8 The heart of German science policy – and its green lungs

According to SKAD, the *context* of a specific discourse plays an important role as background of the production of statements and practices (Keller 2013). In view of the specific policy discourse on cooperation with developing countries and emerging economies in sustainability research, taking the context into account means to analyze it in its relation to other policy discourses within the BMBF. These can be explained as a *historical a priori*, the *conditions of possibility* (Foucault 1972a) for the specific discourse on cooperation with developing countries and emerging economies, and in turn can be set into relation to broadly accepted public discourses. In this chapter I therefore present what I perceive as *legitimating* concepts of science policy in general. I argue that the concept of *economic prosperity through innovation* functions as an overarching frame, guiding discourse or core belief of the BMBF, which is embedded in a dispositive, thus turning into the ministry's institutional and structural backbone. This *leitmotif* of science policy provides the deeper motivation and rationale for the ministry's thematic and crosscutting ideas and strategies, including sustainability research as well as cooperation with developing countries and emerging economies. The discourse on sustainability serves as an additional overall frame of specific policy fields of the BMBF. The uptake of the sustainability within science policy exemplifies how external public discourses may trigger new developments in policy making, on the one hand. On the other hand, it also illustrates how external discourses are adapted and reinterpreted to suit the own needs. In the last section of this chapter, I show how the BMBF's core discourse is related to the specific discourse on cooperation with developing countries and emerging economies. Chapter 8 thus provides a backdrop for chapter 9, which centres on Megacities and IWRM funding initiatives as concretisation of the BMBF's policy discourse. Both chapters deal with different, but related elements of policy *contents*. In establishing different categories, or types of discourse elements, I resort to the ideas of a phenomenological analysis as suggested by Keller (2005; 2013).

8.1 The heart and soul of science policy

8.1.1 Primal motivations and historical a priori

In order to understand why a discourse evolves into one direction and not the other, hence, to explain why it is what it is, it is crucial to consider the larger context, i.e. the surrounding discourses in which it is produced and reproduced (Hajer 2003a; Keeley and Scoones 2003; Keller 2013). Transferred to the case of BMBF science policy for cooperation with developing countries and emerging economies in sustainability research, this means scrutinizing the institutional structures of the BMBF as a dispositive, as well as the larger political context and historical background of the BMBF as a context. Both dispositive and context are highly relevant to understand the current organisation, direction and political discourse.

I argue that the concept of *economic prosperity for Germany* is the *leitmotif* and core of the BMBF's policies. In a self-description, the ministry argues that "[e]ducation and research are the foundations for our future. The promotion of education, science and research by the Federal Ministry of Education and Research represents an important contribution to securing our country's prosperity." (BMBF 2015a)

The BMBF accordingly conceptualizes research as a means to reach this objective. Technology, applied research and innovation turn into *modal concepts* to achieve the goal of prosperity. This objective lies at the heart of the BMBF since its initial days, when the predecessors of the ministry started to fund applied research by arguing that it was economically relevant for the reconstruction of post-World War Germany (Lengwiler 2010). Consequently, a focus on applied research funding as well as on technological research permeates most BMBF programmes. In the last decades, *innovation* has been added to this row of modal concepts which the BMBF relies on as a means of reaching its primary objectives.

The BMBF's dominant focus on technological innovation and applied research is deeply embedded in the ministry's DNA. As an interviewee spelled out, "[y]ou have to keep in mind the BMBF's role and history. It is a Nuclear Ministry! Then space, water, big stuff" (PA12). Although characteristic for its current orientation, the ministry's concentration on applied research evolved somewhat contingently. In the new governmental set up after the Second World War, the German federal government was left with only few competencies of science and education policy; both science as well as education were responsibility of the *Bundesländer* in the newly established democracy. In order not to lose all stakes in science and education, the federal government seized the niche of funding applied research, which had been left empty by other actors (Lengwiler 2010). In focussing on applied research, the ministry thus made a virtue out of a necessity.

