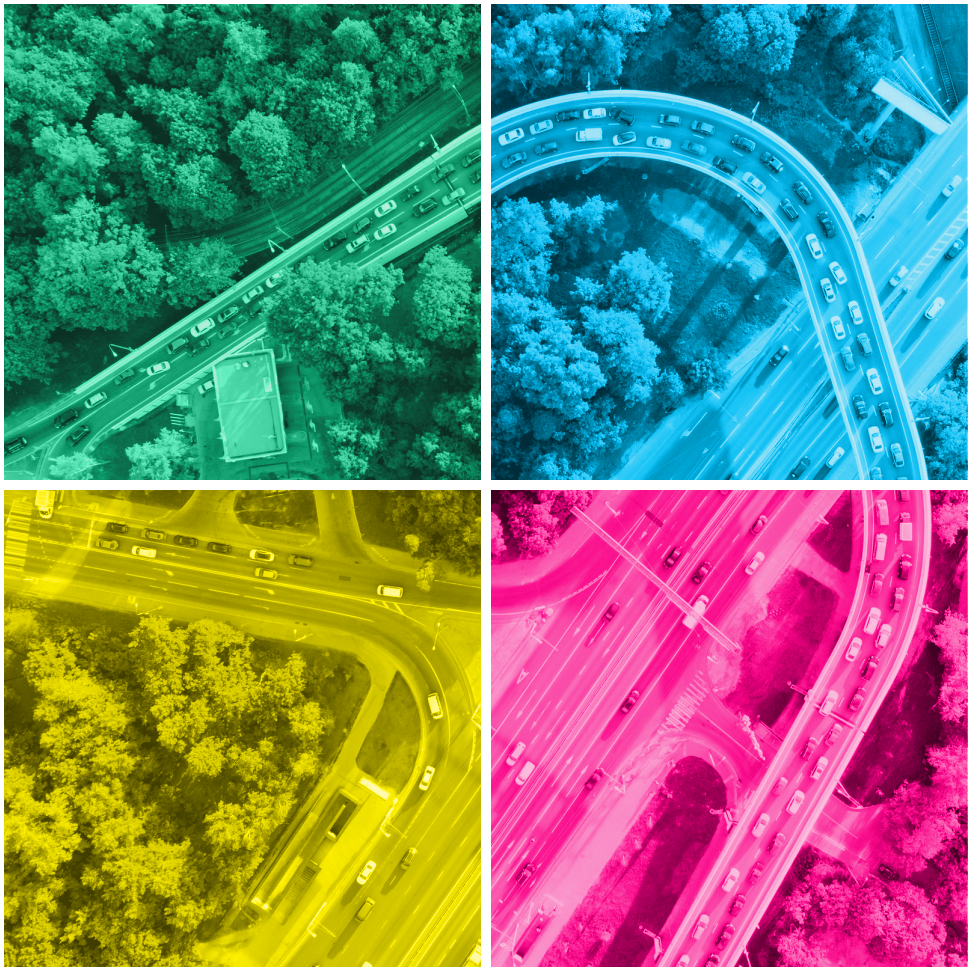
3 | Output
6th Appointment Period

RatSWD.
German Data Forum

The social, behavioural, and economic sciences in roadmap processes



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German Data Forum (RatSWD)

The social, behavioural, and economic sciences in roadmap processes

Contents

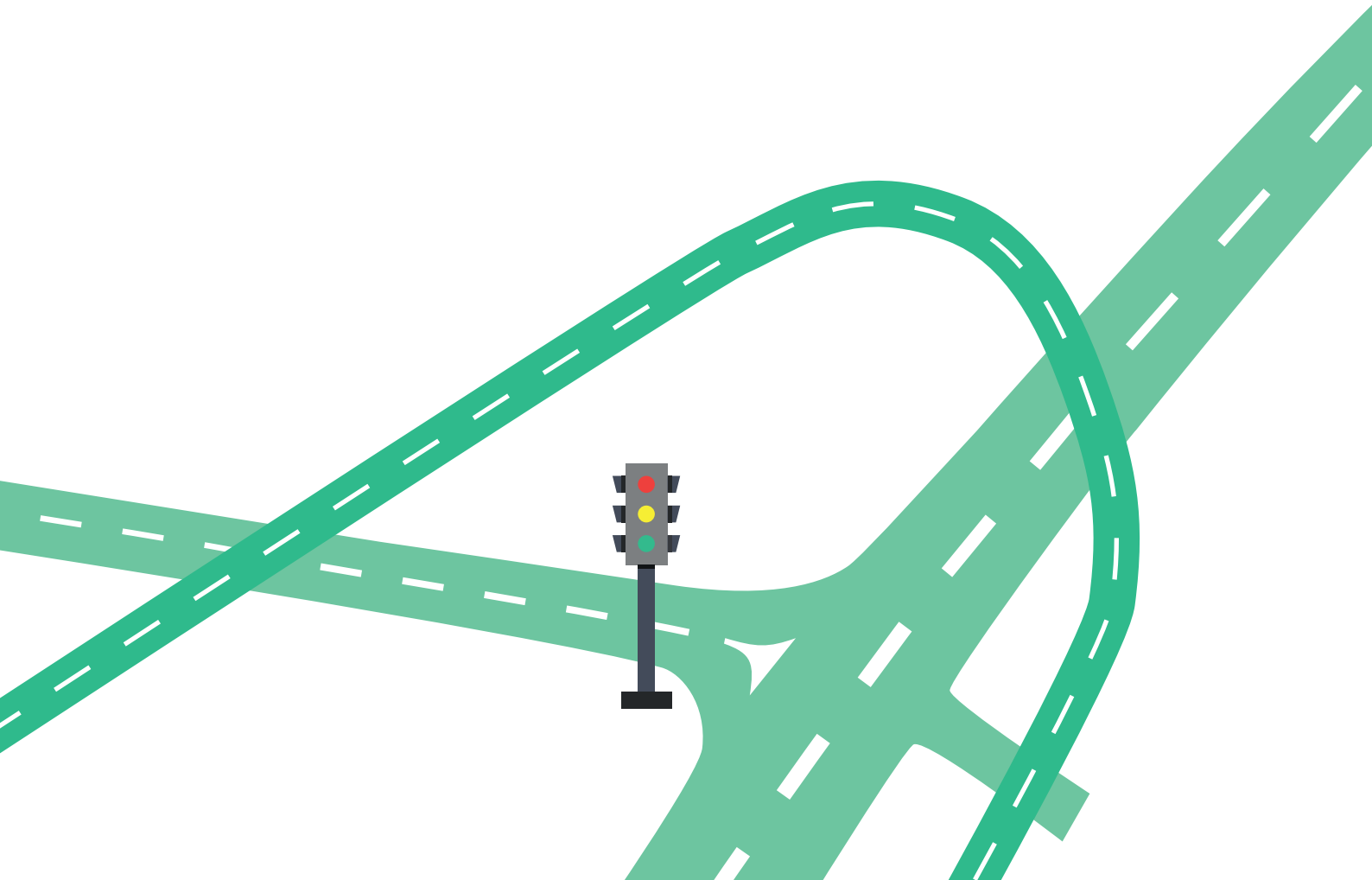
Executive summary

This report by the German Data Forum (RatSWD) investigates why no projects in the social, behavioural, and economic sciences (SBES) were submitted during the German national roadmap application periods in 2013 and 2018.

The report begins by outlining the significance of roadmaps as a tool for managing large-scale investments in research infrastructures. It goes on to address specific features of research infrastructures in the SBES, which generally deploy location-independent information infrastructures, in particular datasets, which are created and made available with a long-term survey horizon in mind.

The RatSWD identifies a range of possible obstacles that could hinder the SBES from participating in existing roadmap processes. These include the working definition of investment costs, which is largely inapplicable to the specific demands of the SBES, vague financial commitments, a lack of information, resource bottlenecks due to the impact of unforeseen historical events during the roadmap's application period, and a narrow national focus.

The RatSWD recommends distinguishing more clearly between investment costs and operating costs, opening the process up to follow-up investments as well as international research clusters, introducing a two-stage application process at regular intervals, and promoting discussion of the process in the relevant disciplines ahead of the roadmap application periods.



