B 5-1 The High-Tech Strategy

The High-Tech Strategy as a coordination instrument

Policies on research, technology and innovation have become increasingly complex in recent decades in highly developed industrialised countries like the Federal Republic of Germany.[265] This complexity is reflected in the coexistence of different state funding concepts for research and innovation (R&I), each of which have been initiated with different motivations and objectives (cf. Infochart B 5). There has been a significant increase over time in the number of instruments used and actor groups addressed, as well as in the number of allocation modalities and funding institutions. In addition, the societal challenges that have become the focus of R&I policy in the context of the new mission orientation also impact on different areas and levels of policy. This makes the coordination of R&I policy a key challenge.

Partially as a response to the increased need for coordination in state R&I policy, in 2006 the Federal Government initiated the so-called High-Tech Strategy (HTS), which entered its third phase in September 2014. In the first phase of the HTS from 2006 to 2009, the focus was mainly on key technologies and lead markets,[266] although attention was also already drawn to the need to use innovations to help overcome major societal challenges. The second HTS phase from 2010 to 2013 (High-Tech Strategy 2020 for Germany – Ideas, Innovations, Growth) brought these societal challenges even more into the centre of attention as a justification for an overarching state R&I policy.[267] The current, third phase of the HTS since 2014 (The New High-Tech Strategy – Innovations for Germany) aims to link together the 'threads' of the first two phases[268] and to further develop the HTS[269] into a "comprehensive interdepartmental innovation strategy."[270]

The Commission of Experts welcomes the fact that the establishment of the HTS has successfully strengthened inter-departmental cooperation in the shaping of R&I policy.[271] However, it still sees room for improvement – above all, the inter-departmental coordination of R&I policy should be significantly speeded up during the next legislative period.

The New High-Tech Strategy

The New HTS[272] includes a number of different approaches of R&I policy: the promotion of key technologies, promotion based on systemic approaches, and the new mission orientation (cf. Infochart B 5).

In the view of the Federal Government, key technologies are "of particular importance due to their economic leverage effect".[273] Unlike the second phase of the HTS, the use of key technologies in the third HTS phase was no longer geared primarily towards solving specific problems in the field of societal challenges.[274] In its 2015 Report, the Commission of Experts welcomed this as well as the open funding concept. However, the delayed implementation of the third phase of the HTS makes it almost impossible to draw conclusions on the effectiveness or success of the new approach.

Many of the new HTS's funding measures are based on systemic approaches. For example, the HTS promotes networking and transfer, as well as the innovation activities of SMEs and the creation of start-ups.[275] Furthermore, the Federal Government regards it as an important task to create innovation-friendly framework conditions – including, for example, better innovation financing and the creation of an education- and research-friendly copyright law.[276]

The New HTS contains policy requirements that are characteristic of the new mission orientation.[277] Six societal challenges were named in the HTS as "priority challenges": digital economy and society, sustainable development and energy, innovative work

Tab. B 5-1-1

Download data

Percentages of expenditure by the Federal Government on research and development by funding areas, 2009 to 2016

Funding area[1),2)]	2009 Actual	2010 Actual	2011 Actual	2012 Actual	2013 Actual	2014 Actual	2015 Target[3)]	2016 Target[3)]	% change 2009–2016
A Health research and health industry	12.8	12.8	12.8	13.5	13.0	13.8	13.9	14.1	45.2
B Bioeconomy	1.9	1.8	1.7	2.0	1.9	1.9	1.9	1.8	27.0
C Civil security research	0.7	0.7	0.7	0.7	0.7	0.6	0.7	0.7	25.3
D Nutrition, agriculture and consumer protection	4.5	4.5	4.3	4.7	4.4	4.5	4.8	5.0	46.4
E Energy research and energy technologies	6.5	6.2	6.5	7.6	8.0	8.3	8.4	8.3	67.9
F Climate, environment, sustainability	8.1	7.7	7.6	8.0	8.0	8.1	8.4	8.4	36.8
G Information and communication technologies	6.2	5.8	5.5	5.5	5.4	5.1	5.2	5.7	21.8
H Vehicle and traffic technologies including maritime technologies	1.9	3.1	3.9	1.6	2.0	2.0	2.3	2.5	75.8
I Aerospace	10.4	9.9	10.0	9.8	9.7	9.9	9.9	10.5	33.1
J Research and development to improve working conditions and in the service sector	0.7	0.7	0.7	0.6	0.5	0.5	0.6	0.6	12.6
K Nanotechnologies and materials technologies	3.6	3.4	3.5	3.6	3.7	3.6	3.6	3.5	28.0
L Optical technologies	1.4	1.3	1.3	1.3	1.3	1.2	1.2	1.2	15.2
M Production technologies	1.7	1.7	1.6	1.5	1.5	1.6	1.5	1.5	11.5
N Regional planning and urban development; construction research	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7	43.8
O Innovations in education	3.0	3.1	3.1	3.2	3.2	3.4	4.0	3.0	31.2
P Humanities; economics and social sciences	6.3	6.2	6.2	6.5	6.4	6.5	6.7	6.9	45.5
Q Innovation funding for small and medium-sized SMEs	6.7	8.4	9.4	7.4	7.5	7.1	7.5	7.2	40.3
R Innovation-relevant underlying conditions and other cross-cutting activities	2.3	2.7	2.5	2.7	2.8	2.8	3.1	2.7	56.0
T Funding organisations, restructuring of the research field in acceding areas; construction of universities and primarily university-specific special programmes[4)]	4.6	3.8	4.1	4.7	4.6	4.8	4.7	4.6	32.1
U Large-scale equipment for basic research	7.0	6.6	7.1	7.6	7.3	7.3	8.1	8.1	51.8
Z Global reduced expenditure; budget reserve[5)]	0.0	0.0	0.0	0.0	0.0	0.0	-2.7	-1.6	
Civilian funding areas combined	90.8	91.1	92.8	93.2	92.4	93.8	94.4	95.1	38.2
S Military scientific research	9.2	8.9	7.2	6.8	7.6	6.2	5.6	4.9	-29.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	
Total expenditure in billions of euros	12.0	12.8	13.3	13.4	14.3	14.2	14.9	15.8	32.0