The BMBF of today emerged from several predecessors with different names and slightly different organisational set ups and responsibilities. The first in a row

of ministerial ancestors was the Federal Ministry of Atomic Issues (*Bundesministerium für Atomfragen*), which was founded in 1955 in order to promote the civil use of nuclear power. In 1962, this ministry was renamed as Federal Ministry of Scientific Research (*Bundesministerium für wissenschaftliche Forschung*). Its scope was extended to cover general science funding, aerospace technologies, and large-scale research such as military research and nuclear power. This direction of science policy was legitimized by drawing on discourses of economic wellbeing and closing a technological gap between Germany and the US. As of the late 1960s, German national science policy began to pursue an internationally competitive and specifically German research profile. The funding portfolio therefore diversified, now including areas of innovative high technologies, such as biotechnology or information and communication technologies. In parallel, legitimized by drawing on a discourse of contributing to a higher quality of life through research, research areas such as environmental or health research and a first programme for applied social research were introduced as funding priorities. In 1969, the Federal Ministry of Scientific Research was renamed again, from now on titled Federal Ministry of Education and Science (*Bundesministerium für Bildung und Wissenschaft*). In parallel, the Federal Ministry of Research and Technology (*Bundesministerium für Forschung und Technologie*) was founded in 1972 to promote basic and applied research and technological development in fields such as aerospace technologies, transport, environment and energy, information and communication technologies, biotechnology and health research. Due to the economic depression and energy crisis in the mid-1970s, science policy objectives shifted towards ensuring energy supply and economic innovation through key technologies. Meanwhile, and not surprisingly, the two ministries competed in view of their competencies and responsibilities before they merged into a joint Federal Ministry of Education and Research in 1994 (Stucke 1993; Lengwiler 2010; BMBF and Indian Department of Science and Technology 2011; BMBF 2014r).

The overview of the historical background is given to make a specific point: The core discourse of the current ministry, its leitmotif, as well as the corresponding institutional shape with its strong thematic departments (ch. 5, 7) mirrors the traditional institutional focus on applied sciences, technologies and large-scale science infrastructures. These have persisted as the BMBF's core despite of changing political leadership.

Remaining within traditional pathways is typical for a political ministry: Policy often makes use of historically grown arguments and discursive patterns. Current discourses are often influenced by pre-existing historical ones which contain knowledge of how similar phenomena were dealt with in the past (Hajer 1993; 2003a). The history of BMBF topics clearly backs up Hajer's argument, as the ministry's prevailing focus on technological development is deeply rooted in its tradition. At the same time, this general leitmotif of the BMBF is also strongly institu-

tionalized in its current shape and permeates specialized science policy discourses. This is true for the direction of policies for sustainability research as well as for cooperation with developing countries and emerging economies.

Nevertheless, the uptake of new discourses, as in case of *sustainability*, shows that the core discourse does not coin BMBF thinking and action in a totalizing way. Chapter 8.2 unravels how the public discourse on sustainability slowly trickled into the BMBF, underwent a process of reinterpretation and turned into the main concept for guiding actions of the Sustainability Subdepartment.

8.1.2 Innovation at the centre of science policy

While the leitmotif of economic prosperity through research, technology and innovation inspires the entirety of the BMBF's policies, they are most palpable in the High-tech Strategy, which encapsulates this leitmotif and serves as a container of related ideas. The High-tech Strategy condenses BMBF core thinking and epitomizes the overarching frame of the BMBF's policies. Designed under BMBF lead, the High-tech Strategy is a strategic frame for the entire German government (BMBF 2014c). The initial strategy, termed *Igniting Ideas. High-tech Strategy for Germany* was issued in 2006, with updates following in 2010 (*Ideas. Innovation. Prosperity. High-Tech Strategy 2020 for Germany*) and 2014 (*New High-tech Strategy. Innovations for Germany*) (BMBF 2006; 2010c; Bundesregierung 2014). In all its editions, the High-tech Strategy at its core has been directed at "strengthening Germany's competitiveness as an economic centre" (Bundesregierung 2014: 20). In order to reach this goal, a line of causality is established between funding research and innovation and economic wellbeing. In consequence, the strategy is aimed at fostering types of innovations that are beneficial for the economy based on the argument that "innovative solutions are the factors that drive our prosperity and support our quality of life. They strengthen Germany's position as a leading industrial and exporting nation. And they make it possible to find creative answers to the urgent challenges of our time" (Bundesregierung 2014: 3). The same equation of research, innovation and wellbeing is prominently exhibited in the past High-tech Strategy's title of Ideas. Innovation. Prosperity (BMBF 2010c).