Preface

One of the German Data Forum's (RatSWD) central tasks is to advise the Federal Government and the governments of the German Länder on how to best enlarge and improve the research data infrastructure in the empirical social, behavioural, and economic sciences. At the beginning of the German Data Forum's 6th appointment period, the Federal Ministry for Education and Research (Bundesministerium für Bildung und Forschung, BMBF) suggested that the RatSWD set up a working group to address the German roadmap processes and to investigate why no project proposal had been submitted in the social, behavioural, and economic sciences. Roadmaps are tools for developing important, large-scale scientific infrastructures. In Germany, the first national roadmap for research infrastructures was created in 2013 (BMBF 2013).

This is an important issue because national roadmaps are incorporated into the European Roadmap and, conversely, the European Roadmap is intertwined with national initiatives. Aimed at a coherent and strategic European research policy, the European Roadmap for Research Infrastructures is updated on a regular basis (ESFRI 2018: 11). It is vital that the social, behavioural, and economic sciences in Germany participate in national roadmap processes so that they may benefit from future European-level funding programmes for research and innovation.

The RatSWD responded to the BMBF's request and set up a working group, which has developed the following report. The RatSWD wishes to thank the working group's external members for their contributions. The following report was passed by the RatSWD at its 52nd meeting on 7 June 2019.

1 Introduction

Research infrastructures (RIs) are vital to the German, European, and international research landscape (BMBF 2013: 2; WR 2013: 5; 2017: 48). Due to their strategic relevance in the German and international science system and their ensuing high costs, an increasing number of roadmaps are being drawn up on various political levels. Serving to prioritise long-term research infrastructure projects (BMBF 2016: 3, 12f.), roadmap processes help in making transparent and well-founded funding decisions in the field of science policy (BMBF 2013: 3).

Important criteria for research infrastructures to be admitted to a roadmap include their usefulness to society, a high and pressing demand, scientific quality, and a positive cost-utility ratio (ibid: 2).

Many European states have created national roadmaps, including Sweden, France, and Switzerland.[1] At a global level, other countries such as the US, China, and Australia also use roadmaps as an instrument to coordinate research funding (BMBF 2016: 16). At the European level, the European Strategy Forum on Research Infrastructures (ESFRI) issues a roadmap at regular intervals for new transnational research infrastructure projects (ESFRI 2016, 2018). Moreover, ESFRI highlights successfully implemented projects from previously established infrastructures as so-called 'Landmarks'. However, currently neither the financial nor the research-related interdependencies between roadmap projects and previously implemented Landmarks are sufficiently transparent.

In Germany, the Federal Ministry for Education and Research (BMBF) launched two National Roadmaps (2013 and 2018[2]) for RIs. There were no applications submitted or approved for projects in the social, behavioural, and economic sciences. The following report aims at explaining this absence and puts forward recommendations on how to design future national roadmap processes to better address the specific demands of social, behavioural, and economic research.

1 See the appendix for a more in-depth look at selected national RI roadmaps.

2 To the German Data Forum's best knowledge, the BMBF's planned 2018 Roadmap had not yet been approved when this report was published (May 2019). To ensure clarity, it will be designated in the following as the '2018 Roadmap.'

2 German and European roadmap processes in the context of science policy

2.1 The German roadmap process

The Federal Ministry for Education and Research (BMBF) first conducted a pilot process for a National Roadmap in 2011–2013. The knowledge gained during that pilot fed directly into the initial roadmap process, which was launched in 2015 (WR 2017: 9f.). The ministry views successful inclusion of a research infrastructure in the National Roadmap as equivalent to a general intention to fund a project. (ibid.: 5) During the process of selecting projects and creating the roadmap, the BMBF focuses on achieving close links with the European Roadmap of the European Strategy Forum on Research Infrastructures (ESFRI).

2.1.1 Requirements for inclusion in the National Roadmap

To be considered for inclusion in the National Roadmap, proposed projects must constitute either a new and large-scale research infrastructure (RI) or a substantial upgrade of an existing RI (BMBF 2016: 4). There are four RI categories (WR 2013: 100–102):

- Equipment (e.g., particle accelerators, or research vessels)
- Information infrastructures (e.g., surveys, archives, libraries, data collections, or scientific collections of objects)
- Information technology infrastructures (e.g., computers, research clusters)
- Social research infrastructures (e.g., meeting or research centres)

Moreover, the projects must be of significant national importance for science policy, have a long-term service life (generally at least 10 years) and thus exceed standard project and funding periods, provide external researchers with unhindered access, and have task-oriented, higher-level governance. Lastly, inclusion as a prioritised roadmap project requires significant start-up and investment costs that justify investing substantial federal funds (WR 2017: 9).[3]

RIs taking part in the National Roadmap process receive extensive support from the first project draft at the end of the definition phase until the completion of a detailed and theoretically implementable concept at the end of the planning phase (BMBF 2016: 8). For this reason, only RIs that are not yet operational may apply.[4]

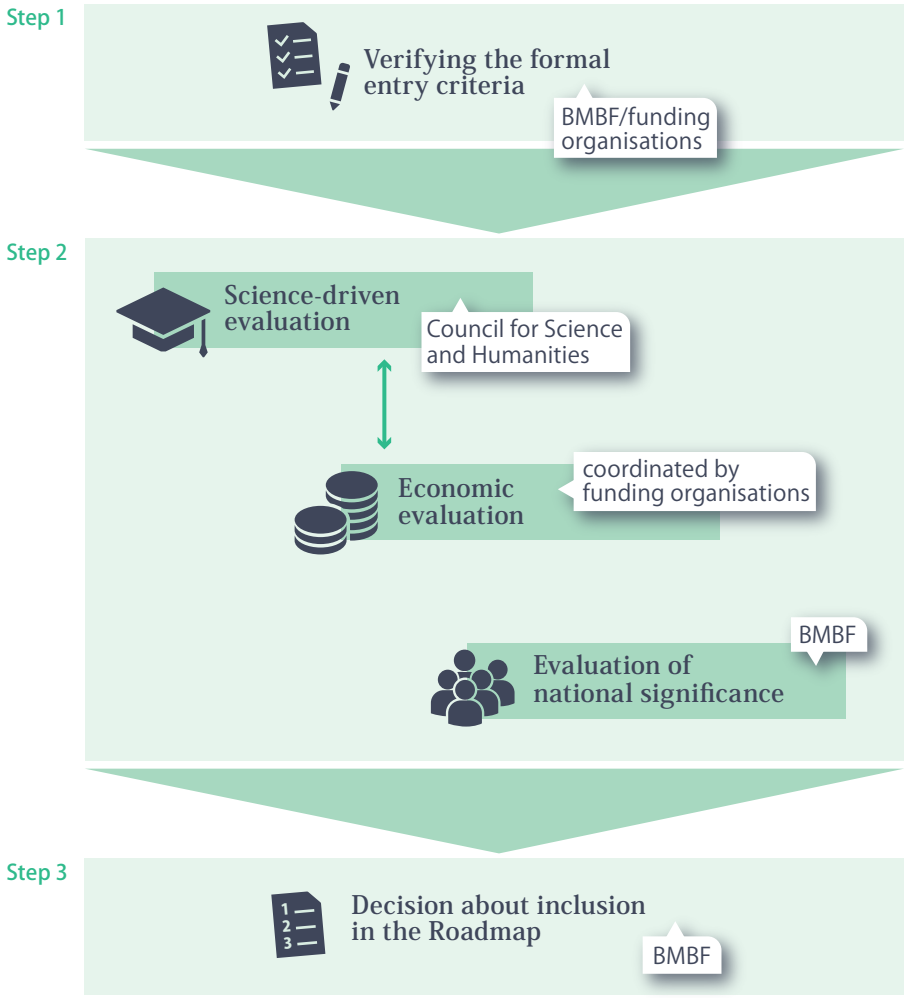
3 This categorisation of costs in the Roadmap's funding structure is an unsurmountable obstacle for surveys because it treats the annual costs of replication, or of longitudinal surveys, as *operating costs* rather than *investment costs* (see chapter 5).