[1)] According to the categories of the Federal Government's 2009 R&D-planning system (Leistungsplansystematik). Expenditure was converted to the final planning system in 2009. Expenditure by the non-university research organisations is distributed across individual funding areas and funding priorities.
[2)] 2009 to 2011 including Investment and Amortisation Fund without Länder allocations (Economic Stimulus Package II), from 2011 including the Energy and Climate Fund. Research funding in the field of electromobility has been financed by the Energy and Climate Fund since 2012. From 2016 including investments in the future.
[3)] Some of the distribution to funding areas and funding priorities was estimated or extrapolated.
[4)] Including the Bundeswehr universities and Federal University of Applied Administrative Sciences.
[5)] The distribution of the global reduction in the BMBF's spending across funding areas and funding priorities can only be given in the actual figures.

Source: BMBF data portal, cf. http://www.datenportal.bmbf.de/portal/de/Tabelle-1.1.5.html (accessed on 19 December 2016); own calculations.

environment, healthy living, intelligent mobility, and civil security.[278]

In its 2015 Report, the Commission of Experts called for clear target hierarchies to be also formulated within these priority challenges.[279] As a positive example it singled out the fact that the new HTS places more emphasis on participatory processes to ensure that citizens and groups of actors in civil society are involved in deciding on the priorities for funding.[280] For example, the 3rd Framework Programme of Research for Sustainable Development (FONA³)[281] launched in 2015 was developed as part of an agenda process involving science, business, politics and civil society.[282]

In addition to the development of clear target hierarchies, the Commission of Experts recommends paying more attention to important cross-references that are relevant for several priority challenges. Examples of these include digital business models or the use of robotics. In the view of the Commission of Experts, such cross-references have been neglected as a result of the focus on the production sector (Industry 4.0), particularly in the ICT sector.

Extension of the concept of innovation in the New High-Tech Strategy

The concept of innovation has been extended in the New HTS and now also includes social innovations.[283] However, the concept of social innovation is not uniformly defined. The Commission of Experts understands it as the change in social practices, e.g. changes in the use of technologies, changes in lifestyles, business and financial models, working practices and forms of organisation.[284] In its view, there is no need for a fundamental paradigm shift in R&I policy in order to take social innovations more into account.[285] In other words, no special funding criteria are required to distinguish between social and technological innovations.[286] In principle, funding is always required when there is a market failure.[287] According to this premise, the development, research and testing of new ideas for changing social practices are also eligible for funding.

The Commission of Experts welcomes the explicit consideration of social innovations by the new HTS and the first steps towards concrete implementation in the form of funding measures.[288]

The Federal Government's priorities in R&D funding

The Federal Government supports R&D in tertiary education institutions, non-university research organisations and private companies in many different ways – for example via the DFG's thematically unspecified funding, the institutional promotion of non-university research organisations, the promotion of civilian projects within the framework of thematic programmes and funding measures, as well as the award of civil R&D contracts, funding that is open to all technologies, and the award of R&D contracts by the BMVg (cf. Chapter B 3-2).

In recent years, the Federal Government's overall expenditure on R&D has increased significantly – from 12.0 billion euros (actual figure) in 2009 to 15.8 billion euros (target figure) in 2016. At the same time, the distribution of resources to the individual areas of funding has largely remained constant (cf. Table B 5-1-1). While welcoming the considerable growth in funds made available for R&D, the Commission of Experts calls for a critical examination of the distribution of resources. For example, there is no indication that more resources were directed to the field of information and communication technologies – which are so important for managing digital change – in the period from 2009 to 2015. Only the target value for 2016 points towards a slightly higher prioritisation of this funding area. The Federal Government published a new framework programme in the field of microelectronics in February 2016.[289] Overall, the redirection of funding to benefit research in information and communication technologies has taken a relatively long time.