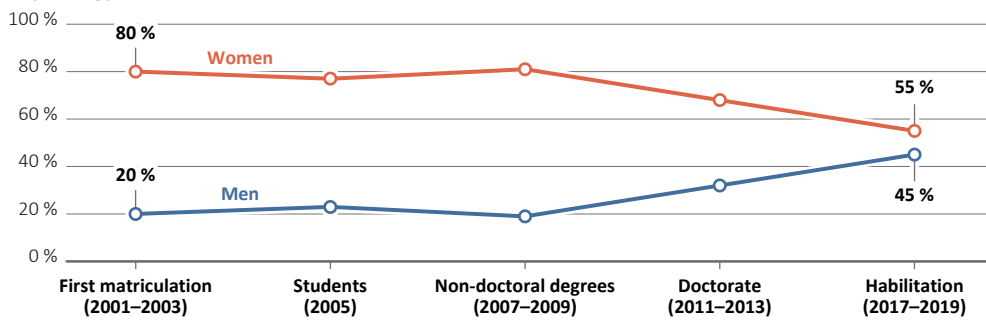
<sup>32</sup> Guarino and Borden 2017.

<sup>33</sup> Laursen and Austin 2020.

<sup>34</sup> Morgan et al. 2021; Antecol et al. 2018; Mason et al. 2013; Amano-Patiño et al. 2020; Sevilla and Smith 2020; Schiebinger and Gilmartin 2010.

<sup>35</sup> Jöns 2011; Leemann 2010.

<sup>36</sup> Etzkowitz et al. 2008.

**Biology****Medicine****Psychology**



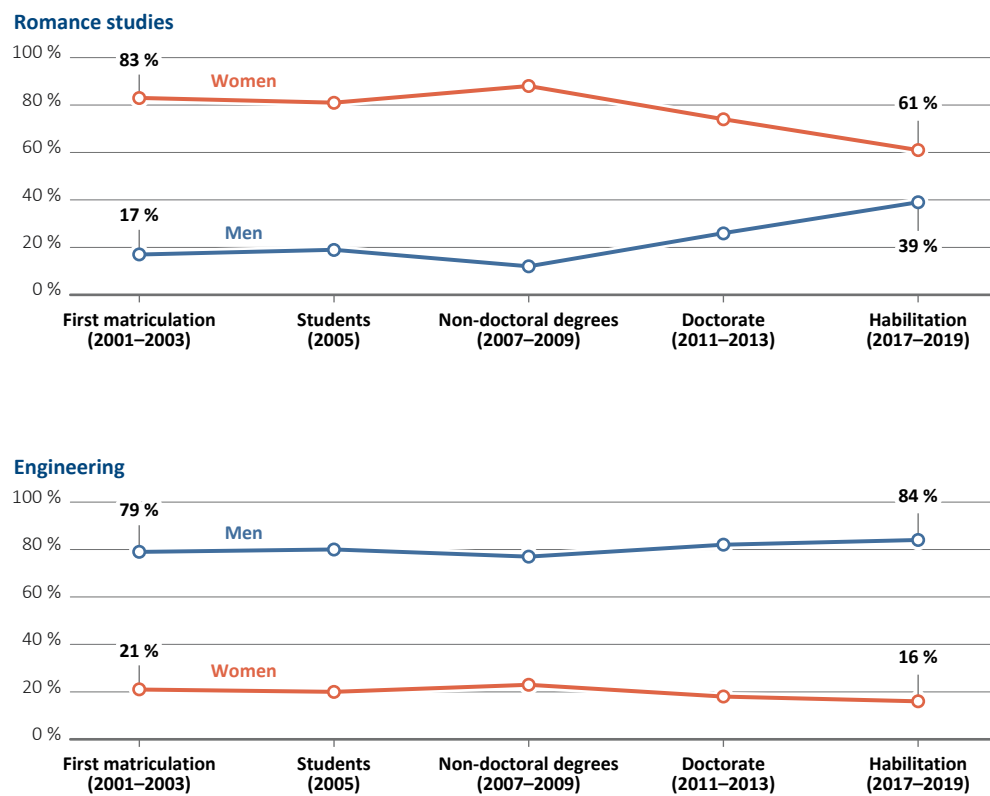


Figure 6: Development of the gender ratio across qualification phases in selected disciplines.<sup>37</sup>

<sup>37</sup> Destatis 2021; 2022.