4 An exception is made for substantial upgrades of existing RIs that provide significant added value (BMBF 2015b: 5).

2.1.2 The procedure

Applicant RIs undergo a three-level evaluation (see fig. 1). Firstly, the BMBF, or another research funding organisation, conducts a formal initial evaluation. After that the project is evaluated separately by independent experts from a scientific as well as an economic perspective. The German Council of Science and Humanities (Wissenschaftsrat, WR) coordinates the scientific evaluation (WR 2017: 11), while the respective research funding organisations are responsible for evaluating the economic aspects of the projects. The BMBF (or other responsible ministry) is responsible for ascertaining a project's national relevance (ibid.: 5). Finally, based on these evaluations, the BMBF decides whether a project is included in the National Roadmap (BMBF 2015b: 4; 2016: 16).

Figure 1: The Roadmap's evaluation procedure (2015–2018)



Source: RatSWD Working Group on Roadmap Processes, based on: BMBF 2016: 16 [own translation].

2.1.3 From the pilot phase to the National Roadmap

Three RIs were included in the National Roadmap during the pilot phase: CTA (Cherenkov Telescope Array), EU OPENSCREEN (Open screening platforms for chemical biology), and IAGOS (In-service aircraft for a global observing system) (BMBF 2013: 511). The publication of the results of the pilot process (BMBF 2013) profiled numerous other RIs that were already in operation and that had been funded through other processes, some of which with close links to the European ESFRI Roadmap. Six of these 'established' projects were in the social sciences and humanities (ibid.: 13–37):

cessda Council of European Social Science Data Archives	CLARIN Web and centre-based research infrastructure for the social sciences and humanities	DARIAH-DE Digital Research Infrastructure for the Arts and Humanities Digital research infrastructures for the humanities
European Social Survey European Social Survey	NAKO Gesundheits-Studie German National Cohort (Nationwide long-term health study)	SHARE Survey of Health, Ageing and Retirement in Europe Survey of Health, Ageing and Retirement in Europe
SOEP The Socio-Economic Panel Socio-Economic Panel		

With the exception of the NAKO and SOEP, two projects that are both well-connected at an international level but, technically, not infrastructures distributed across Europe, all these RIs are Landmarks in the 2016 ESFRI Roadmap, that is, actively implemented projects.

Several aspects of the process tested during the 2011–2013 pilot phase were adjusted in the 2015–2018 roadmap process (BMBF 2015b: 4; WR 2017: 45).

Firstly, the modalities of the call for applications were changed: the pilot process was based on a closed call with the BMBF inviting potential RIs to apply (WR 2017: 10). The first roadmap process, on the other hand, was based on a public call. Application was open to all projects from research organisations and other German institutes of higher education that met the formal requirements (BMBF 2016: 15).

Secondly, the minimum threshold for investment costs was raised from previously 15 million euros (overall investment costs) (BMBF 2013: 2) to 50 million euros (in the context of transnational projects, this applied to the German contribution). In the social sciences and humanities, the minimum investment costs for RI projects was set at 20 million euros. While this threshold was treated as a suggested level during the pilot phase, the thresholds for investment costs were later treated as minimum levels (WR 2017: 45).

Thirdly, the German Council of Science and Humanities, which is responsible for the scientific evaluation of the proposed projects, after being confronted with a much higher number of projects than during the pilot phase, modified their comparative evaluation process. The Council maintained its comparative assessment approach across disciplines and for each dimension independently. However, in the National Roadmap, the projects from one discipline were paired and compared with each other in each individual dimension, resulting in a list that was then divided into classes. This approach of pairing and comparing was not applied during the pilot phase due to the limited number of applicants (ibid.: 19).

2.1.4 Interim results of the German roadmap process 2015–2018

Twelve projects (see table 1) were scientifically evaluated during the 2015–2018 roadmap process (WR 2017: 11f.). The German Council of Science and Humanities deemed only one of the projects as too immature in its development and did not include it in its final comparative evaluation (ibid.: 18). However, a positive assessment by the German Council of Science and Humanities does not necessarily mean that the project will be approved by the BMBF for the National Roadmap.

Table 1: Roadmap projects in the pilot process 2013 and applicants 2018

Roadmap	Project	Investment costs overall project (in million euros)
2013 Pilot Process	In-service Aircraft for a Global Observing System (IAGOS)	40
	European Infrastructure of Open Screening Platforms for Chemical Biology (EU-OPENSCREEN)	55
	Cherenkov Telescope Array (CTA)	191.2
2018 Applicants	ACTRIS - Aerosols, Clouds and Trace gases Research Infrastructure	86.5
	AtmoSat	110
	German Centre for Biodiversity Monitoring (BioM-D)	419
	German Natural Sciences Collections as an Integrated Research Infrastructure (DCOLL) (DCOLL)	370
	Tandem-L (TDL)	665
	German BioImaging Research Infrastructure (GerBI-FIS)	96.9
	Leibniz Center for Photonics in Infection Research (LPI)	154
	National Biomedical Imaging Facility (NIF)	243
	National Imaging Science Center (NISC)	132.7
	Ernst Ruska-Centrum 2.0 (ER-C 2.0)	98
	European Solar Telescope (EST)	50 (German contribution)
	National Photonics Labs (NPL)	125

Source: RatSWD Working Group on Roadmap Processes, based on: BMBF 2013: 40; WR 2017: 21–43.

2.2 The European roadmap process

The European Strategy Forum on Research Infrastructures (ESFRI) was set up as an informal forum at the European level in 2002. Its task is to respond to the long-term demands of the European research community in all disciplines by identifying research infrastructures of pan-European relevance (ESFRI 2016: 10).

According to its mission statement, the ESFRI Roadmap supports 'a coherent and strategy-led approach to policy-making on research infrastructures' (ESFRI 2016: 17) to strengthen the European research area. Before applying to ESFRI, research infrastructures must have reached a high degree of maturity and make substantial contributions to research and innovative competitiveness in Europe (ibid.: 11, 24). Moreover, applications must contain a) a funding commitment ('expression of commitment') of the member state or associated country proposing the project for the Roadmap (so-called lead countries) as well as b) proof of political support ('expression of political support') from the lead country as well as the host countries, and two further member states of the European Union or associated countries (ibid.: 11).

The period between a project's inclusion in the Roadmap and its implementation may not exceed 10 years (ibid.: 10ff., 21f.). During this period, the projects are supported, and evaluated at regular intervals. After a project has been successfully implemented[5], it becomes a so-called 'Landmark' and ensures ESFRI's further assistance and support.

Projects are included in the ESFRI Roadmap, which is updated every two years, following extensive review. The projects are assessed by the responsible ESFRI Strategy Working Group with regard to their scientific excellence, pan-European relevance, and socio-economic impact.[6] Moreover, the ESFRI Implementation Group evaluates their maturity based on a so-called 'assessment matrix' (ibid.: 13).

The 2018 ESFRI Roadmap consists of 18 projects, two of which are in the social sciences and humanities. In 2018, six new projects were included, while the remaining 12 projects were included from the 2008, 2010, and 2016 Roadmaps. Furthermore, the current ESFRI Roadmap consists of 37 ESFRI Landmarks, five of which are in the social sciences and humanities (ESFRI 2018: 16f.).

5 Pursuant to Recital 8 as well as Art. 5 (5) (1) COUNCIL REGULATION (EC) No 723/2009 of 25 June 2009 regarding the Community legal framework for a European research infrastructure, pan-European projects can be institutionalised as ERICs (European Research Infrastructure Consortium) – a special legal form with the status of an international organisation.

6 The ESFRI Strategy Working Groups are made up of European experts and international observers from six research fields: Energy (ENE), Environment (ENV), Health & Food (HF), Physical Sciences & Engineering (PSE), Social & Cultural Innovation (SCI), and Data, Computing and Digital Research Infrastructures (DIGIT).

3 The social, behavioural, and economic sciences in roadmap processes

3.1 Specific features and funding demands of the social, behavioural, and economic sciences

Research, teaching, and knowledge transfer in the social, behavioural, and economic sciences (SBES) are increasingly dependent on research infrastructures. Empirical research projects in SBES rely on information infrastructures (see 2.1.1), which, for example, generate large survey datasets and make them available to researchers in an easy-to-use form, organise access to administrative data, or provide other sources of information. These projects are in many cases well-connected with social infrastructures.