The strategy is thus aimed at promoting innovative technical solutions, as these are considered as a driver of economic growth. In addition to strengthening the German economy and its competitiveness on a global scale, the strategy shall also help to solve national and global challenges. To do so, in its different versions, the High-tech Strategy defines a number of key priorities of innovation, among them

health and nutrition, mobility, energy and climate, communication, and security.[1] The strategy aims to strengthen innovation capacities in the different thematic areas through crosscutting actions and measures across all federal ministries: It wants to contribute to a positive "innovation climate" (BMBF 2010c: 9) for companies, thereby improving the overall conditions of innovation through a bundle of measures ranging from legal to financial frameworks; it strives for a competitive innovation-based industry and encourages stronger interactions between industry and academia as well as between basic and applied research, for example through supporting cluster initiatives.

The High-tech Strategy illustrates that the BMBF does not derive its main purpose and mandate from stressing the value of science as such, but from the links established between science and economic wellbeing. In doing so, the BMBF draws on external discourses that are widely accepted in today's society, such as the capitalist, growth-oriented market system.

The core discourse of science policy thus is based on establishing a causality between technology, applied research, innovation and economic growth, which in turn is portrayed to equal overall German well-being, which is reduced to economic aspects. The ministry thereby chooses a legitimation *beyond* research. This legitimation underlies its general direction and mandate (BMBF 2013e). I argue that this idea is perceived as so strong that it provides the ministry's *raison d'etre*. What could be considered as a basic mandate of a science ministry – to foster science – is thereby put into the broader context of *economic prosperity,* which links research to the underlying ideas of an economy-driven capitalist society. While the principle of a market economy is not prescribed in the German constitution, it is a vastly accepted social norm (Papier 2007) and as such rather taken as a fact than as a social construct. Drawing on this permeating public discourse, the BMBF thus conceptualizes science, research and innovation in view of their economic function, measuring its value in terms of rentability and commercial usability (Hornidge 2007). I argue that other concepts central to BMBF policies, such as *innovation* and *sustainability*, are conceptualized in a way congruent to this leitmotif. As chapter 8.3 will show, these core values, although not originally intended to provide a frame for international cooperation, nevertheless also influence it substantially.

While first concepts of innovation surged in the early 20th century (ch. 2), it was not pivotal for science, technology or other economy-targeted policies until the 1970s. Until then, German (economic) policies had focused on large industries, which were considered to have the largest potential for economic development,

1 In the newest version of the High-tech Strategy, the innovative workplace is introduced as an additional topic and communication with / participation of civil society actors in innovation processes and policy definition is encouraged (Bundesregierung 2014).

creating jobs and overcoming regional structural weaknesses. Increasing productivity of existing industrial branches through improving existing technology lay at the core of policies. The focus on technological innovation surged with the economic crisis of the 1970s, which was perceived as a structural problem. As such, the OECD detected a technological gap in Europe as an underlying cause of economic problems. Thus, as of the mid-1970s, technological process and product innovation was promoted as a source of economic prosperity in times of economic restructuration. Policies began to target the development of new markets instead of increasing productivity in old branches. Instead of large industries, SME (small and medium enterprises) were focussed in view of their economic innovation potential. To foster innovation, policies were to enhance the transfer of innovative technologies from public research to business. In doing so, knowledge was conceptualized as a factor of economic productivity next to human labour and economic capital (Hofmann 1993).

Today, innovation is the silver bullet of reaching the objectives of German science policy:

> "Innovations are the key to growth, employment, prosperity and quality of life. […] innovations, small and large, can change the world for the benefit of people. Scientific breakthroughs and innovative solutions create opportunities to harmoniously combine a) dynamic economic growth and social cohesion and b) efforts to protect natural resources and to respect the carrying capacity of ecosystems." (Bundesregierung 2014: 9)

While innovation has been conceptualized from different angles in different contexts, including social or non-economic types of innovation (ch. 2.4), the BMBF understands innovations as "new or significantly improved products or services that have been introduced to the market (product innovations) and new or improved production or delivery methods (process innovations)" (BMBF 2016c). The BMBF's innovation concept is narrowly focused on commercial products, services and economically usable processes. In the ministry's conceptualisation, there seem to be no alternatives to this type of innovation as a way forward to reaching economic prosperity (Stirling 2008; 2009). Given the status that the BMBF commonly attributes to innovation, the term seems to have turned from an originally modal concept, a means of reaching a larger objective, into an objective of its own. Innovation has been so often conceptualized as a way towards wellbeing, that the term itself has started to represent a desirable objective.