## 4 Future

The working group addressed the problems, weaknesses and failures in terms of equal opportunities for women and men in science and research. Their recommendations focus on the career phase following the doctorate, in which highly qualified women leave the system in disproportionate numbers and change career fields.<sup>38</sup> That there are other factors before this threshold, beginning in early childhood and reinforced by educational interventions, which prevent women from pursuing scientific careers or put them off certain disciplines, is common knowledge, yet this is something that the academic system can hardly influence, if at all.<sup>39</sup>

This is why the recommendations focus on what the system can and must do to recruit, retain and promote qualified women. This decidedly does not mean measures to simply favour women regardless of their scientific performance. Rather, the focus is on creating an assertive and enduring culture of scientific leadership which ensures equality is a task for leadership at every level. Equality must become an established and prioritised task for heads of organisations. Purposeful initiatives and long-term measures are required to change the structures and behaviours that continue to hinder and even prevent the scientific careers of women.

The measures and interventions named hereafter are recommended with a view to the objective of creating gender parity in scientific leadership positions in the foreseeable future. This parity is a target for society as a whole. It should apply in institutions such as academies, universities and non-university research institutions as well as in the planning of association projects and the presentation of awards and honours. At the same time, investments and measures that create and foster gender parity increase the attractiveness of the scientific profession and ultimately benefit all personnel.

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<sup>38</sup> Cordis 2008.

<sup>39</sup> Olsson and Martiny 2018; Lockwood 2006; Wigfield and Eccles 2000.

### Gender parity

In general, the aim should be a balanced ratio between men and women in all scientific institutions and disciplines; the ratio should reflect the respective proportions of the population. The starting point for this is already present in the humanities, social and life sciences (above all in medicine), given the high percentage of women among students and graduates: There are already many qualified women that could be appointed. This number could be significantly increased via definitive measures to close the leaky pipeline after the doctorate or the postdoc phase. In the STEM disciplines, which see fewer women take up a degree and correspondingly fewer women achieve doctorates, parity in leadership positions represents a larger challenge with no quick and easy solution. In this case it is especially important to create role models so as to increase young women's interest in such careers. In addition, degree courses which are more tailored to the interests and preferences of female students (example: "Physics of climate change") should be offered.

The recommendations of the working group are divided into four parts:

1. Change structures
2. Empower women
3. Make women visible
4. Document progress, review developments

#### 1. Change structures

- a. The leadership of universities, non-university research institutions and academies should be measured against how quickly and sustainably they meet the requirements for gender equality.<sup>40</sup> To reinforce this, institution-based funds and personal performance incentives can be granted on the condition that equality targets are reached within the scope of the respective institution's abilities. In addition, equality goals and their successful implementation should be accorded more significance in evaluations and certifications.
- b. How quickly equality can be achieved in science and research also depends on the availability of attractive positions not bound by mandates. In this respect, the Federal Republic of Germany performs extremely poorly in international comparison.<sup>41</sup> More permanent positions are urgently recommended.
- c. In scientific organisations too, transparent and cooperative structures based on team thinking contribute to an improved working environment and reduced friction. This includes collaborations in and between scientific institutions with the involvement of all scientific staff. All of those involved, men and women alike, profit from such horizontal modes of working.<sup>42</sup>

<sup>40</sup> HRK (Hochschulrektorenkonferenz) and Goethe Universität Frankfurt am Main 2021.

<sup>41</sup> Höhle 2019; Kreckel 2008.

<sup>42</sup> Fox 2020; Way et al. 2019; Bozeman and Youtie 2018; Albert et al. 2016; Wagner 2016; Zeng et al. 2016.

- d. The concentration of power can hinder and prevent scientific careers. The latter is often at the expense of female scientists. If the requirements of the discipline allow, it is thus recommended that hierarchical structures be dismantled in favour of horizontal organisation in order to bring about positive effects on equality.<sup>43</sup>
- e. Tenure track positions represent a suitable means of providing reliable planning and employment prospects, based on performance, to young scientists following a doctorate or a first postdoc.<sup>44</sup> Between the ages of 30 and 40, such prospects take on particular importance since life decisions in terms of starting a family and career progression take place at this time and many women leave academia – in significantly higher numbers than men.<sup>45</sup>
- f. Filling tenure track and other mandate-bound positions (e.g. leadership of a research group) should be based on parity. In disciplines in which no parity can be achieved due to a low number of female students and doctoral students, ambitious goals are to be defined that significantly increase the percentage of women in the foreseeable future. Should the goals not be attained in the agreed time frame, material and structural consequences (loss of financing, renaming of positions, etc.) are to be prepared and implemented.
- g. According to research, a “critical mass” of around 30 percent is required for minorities in organisations to reach their potential and exert an influence.<sup>46</sup> In the STEM disciplines, with their relatively low percentage of women among students and doctoral students, significantly more professorships must also be held by women – at least every fourth, later every third. Continued use of the cascade model is not sufficient.<sup>47</sup> This wastes time and underestimates the positive signal and imitation effect that a “critical mass” of female professors in traditionally masculine domains can have on female students and doctoral students. In the humanities, social and life sciences, in which more than half of students and doctoral students are women, this proportion should be reflected in leadership positions.
- h. In terms of appointments, women should of course receive the same salary offers, including all bonuses, as men. This also applies to material and financial resources.<sup>48</sup> Transparent and gender-neutral salary structures are an essential part of good governance and must be correspondingly communicated.