On the other hand, major research equipment in the narrower sense, such as the equipment used in the natural sciences, is not currently relevant in SBES. Since this was first addressed by the German Council of Science and Humanities in 2006, the official science policy nomenclature has also changed and now speaks of research infrastructures rather than large-scale research equipment (WR 2006: 8). Consequently, it is fair to call nationally representative surveys the large-scale research equipment of SBES. Operating these surveys requires annual investments in data collection; even panel surveys create annual costs that are comparable to the first waves of long-term surveys. Operating costs of such surveys also include the operation of research data centres (RDCs), which enable researchers to access and use the collected research data. Ongoing investments into the 'collection of research data' in the SBES have been inappropriately classified up to now as operating costs.

There are other specific features of research infrastructures (RIs) in the SBES that distinguish them from those in other disciplines. First, most RIs in the SBES are less location-bound than major research equipment in the natural sciences. Instead, RIs in the SBES are often spread out across multiple locations or are location-independent, for instance, providing access to large datasets through virtual or remote access. Secondly, since surveys most often examine their respective units of investigation (people, households, or organisations) periodically and are subject to data protection regulations, RIs in SBES have longitudinal or repeating elements and thus a temporal nature. This underscores that the funding of RIs cannot be secured by one-time investments. Every new survey wave constitutes a renewed investment, which is a prerequisite for addressing the survey's respective research question. Thirdly and lastly, RIs in SBES are different to those in other disciplines because regional units (e.g., countries, neighbourhoods) and social units (families, networks) make up the structural context of their subjects of observation. If one's aim is to draw conclusions about Europe as a whole, surveys must be conducted at a European level. This, in turn, requires flexible and transnational funding and availability of resources.

The absence of applications for the inclusion of social science projects in the Roadmap should *not* be viewed as indicating a lack of need for infrastructure. The list of desirable infrastructure initiatives that are worthy of funding is extensive and diverse. It ranges from generating new or additional databases, to closing information gaps, to tapping and better linking existing data sources. The following list contains several examples of such projects. Its order is not based on relevance or priority.

- Setting up a comprehensive, long-term (infant) cohort study
- Collecting data using novel technologies
- Closing the gap between the social sciences and the life sciences, e.g., NAKO, SOEP, and ALLBUS
- Creating infrastructures that link data collected by researchers (e.g., surveys) with register data and administrative data (e.g., from private and public health insurance providers) by way of a data linkage centre

- Setting up a structured repository for experimental economic research tailored to the field's specific requirements
- Creating a science-driven panel for consumer behaviour
- Creating a web observatory that generates data for researching the technical, legal, and social development of the internet
- Creating structures that provide access to data from commercial sources, e.g., social media platforms
- Establishing a national mortality index
- Expanding recurring victimisation surveys

Investigating the reasons why such projects have not been submitted for inclusion in the Roadmap remains in the realm of speculation. In addition to the legal problems that arise with some projects, for instance, those that entail linking research data with register data, the low degree of organisation in SBES compared to other scientific communities (e.g., astrophysics) may be a relevant factor. This includes a lack of commitment to establishing new infrastructures as a service benefitting the entire research community in a particular field, which could be characterised, to some extent, as a free-rider problem. Infrastructures provide benefits not only for a project's principal investigators, who invest time and energy into the laborious and time-consuming process of setting up an infrastructure, but also for colleagues who focus solely on research. This dilemma could be at least partially alleviated by establishing 'embargo periods' of up to 12 months for exclusive use by the project applicant.

3.2 The social, behavioural, and economic sciences in international roadmapss

When looking at the results of national roadmap processes in other countries, which are often characterised by their own specific science funding structures and research institutions, it is striking that they indeed feature several projects in the SBES (see the summary in the appendix).

Sweden is a notable example: the task of the Government Commission of the Swedish Research Council is to foster the development of a national research infrastructure. Twenty-seven out of 71 projects on the Swedish roadmap are in the SBES. Due to the comparatively weak non-university research structure in Sweden, the focus of Swedish research funding is on university research structures (Swedish Research Council 2015).

Six out of 99 projects on the 2018 French roadmap are in the social sciences and humanities. Strikingly, only one of these projects is purely national. All the other projects are the French contributions to European-level research projects (MESRI 2018).

The European Roadmap ESFRI also features social science projects, some of them with German involvement, such as SHARE, ESS, and CESSDA (ESFRI 2018). Hence, on an international level, there is no evidence that infrastructure projects in the SBES are less relevant.

4 Explaining the absence of the social, behavioural, and economic sciences in the German roadmap process

In this chapter, we discuss potential reasons for the absence of project applications from the social, behavioural, and economic sciences in the German roadmap processes.

a) High thresholds for investment costs in combination with a lack of resources for operation costs

Published on 28 August 2015 by the Federal Ministry for Education and Research (BMBF), the public call for submissions to the roadmap process set the minimum investment threshold for projects in the social sciences and humanities, as well as in educational research, at 20 million euros. Project investment costs had to exceed this amount in the course of the initial 10-year start-up phase. In other disciplines, the minimum investment threshold was 50 million euros. This included 'those costs that are required for the ongoing establishment of the research infrastructure. Operation costs that are incurred during the research infrastructure's operation and do not significantly contribute to data and information collection may not be used to this end.' (BMBF 2015a, own translation).

We have already examined how infrastructure projects in the social, behavioural, and economic sciences (SBES), for example, replication and longitudinal surveys, accrue high costs that are classified as operation costs rather than investment costs. Due to this differentiation, most SBES infrastructures generally are not able to reach the minimum investment threshold.

Successful applicants receive funding for budget requirements they classified as investment costs. Since most SBES research infrastructures are longitudinal surveys, which cannot finance the high costs of data collection this way across several survey waves, the roadmap process currently does not meet their specific needs. As long as they are unable to cover such data collection costs, these RIs will not be able to sustain themselves in the long term and will thus abstain from submitting a Roadmap application (Allianz 2017: 2).

b) Lack of demand for short-term investments in the narrower sense

The funding needs of RIs in SBES include sustainable financial support for new projects as well as the expansion and further development of existing projects. The current Roadmap does not cover these particular investment needs. For this reason, the social, behavioural, and economic sciences, which rely on long-term infrastructures, did not benefit from calls for projects establishing new infrastructures.

c) Vague funding commitments

The Roadmap calls did not specify any concrete funding commitments for the prioritised projects: 'The concrete implementation of an RI project application may only occur subsequently to the Roadmap process in the course of a formal application procedure and is conditional on the availability of the required budget funds' (BMBF 2015a) [own translation]. Due to the limited possible advantages but high risks, potential applicants for projects in the social, behavioural, and economic sciences may have been more apprehensive than applicants in other disciplines about investing the effort required to submit an application.

It is possible that many potential applicants were unable to discern the envisioned long-term interlinkage with European RI processes from their outside perspective. Unambiguous, long-term, and reliable communication and project design clearly would have been beneficial. It would have strengthened the trust of potential applicants in the process and reduced the obstacles to submitting an application.

d) The Roadmap does not correspond with existing funding needs

In some cases, potential applicants may have refrained from submitting projects because the roadmap process does not provide for the necessary transition between mid-to-long-term project funding and permanent institutionalisation (e.g., SHARE, pairfam, and TwinLife), which they must finance through other sources.[7] Applicant projects must then invest into securing alternative funding to bridge the gap created by the roadmap's lengthy process of project selection and its relative lack of reliability with regard to project planning and scheduling.