Different types of innovation, such as low-tech innovation or social innovation, which are not based on economically viable innovations, are not put up for discussion. The latest High-tech Strategy mentions to use an "expanded concept of innovation that includes not only technological innovation but also social innovation – and that includes society as a central player" (Bundesregierung 2014:

4). However, social innovation is rather pictured as a *part* of economic innovation, which contributes to its economic success, rather than as an *alternative* or *additional* innovation concept:

> "Innovations result from the interplay between societal demand, scientific development and technological possibilities. If Germany's innovation strength is to be increased, both government and entrepreneurs need to invest in research, and all parties involved in innovation activities need to help shape innovation processes. The society needs to become involved in these areas even more extensively than has been the case to date. Only when all stakeholders participate can desirable and accepted technologies and internet content be integrated within everyday life. With such participation, research findings can enter more rapidly into the practical sphere and be effective there – i.e. ideas can quickly turn into innovations. The key to intensifying participation by all stakeholders – including the science and industry sectors and the general public – is to transparently document and present research and innovation funding. Transparency facilitates dialogue, promotes balanced consideration of opportunities and challenges and fosters openness to new things." (Bundesregierung 2014: 44)

The long quote illustrates that the role foreseen for social innovation is to support economic innovation. In the BMBF's view, social innovation equals stakeholder participation in the innovation process, which ensures the uptake of (technical) innovations in society. Thus, this conceptualisation of innovation heavily relies on the economic benefit of the producer of an innovation. While the innovation as such may potentially contribute to improving any area of life, the pathway of impact is per BMBF definition market-based. The quote also is an example of the appropriation of external discourses and terms into science policy. Terms and discourses such as social innovation, stakeholder participation or sustainable growth, which originally coined alternative discourses, are taken up and integrated into BMBF discourse. In this appropriation, a reshaping takes place. Using terms that superficially accommodate critics enlarges the room for a continuation of practices in line with the ministerial leitmotif below the surface.

8.1.3 Hightech and innovation discourse as ordering concept

The discourse of science, technology and innovation directed at economic benefits that underlies the High-tech Strategy is highly influential across all BMBF departments. Next to shaping thinking and the policy orientation, it is also embedded structurally. The core discourse is thus institutionally anchored in a strong dispositive. Except for those departments that are dealing with the structure of the German science system, the entire BMBF's funding activities in the thematic departments as well as the International Department are aligned with the High-tech

Strategy's objectives. While the High-tech Strategy does not have specific funds in form of specific funding programmes assigned to its implementation, the impact of the economic innovation discourse is actually much deeper: The entire ministry is organized according to the objectives of the High-tech Strategy on a crosscutting structural level. Most – if not all – existing funding activities are subsumed under the High-tech Strategy's umbrella. Accordingly, the overall BMBF funding is aimed at fulfilling the High-tech Strategy's objectives; this can be traced in the official governmental budgetary planning for the BMBF, which is ordered according to the High-tech Strategy and organizes all different funding activities in its frame (Bundesregierung 2012a). As funding initiatives emerge within the organisational structure of departments and working units of the ministry (ch. 6), the overall BMBF discourse thereby permeates into all thematic as well as crosscutting science policy discourses such as those on cooperation and sustainability.

In addition to the structural impact on the organisation of funding, the discourse underlying the High-tech Strategy possesses ideational authority within the BMBF. The core thinking presets the potential pathways that further policies can potentially follow, thus functioning as a historical a priori which both enables as well as delimits the development of subdiscourses in science policy. This becomes clear in its impact on further funding strategies and their underlying ideas. Although the BMBF's leitmotif is most plainly and transparently exhibited in statements on the general direction of science policy, such as in the High-tech Strategy, it nevertheless pervades all further specialized discourses of science policy, such as those bundled in thematic and crosscutting strategies.

8.2 The green lungs: Sustainability as a new discourse in science policy

The perpetuation of a science policy based on technological and applied research targeting economic wellbeing illustrates the point of self-reinforcing ideas and structures in discourse. In contrast, new concepts may still be taken up. This exemplifies that the interplay between the discourse's idea and the structures that carry it, its dispositive, does not necessarily lead to a lock-in or an unchangeable system. The introduction of sustainability as a novel concept in science policy demonstrates this point. As a discursive frame of policy for cooperation with developing countries and emerging economies, sustainability is gaining increasing importance.

8.2.1 Environmental research as a starting point

The BMBF's conception of sustainability still is strongly based on the environmental dimension, which surged as a new topic in science policy in the 1980s, in close connection to the discursive context of its time. While the predecessors of the BMBF