<sup>43</sup> The newly founded TU Nuremberg introduced, for example, departmental structures and centrally assigned to each department positions for female scientific officers; see DUZ 2022.

<sup>44</sup> The new Berlin university legislation, currently the subject of heated debate, allows for permanent positions or positions with the potential to become permanent (tenure track) for scientists funded by the university. Positive effects on the gender parity of scientists following the doctorate are expected yet depend on how staff structures are designed and on their integration in measures for increasing gender equality. When designing staff structures it must be ensured that women from all career levels are adequately considered.

<sup>45</sup> Konsortium Bundesbericht Wissenschaftlicher Nachwuchs 2021, p. 14.

<sup>46</sup> The “critical mass” hypothesis has so far been tested in business and political practice. Joecks et al. 2013; Apestequia et al. 2012; Dahlerup 1988; Grey 2006. For academia, see Etzkowitz et al. 1994.

<sup>47</sup> The cascade model, towards which gender equality policy in science currently orients itself, defines the goals for the percentage of women at each individual career level by the number of women on each previous level. Cf. Mann and Specht 2020 for criticism.

<sup>48</sup> A study by the Massachusetts Institute of Technology shows that such equal treatment is not a matter of course, 1999.

- i. Dual career possibilities must be funded. Relocations necessary for the progression of a scientific career can be facilitated by offering a corresponding position to life partners who previously secured family upkeep via a long-term career position. This is particularly important for the recruitment of female scientists since, unlike men, their partner is more often someone who is employed full time and who holds at least the same qualification level as themselves. The establishment of a dual career fund, with which bridge financing could be guaranteed for the permanent employment of the partner of the scientist being appointed, would be helpful. Such measures should apply across federal state borders.
- j. Cluster hiring, i.e. a simultaneous and open tender for several positions, increases the chances of diversity and parity, attracts innovative researchers, and simplifies dual career appointments.<sup>49</sup>

## 2. Empower women

- a. Considering the growing gap between women and men when it comes to career progression after obtaining a doctorate, more efforts are needed to retain qualified women in science and research. Personal consultation and mentoring (not only by women)<sup>50</sup> are just as necessary as the material support of young families (also in terms of stays abroad) and the flexibilisation of working hours.
- b. Recurring meetings crucial for career progression should not take place at times allocated for family and care tasks. For one-off events (conferences), hosting institutions should make childcare available. Part-time work – which is practised especially often by women – should be advised against. It can lead to permanent career disadvantages as carrying out a qualified and qualifying job part-time is difficult in the long-term due to the very dynamic processes of science and research.
- c. Exemplary partnerships in which both partners take on family care work and encourage each other's careers should be more visible. They deserve institutional and media support, for example in the form of appreciative reporting via newspaper articles, profiles and interviews.
- d. Networks, both national and international, are an essential foundation for scientific success; their expansion requires a high degree of interregional mobility. This should be facilitated for women and financially supported by travel expenses, for example. Hybrid formats can simplify access to networks over long distances.
- e. By means of long-term staff planning, the leadership of universities and non-university research institutions should be able to identify vacancies in advance and begin recruitment campaigns that focus on women. In this way female candidates can be found without having to forgo quality in last-minute employment decisions for the sake of women's empowerment.<sup>51</sup>

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<sup>49</sup> Flaherty 2015.

<sup>50</sup> Lerchenmüller et al. 2021.

<sup>51</sup> Woelki and David 2015; Kalev et al. 2006.