This is where the needs of SBES are vastly different from those in other disciplines: while common large-scale research equipment periodically depreciates in value and is replaced, in SBES, the aim is to further develop and expand existing projects. The value of longitudinal surveys, in particular, increases with project duration, or even permanence, because they make possible certain types of long-term analyses, including cross-generational, replication, and longitudinal studies, as well as the continuous development of methods.

e) High maturity as a requirement for application

In some cases, it would have been beneficial to precede the application period by a draft or start-up period, during which funding is provided to help projects to reach the required level of maturity, to strengthen existing partnerships, or to help create new ones. The lack of a preparatory phase and the required high level of maturity may have prevented some projects from being submitted.

f) Lack of information

It is possible that potential applicants had no knowledge of the call for submissions to the roadmap because, compared to other disciplines, SBES do not have an established tradition of funding for major research infrastructure. It is primarily those institutes with a high share of outside research funding that regularly scan websites publishing calls for submissions. Even in cases where non-university research institutions were included in the flow of information and notified about the call, it is not clear how the information was shared with potential applicants from universities and whether, for example, the German Research Foundation (DFG) informed project leads of previous DFG-funded projects prior to the call. From a present-day perspective, it is not possible to determine whether the BMBF promoted the call equally across all of the disciplines.

g) Lack of time to submit the application

Set against the prospective volume of the funding, the Roadmap's application period was comparatively short. In individual cases, this may have prevented some projects from investing in drawing up complex business plans and in making the significant efforts required to coordinate with associated projects.

Moreover, some potential applicants did not apply because their human resources were limited due to work on simultaneous funding opportunities and other developments. These included European research infrastructure developments (the establishment of ERICs) as well as a unique historical situation: At the time of the call (31 August 2015 to 15 January 2016), researchers in the social sciences were deeply involved in developments in the area of migration and refugees.

7 See the joint statement of the Academy of Sciences Leopoldina, acatech – National Academy of Science and Engineering, and the Union of German Academies of Sciences and Humanities (2016) as well as RatSWD (2017).

h) Effects of international funding on national applications

Particularly for comparative surveys on an international level, it is currently not possible to obtain funding to collect research data outside of Germany, even to a limited extent, and even if the survey can name sufficient reasons for doing so. This limits the potential scope of action and development of RIs that are part of international research networks. Hence, calls limited to the national level with these kinds of structural limitations attract very little interest from researchers.[8]

i) Legal regulation of data protection

Compared to other European countries, Germany has had tight research-relevant regulations in place protecting personality rights for many years.[9] This has affected the flexibility with which data-based infrastructures could be established and operated. This has affected the overall situation of SBES in Germany compared to other disciplines and to SBES in other countries.

8 See the statement of the Alliance of Science Organisations in Germany (2017) on this issue, which called for developing detailed regulation on the cooperation within international partnerships, which are of particular relevance for Germany's science and research system.

9 See Johannes and Richter 2017 for more information on research-relevant regulations in German data protection law and their development as part of the EU data protection reform.

5 Recommendations

We have developed the following recommendations based on the specific features and funding demands of SBES and the experience gathered during previous rounds of the National Roadmap.

1 Periodic costs of data generation, processing, and provision in long-term surveys should be classified as **investment costs**.

Particularly for surveys and long-term studies, the current practice of not covering ongoing investments in data generation, which are classified as operating costs, is prohibitive and results in a heavy and unsustainable burden on the respective institutions and infrastructures. Surveys are the high-powered scientific instruments of the social, behavioural, and economic sciences, and every recurring survey wave must be viewed as a renewed investment.

2 Existing research infrastructures (RIs) should not be barred from applying simply because they are already in operation. **Expansions and innovations in existing RIs** should be included in the funding scheme.

Existing RIs should not be barred from applying since the expansion of existing RIs can significantly strengthen their international reach and scientific potential. In contrast to RIs in other disciplines, those in SBES are distinguished by an increase in relevance and scientific potential over time as the database expands and improves. Ongoing investments are essential because they provide the empirical basis for addressing pivotal issues of social change. Over time, moreover, a survey's research questions, methodology, and subject matter can be modified and enriched to include new, innovative elements.

3 **Existing networks of RIs should be opened** up to additional participants and follow-up investments.

The possibility of building on existing RIs improves their chances to become hubs for cooperation with other disciplines and stimulates the creation of multidisciplinary and interdisciplinary research networks.

4 It should be possible for internationally comparative surveys to use funding to cover the collection of **research data outside of Germany**, at least to a limited extent, insofar as this is justified by the survey's objectives..

Some of the most cutting-edge research infrastructures come into being as international partnerships. Such projects should not be unnecessarily burdened by red tape (Allianz 2017: 2). Key research topics at the macro and micro level in the SBES are the nation state and its constituent social actors (individuals, households, companies). This research crucially requires transnational data collection and RIs that are capable of doing this.

5 Two-phase application process

A two-phase application process could help to limit the effort and the risks of a comprehensive application for all those involved. A draft phase preceding the main application could lower the obstacles for application and encourage innovative RI projects (ibid.: 3). Only projects that are evaluated as meeting the minimum requirements would be invited to take part in the main application process. First-time applicants should receive start-up funding ahead of the application to ensure that they do not have to simultaneously invest effort in other applications parallel to the roadmap process with its uncertain outcome.

6 Conducting the roadmap process at regular intervals

Conducting the roadmap process at regular intervals would increase the reliability of the process for potential applicants and could help build trust. However, this trust is easily lost when subsequent roadmap processes are delayed or not brought to fruition after substantial time and energy was invested in drawing up and evaluating comprehensive applications.

7 Publication of the call for submissions to the roadmap process

If there is a lack of SBES application in the current round, we should consider overhauling the communications strategy of the Federal Ministry for Education and Research (BMBF) and the respective departments involved in the process. The Ministry should aim at initiating discussions before the call is published and create the necessary forums for this discussion. It should also examine and test specific forms of needs analysis. Given that they are relatively new to this funding process, the SBES may not be as well-equipped as the natural sciences, which have developed professionalised structures for the operation of large-scale scientific equipment and other RIs. Informing the respective academic organisations directly and transparently as well as stimulating debate will be a good step forward.

6 Conclusion

The use of a *closed call* for the German roadmap process in 2013 and an *open call* in 2016 resulted in a lack of projects from the social, behavioural, and economic sciences (SBES) being included in the previous roadmaps. This report discussed the specifics of different roadmap procedures and scientific disciplines against the backdrop of the experiences and roadmap procedures in other countries.

The German Data Forum (RatSWD) places high value on Germany's numerous internationally recognised data infrastructures, particularly in the field of SBES research data. The fact that projects in the SBES were not submitted in one round of Germany's National Roadmap should therefore not be construed as a sign of weakness or a lack of innovative capability. Rather, it can be viewed as indicative of the already high quality and excellence of existing research infrastructures. Systemic, historical, and discipline-specific factors stood in the way of SBES projects' participation in the past RI roadmap process.

Due to current developments, it is important to note that the call for the development of the Nationale Forschungsdateninfrastruktur (NFDI), a large-scale research data infrastructure programme in Germany, has much in common with the research infrastructures roadmap. Since the two programmes complement each other, it is important to communicate the various funding interests more clearly ahead of time. Setting up data-related services for the use of research infrastructures, as planned by NFDI, is not the same as setting up the research infrastructures themselves. In both cases, it is important to establish infrastructures in the social sciences and humanities in a sustainable and reliable fashion as well as to foster and support new initiatives. To strengthen SBES infrastructures in Germany, it would be important to better coordinate future needs assessment and to accompany this with an information campaign in advance of the next roadmap call.

The RatSWD has put forward a series of recommendations aimed at representatives of science, research, and science policy that serve to improve SBES participation in future roadmaps. It is in the best interest of society as a whole to strengthen the German SBES and enable researchers to continue to make relevant scientific contributions by building on internationally competitive infrastructures. More large-scale scientific equipment will not enable them to do this; more research infrastructures will.

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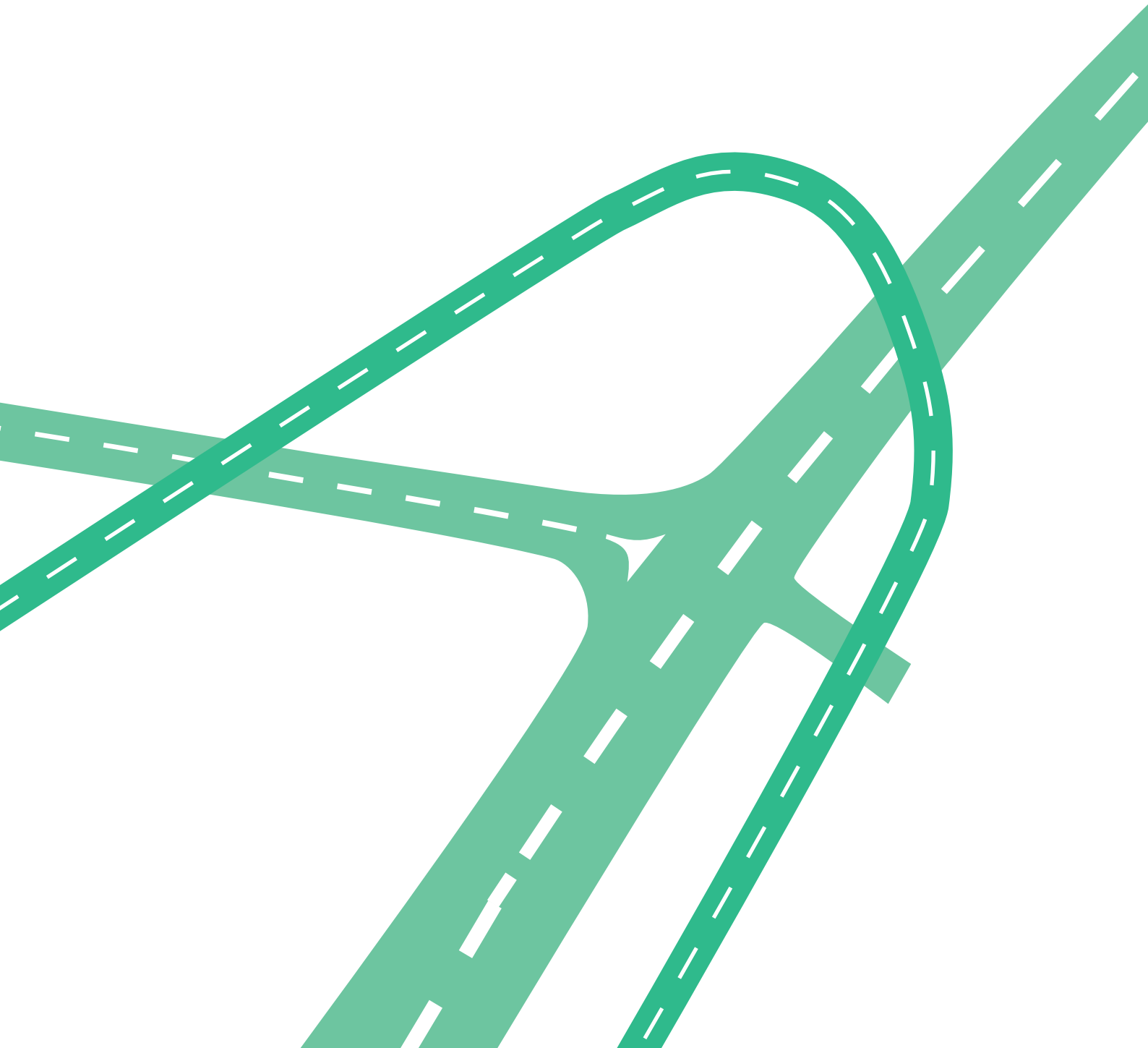
Appendix: Profiles of national and European-level roadmap processes



a) European level

Goals/general concept[10]

- Supporting a coherent and strategy-led approach to policymaking on research infrastructures in Europe
- Facilitating multilateral initiatives leading to the better use and development of research infrastructures
- Establishing a European Roadmap for research infrastructures (new and major upgrades, pan-European interest) for the coming 10–20 years
- Stimulating the implementation of these facilities, and updating the Roadmap as the need arises
- Ensuring the follow-up of implementation of ongoing ESFRI projects after a comprehensive assessment as well as the prioritisation of the infrastructure projects listed in the ESFRI Roadmap

Requirements for admission

- High maturity level of research infrastructures (RIs) during their preparatory phase
- High demand for the completion of a research infrastructure
- Scientific excellence
- Pan-European relevance
- Positive socio-economic impact

Modalities of the call

- Formal agreement for a design and feasibility study
- Complete plan for a business case and the delivery strategy
- Proof of political support, i.e., Expression of Political Support (EoS) by the lead country and at least two additional EU member states and associated countries, signed by the national ministries responsible for RI (in case of an EIROforum,[11] member commitment of a Council resolution)
- Proof of financial commitment, i.e., Expression of Commitment (EoC) to financially contribute to the preparation and implementation phases by an authority from the lead country (in case of an EIROforum member, the financial commitment should be explained in the Council resolution)
- Proof of an inter-institutional and multi-lateral agreement, e.g., a Memorandum of Understanding (MoU) signed by the core partners (research institutions) formally involved in the consortium

Role of the social sciences and humanities

- Two out of 18 RI projects on the ESFRI Roadmap are in the social sciences and humanities. Five out of 37 Landmarks are also in these fields.

10 Vgl. ESFRI 2018; http://www.esfri.eu

11 EIROforum is an organisation consisting of eight European intergovernmental scientific research organisations (including, for example, CERN and ESA) devoted to fostering joint activities.

European Strategy Forum on Research Infrastructures (ESFRI)

Project duration

- Min. 10 years

Timeframe

- Last update: 2018
- Next update: expected 2020/2021

Geographic/ institutional reach

- EU member states
- EU associated countries in Horizon 2020
- European Economic Area (EEA)

b) National roadmaps in Europe

National Roadmap (Germany)

Project duration

- Min. 10 years

Timeframe

- Last update: 2015
- Next update: completion was expected in 2018

Geographic/ institutional reach

- National
- The long-term aim is to integrate projects into ESFRI

Goals/general concept[12]

- Strategic tool for science policy to prioritise future investment in research infrastructures
- More planning security and efficiency
- An optimised strategic focus of research and research funding
- Ideal conditions for Germany as a research location
- Safeguarding that investments from public sources are sound and appropriate

Requirements for admission

- The projects are of national relevance for science and research
- They will be used for a long period of time (a minimum of 10 years)
- Access is generally open, and use is governed based on scientific quality standards
- Costs of project development and establishment require significant national public funds and justify a comprehensive national decision-making effort
- Projects have task-oriented, higher-level governance. If a project will be carried out across various locations with complementary tasks, they must be integrated into a research infrastructure with common standards, which constitutes a functional entity

Modalities of the call

- The National Roadmap for Research Infrastructures focuses on the decisive early periods of a research infrastructure's lifecycle – between the end of the definition phase to the end of the planning phase

12 See BMBF 2016, https://www.bmbf.de/de/roadmap-fuer-forschungsinfrastrukturen-541.html.

Procedure

	Pilot phase (2011–2013)	Roadmap (2015–2018)
Step 1: Call	Federal Ministry for Education and Research (BMBF) will invite institutions responsible for well-known projects to hand in project concepts (closed call)	Opening of the current national roadmap process for all interested universities and non-university research institutions (open call)
Step 2: Application	Projects received will be evaluated based on formal criteria by the BMBF or the responsible research funding organisation	
Step 3: Evaluation	▶ Science-driven evaluation (German Council of Science and Humanities) ▶ Economic evaluation (external appraisers coordinated by the research funding organisation)	
Step 4: Prioritisation	▶ Assessment of the national relevance and priority in terms of science policy (BMBF or responsible department) ▶ Decision about the research infrastructure's inclusion in the Roadmap by the BMBF or responsible department	

Minimum investment per project[13]

	Pilot phase (2011–2013)	Roadmap (2015–2018)
Natural sciences	15 million euros	50 million euros
Social sciences and humanities	No minimum[14]	20 million euros[15]

Role of the social sciences and humanities

	Pilot phase (2011–2013)	Roadmap (2015–2018)
Funding eligibility	Yes	Yes
Role	The BMBF did not issue explicit invitations for submission of SSH-related project proposals.	No proposals for SSH-related projects were submitted.

13 German share in the planned start-up costs (excl. operating costs) for a period of 10 years.
14 WR 2017: 45.
15 Ibid.: 9.