- f. An intensive onboarding process helps to attract and recruit much sought-after female scientists to one's own institution, for example in the form of prior guest stays that create trust and dismantle prejudices (especially when it comes to international recruitment).
- g. Should a key scientific or administrative position be filled by a man it must be transparently and thoroughly explained why it was not possible to recruit a female scientist. Gender parity should especially be borne in mind when it comes to appointing leadership committees; plans for this should be made as early as possible.
- h. The *Professorinnenprogramm* (Programme for Women Professors) of the Federal Government and States offers incentives for universities to work on and implement gender equality concepts. This should be continued, especially with a view to countries that have hardly participated thus far. In addition, policy to establish new positions with ample resources for qualified women should be intensified in order to, parallel to the suggested measures, quickly and sustainably increase the presence of female scientists in leadership positions, also and especially in the STEM disciplines.<sup>52</sup>

### 3. Make women visible

- a. An important leadership task in scientific institutions constitutes working against widespread bias in the assessment of male and female achievements and characters. Established scientists can constructively confront this bias by specifically suggesting qualified women for awards and (national and international) academies, writing reviews, quoting and editing them, and actively supporting them in every way.<sup>53</sup>
- b. As a numerical minority, women are much more overwhelmed in terms of time spent on commission and committee work than their male colleagues. They should receive compensation for this e.g. via a free semester for research purposes, reduced teaching load or additional staff funds.
- c. Scientific conferences and the resulting publications at/in which female scientists are not or hardly present should receive neither internal nor external financial support. The DFG and scientific associations have a special responsibility in this case.
- d. Internal and external scientific media, new as well as traditional, should specifically address their reporting to qualified female scientists. It would make sense in this regard to illustrate the career progression of women, including the support they received and obstacles they faced, and to highlight positive role models, especially in the STEM disciplines.

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<sup>52</sup> Wissenschaftsrat 2013.

<sup>53</sup> He et al. 2019.

### The traps of visibility

Women in the public eye more often attract negative attention and become targets for hate and harassment. The science and research system must position itself clearly in this regard and emphatically ward off such attacks, with the assistance of legal means when necessary. Accusations of wrongdoing or abuse of power likewise highlight the particular vulnerability of women in leadership positions. Such accusations should be carefully investigated by the academic institutions involved. They should also just as attentively investigate reports of prejudice and bias of all kinds. Surveys among female doctoral students indicate that conflicts with female supervisors are reported far more often than those with male leaders.<sup>54</sup> This could be linked to the fact that there are different expectations for women regarding empathy and consideration than for men.<sup>55</sup> In turn, this increases the risk of disappointment and forms a bias in reporting behaviour.

## 4. Document progress, review developments

- a. Currently available data on the assessment of career opportunities for women in science is far too little differentiated in terms of discipline and professorial hierarchy. Categories such as family status, age, region, migration experience, etc., are not recorded. In order to agree on more specific gender equality measures, GWK and the federal statistical office should provide more comprehensive and detailed data in order to facilitate a sophisticated analysis. This also and especially applies to the situation of postdocs and their career goals and paths.
- b. The Federal Ministry of Education and Research (Bundesministerium für Bildung und Forschung, BMBF) should commission the evaluation of women's advancement programmes in order to review their effectiveness.
- c. In order to lend greater visibility to the progress, but also problems and obstacles of gender equality, all scientific institutions and funding institutions should regularly (every two to three years) report on the development of gender equality, especially in the critical phase following the doctorate or the first postdoc. These reports should be bundled and evaluated according to standardised criteria and made available for public use in a central monitoring system (preferably via the BMBF). Regular reporting on gender equality policy would help institutions to recognise their deficits and to increase readiness for additional measures. A further motivating effect would result if such data were to be considered when approving funds or diversity programmes.
- d. It is recommended that scientific institutions regularly carry out surveys on the implementation of gender equality goals, publish them in a differentiated manner according to payment group and resources, and justify, when necessary, why gender equality has not (yet) been achieved. Facilities that repeatedly fail to implement a purposeful and successful gender equality policy should face financial sanctions.

<sup>54</sup> Heckmann et al. 2021.

<sup>55</sup> Eagly and Karau 2002; Lang et al. 2014; Löffler and Greitemeyer 2021; Thomas and Petrow 2020; Zheng et al. 2018; Johnson et al. 2008.

- e. The results of surveys should be included in the process of every evaluation and certification (e.g. via the Centre for Higher Education [CHE], The German Science and Humanities Council). Here it is especially important to ensure that measures are shown in their actual implementation and effectiveness and not merely described on paper.
- f. Despite broad international research activity on gender-specific discrimination in science and research, comparable studies on best practices and their effects are lacking. In fact, evidence-based studies on the effectiveness of adopted measures are rare and urgently needed. The consequences of the poor representation of women on the innovativeness of research and teaching should also be analysed in international comparison. This requires universities to make external and internal resources available.
- g. Knowledge alone is not enough. We need the political willpower of everyone involved to continually and dynamically adapt to gender equality measures – even in the face of resistance.



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