National Roadmap (Switzerland)

Minimum investment threshold per project

- Min. CHF 5 million (approx. 4.2 million euro)
- Exceptions: international research infrastructures, for example, as part of ESFRI

Timeframe

- Last update: 2019 for 2021–2024
- Next update: 2023

Geographic/ institutional reach

- National
- The aim is also to integrate certain projects into ESFRI

Requirements for admission[16]

- The research infrastructure is new or a significantly upgraded existing infrastructure
- Plans for research infrastructure are advanced (including completion of the 'preparatory phase', phase 2 according to ESFRI), and implementation is imminent ('implementation phase', phase 3 according to ESFRI)
- The research infrastructure creates an added value for science
- The research infrastructure is used intensively by Swiss researchers (of national importance)
- The research infrastructure provides open access to national and international research communities
- The research infrastructure does not primarily pursue autonomous research but is available to researchers for their various projects

Modalities of the call/application

- Required core data
  - Official title of the new research infrastructure (or substantial upgrade of an existing RI), leading funding institution, other participating institutions, head scientists, contact data
  - Overview table of cooperating institutions, legal form of organisation, business plan (including a budget plan)
- Preparation
  - Statement on meeting the formal requirements
  - Description of the new research infrastructure (or substantial upgrade of an existing RI)
- Consistency with strategic planning
  - Statement on the consistency with the strategic planning of the responsible body
  - Statement on feasibility (institutional, technical, and human requirements according to the strategic specifications)
- National (and international) relevance
  - Statement on the national and European (international) relevance
  - Contextualisation and distinction from existing – competing or complementary – research infrastructures
  - Statement on the added value for the respective discipline
- Budget
  - Budget (budget concept, planned funding structure, including own resources and external funding, investment costs, and operating costs)
  - Financial commitment of the funding institution

16 See SBFI 2019.

Procedure

- *Phase 1:* Inventory of newly planned research infrastructure by the responsible bodies (the organisation swissuniversities and the ETH Board)
- *Phase 2:* Scientific evaluation and prioritisation by the Swiss National Science Foundation (SNSF)
- *Phase 3:* In-depth determination of the infrastructure projects' feasibility by the responsible bodies (ETH Board, universities, universities of applied sciences, Federal Government/State Secretariat for Education, Research and Innovation SERI)
- *Phase 4:* Publication of the Roadmap

Role of the social sciences and humanities

- On behalf of the SERI, the SNSF and the Academies (SAHS) have agreed on a funding concept that meets the requirements of the RIPA, the competencies and tasks of the funding bodies involved, and the long-term consolidation of the relevant funding measures for editions in the humanities and scientific secretariats. With regard to editions, in the future, a criteria matrix will be developed jointly by the SNSF and the SAHS to assess national significance with the aim of defining responsibilities early on in terms of evaluation, funding, and support of humanities editions with terms of more and less than 10 years.
- *Phase 1 and 2:* fifteen new projects were selected for evaluation, of which three were in the social sciences and humanities. By order of the SBFI, the SNF rated seven of them as Priority A (high relevance for science). One of these projects is in the social sciences and humanities.
- *Phase 3:* These projects with high relevance for science were included in the 2019 Swiss Roadmap following in-depth evaluation by the Swiss Federal Institutes of Technology and the organisation swissuniversities.

National Roadmap (France)

Project duration

- Several years

Timeframe

- Last update: 2018
- Previous updates 2008, 2012, 2016

Geographic/ institutional reach

- National
- The aim is also to integrate certain projects into ESFRI

Goals/general concept[17]

- Structuring the landscape of research infrastructures at a national level
- Calculation the full costs and the origin of the resources of the research infrastructures
- Strategic management of research infrastructures by the government
- Identification of relevant developments in RIs to support international negotiations

Requirements for admission

- It must be a tool or a device with unique characteristics – as identified by the scientific community that makes use of it – that are required for conducting high-level research activities.
- The targeted scientific communities can be national, European, or international, depending on the case.
- It must have governance that is identified, unified, and effective, and strategic and scientific bodies for steering.
- It must be accessible to the research community and meet the standards of scientific excellence (peer review); it must therefore have suitable evaluation bodies.
- It can conduct its own research, and/or provide services to one (or several) communities of users that integrate stakeholders from the economic sector. These communities can be present on the site, conduct work there on a one-off basis, or interact remotely.
- It must produce a multi-annual budget schedule and a consolidated budget covering all costs.
- It must make the data available immediately or after the end of an embargo period corresponding to established international practices in the field.

Modalities of the call

- International organisations (IOs), very large research infrastructures (VLRIs), research infrastructures (RIs), projects
- These four types cannot be ranked in terms of excellence or technological features. With the exception of IOs, legal or judicial structures, budget dimensions or thematic groupings can take on various forms and therefore are not restrictive criteria distinguishing the VLRIs from RIs or projects.
- Not included in this roadmap, according to the aforementioned criteria, are test infrastructures and demonstrators used in the framework of large equipment programmes (energy, transport, building, agro-foods, space, nuclear, defence, etc.). These infrastructures may conduct their own internal research but without being open to outside researchers.

17 See MESRI 2018.

Procedure

- Coordination groups[18] identify potential roadmap projects in each scientific discipline.
- Projects must fill out a detailed questionnaire.
- The information document from each of these questionnaires is taken out and validated by the research body responsible for the respective facility.
- Coordination groups develop a synthesis for every scientific discipline.
- Documents and syntheses are presented to the High Council of Very Large Research Infrastructures (HC-TGIR).[19]
- HC-TGIR analyses the landscape and all the descriptions and subsequently develops a report.
- Based on this analysis, the Steering Committee of Very Large Research Infrastructures (CD-TGIR)[20] compiles a comprehensive and official list of registered facilities in France.

Role of the social sciences and humanities

- Offer support services to researchers, who work with digital texts, fixed and animated images, and other digital materials
- Facilitate the use of digital tools for the work on non-digital sources
- Design new ways of digital scientific publication equipped with tools for online processing, acquisition, and collaboration
- Produce, access, evaluate, document, and compare quantitative data coming from public statistics, major scientific surveys, and opinion polls
- Ensure territorial coverage of the Very Large Research Infrastructures (VLRI)
- Develop new (inter-)disciplinary and technological skills
- Six out of 99 projects from the French 2018 Roadmap, one of which is purely national, are in the social sciences and humanities

18 Members: representatives of the thematic science alliances, science organisations, the science and research ministry, and a project group (Directorate-General for Research and Innovation and the chair of the Steering Committee).

19 Independent council; consists of 15 experts from all scientific disciplines with extensive experience in managing large infrastructures and high-level research.

20 Chaired by the head of the Directorate-General for Research and Innovation; Members: the presidents of the thematic science alliances, the French National Centre for Scientific Research (CNRS) and the French Alternative Energies and Atomic Energy Commission.

National Roadmap (Sweden)

Project duration

- 8 years (funding for a maximum of 8 years; extension is possible)

Timeframe

- Last update: 2014 for 2015–2020

Geographic/ institutional reach

- National
- The long-term aim is also to integrate projects into ESFRI

Goals/guiding principles[21]

- Large-scale and long-term research infrastructures constitute strategic investments that shape the Swedish research landscape.
- Infrastructure investments are expected to impact on social developments.

Requirements for admission

- Provide conditions for world-class research
- Of broad national interest
- Used by several research teams or users with highly advanced research projects
- So large in scale that individual teams cannot run them on their own
- Have long-term plan for scientific goals, funding, and utilisation
- Open and easily accessible to researchers and to industry and other stakeholders
- Have a plan for accessibility (in terms of using the infrastructure, access to collected data, and presentation of results)
- Introduce new cutting-edge technology (where relevant)

Modalities of the call

- Applications for national infrastructure must generally be made jointly by more than one university (or other organisation).
- Each infrastructure will be led by a board with overall responsibility for the activities.
- The boards are to be composed of outstanding national and international researchers and experts from research infrastructures who are not part of a university management and do not hold other equivalent management positions within the academic sector.
- The Swedish Research Council will continuously monitor the activities and evaluate them prior to making any decisions on renewed funding.

21 See also Swedish Research Council 2015.

Procedure

- The application must also include a financing plan and a binding commitment to financially support construction and operation from each of the partners involved.
- The application must contain a detailed scientific, organisational and technical plan, along with a plan for supporting e-infrastructure.[22]
- A decision to fund in principle involves the Swedish Research Council entering into negotiations with the responsible consortium.
- The grant from the Swedish Research Council will be paid out once a complete consortium agreement and specific terms and conditions for the contribution have been signed.

Role of the social sciences and humanities

- In recent years, research in the humanities, medicine and the social sciences has become increasingly dependent on research infrastructures.
- Investigations point to a need for a nationally coordinated system for quality-assured, research-based individual databases within social sciences and medicine. This work is related to the Swedish Research Council's Government commission of building an improved national infrastructure for register research. It also relates to the need for clearer information and documentation of existing data sources, and the establishment of quality-assured systems for coordination, archiving, and recycling of data within the framework of current legislation.
- 27 out of 71 projects from the Swedish 2014 Roadmap are in the social sciences and humanities. 22 of these are purely national, four are part of the ESFRI Roadmap, and one is international.

22 e-Infrastructures are all resources based on information and communication technology (ICT). This includes networks, big data, data processing, data storage, development and deployment of software, database solutions, as well as advanced user support in all these fields. e-Infrastructures foster the emergence of Open Science, i.e., new working methods based on the shared use of ICT tools and resources across different disciplines and technology domains as well as sharing of results and an open way of working together. https://ec.europa.eu/digital-single-market/en/e-infrastructures

c) Science organisations (Germany)

Leibniz Roadmap

Project duration

- 10–15 years

Geographic/ institutional reach

- Projects from the Leibniz Association
- Nationally, often internationally research resources relevant for their respective disciplines
- Long-term goal is to incorporate projects into other roadmaps, including German National Roadmap/ESFRI

Goals[23]

- Strategic planning of research infrastructures within the Leibniz Association
- Identification and prioritisation
- Further sharpening the Leibniz Association's profile
- The Roadmap maps out how the Leibniz Association can sustainably consolidate and help dynamically shape the German scientific system, including the Association's own institutes.

Selection criteria

- Enabling excellent research
- Social relevance
- Central importance to the scientific landscape
- User-oriented approach
- Innovative character
- Clear unique features

Procedure

- Internal strategic process identifying initiatives for the Roadmap

Role of the social sciences and humanities

- Active role but not focused attention on these disciplines.
- Leibniz Roadmap for research infrastructures consists of nine RIs, two of which are in the social sciences and humanities.

23 See Leibniz-Gemeinschaft (2018); https://www.leibniz-gemeinschaft.de/infrastrukturen/leibniz-roadmap-forschungsinfrastrukturen.html

Goals/guiding principles[24]

- Added value for scientific research
- Improving the quality of products and services of the companies involved in setting up and operating large-scale research equipment
- Strengthening entire regions and their innovation skills
- Comprehensive and best-possible training for international young researchers through independent research activity, cooperation with partners all over the world, and close contacts to the high-tech industry

Requirements for admission

- Only projects that do not yet have a clear funding commitment but a robust funding concept for the phase of operation
- Scientific quality of key research questions
- Strategic relevance of the research infrastructure regarding the Helmholtz Association's research goals in the individual departments and the Helmholtz Association's further development

Modalities of the call

- Only the following fields are eligible for application: energy, earth and environment, health, matter, key technologies, aviation and aerospace, and traffic.

Procedure

- Bottom-up process
- Helmholtz researchers suggest projects based on broad debates within the scientific community.
- Key question: which infrastructures facilitate excellent and cutting-edge research in an international environment?
- Linked to the portfolio process in terms of time and content and discussions in the respective research areas
- Different timescales for different research fields
- All projects must take the international dimension into account – especially participation in planned international infrastructures.

Role of the social sciences and humanities

- Focus on natural science infrastructures (in accordance with the Helmholtz Association's research focus)

Helmholtz Roadmap

Minimum investment threshold per project

- Min. 15 million euros

Timeframe

- Last update: 2015 for 2015–2019

Geographic/ institutional reach

- Projects within the Helmholtz Association
- Long-term goal is to incorporate projects into other roadmaps, including German National Roadmap/ESFRI

24 See Helmholtz-Gemeinschaft (2015); https://www.helmholtz.de/forschungsinfrastrukturen

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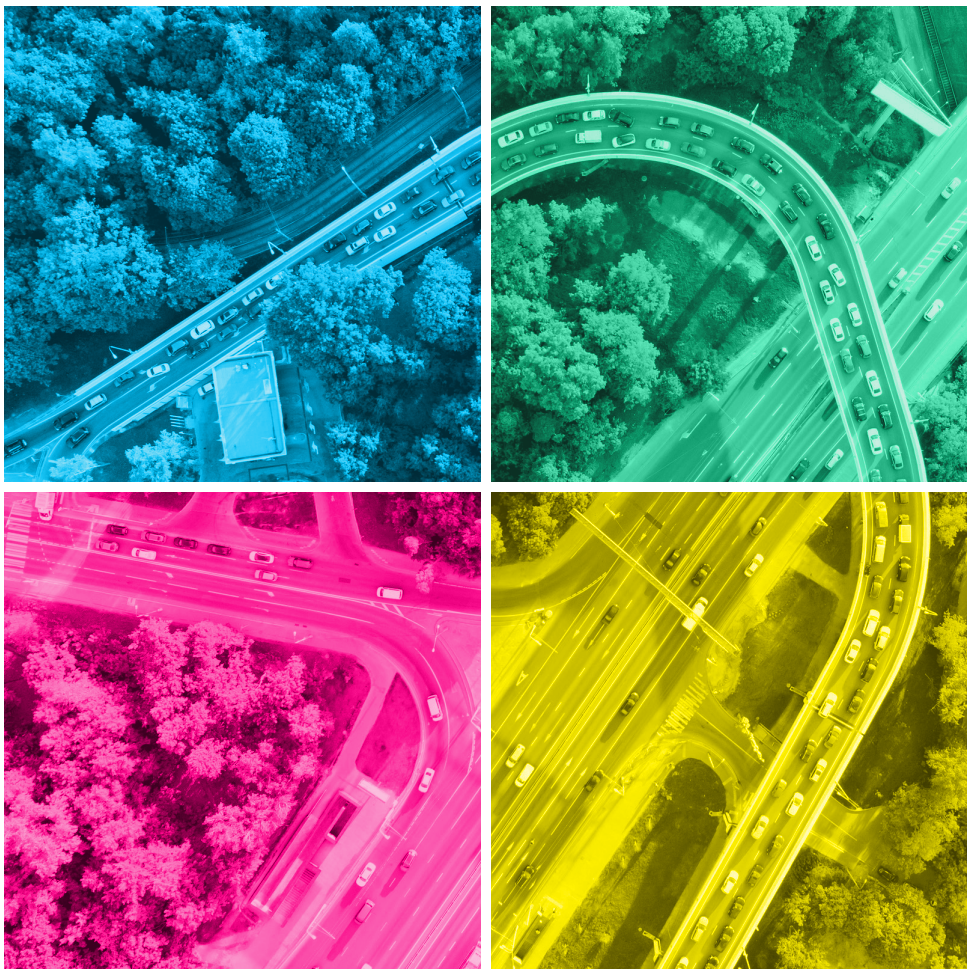
Established in 2004, the **German Data Forum** (Rat für Sozial- und Wirtschaftsdaten, RatSWD) is an independent council. It advises the German federal government and the federal states (Länder) in matters concerning the research data infrastructure for the empirical social, behavioural, and economic sciences. The German Data Forum (RatSWD) has 16 members. Membership consists of eight elected representatives of the social, behavioural, and economic sciences and eight appointed representatives of Germany's most important data producers.

The German Data Forum (RatSWD) offers a forum for dialogue between researchers and data producers, who jointly issue recommendations and position papers. The council furthers the development of a research infrastructure that provides researchers with flexible and secure access to a broad range of data. The German Data Forum (RatSWD) has accredited 34 research data centres and fosters their interaction and collaboration.



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