



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Federal Department for Economic Affairs, Education and Research
EAER

State Secretariat for Education, Research and Innovation SERI
National research and innovation

SERI/NFI

Swiss Roadmap for Research Infrastructures in view of the ERI Dispatch 2017-2020 (Roadmap for Research Infrastructures 2015)

Document acknowledged by the Federal Council as an outline paper for the ERI Dispatch 2017-2020 on 24 June 2015

Contents

Management summary	3
1. Introduction	4
1.1 Content of the roadmap report	4
1.2 Aim of the roadmap	4
2. Review of the current ERI period 2013-2016: Roadmap for research infrastructures 2011	5
2.1 Inclusion criteria.....	5
2.2 Decisions of the Federal Council and Parliament in the framework of the ERI Dispatch 2013-2016.....	5
National RIs	5
3. Swiss roadmap for research infrastructures 2015	8
3.1 Aim and purpose in accordance with RIPA	8
3.2 Operational definition of an RI.....	8
3.3 Responsibilities, procedure and inventory.....	9
4. First phase of evaluation: survey and evaluation process	11
4.1 Evaluation process and criteria	11
4.2 Overview	12
4.3 RIs put forward for implementation	14
5. Second phase of evaluation: allocation and results	15
5.1 Allocation of newly-planned RIs	15
Allocation to the ETH Domain	15
Allocation to the cantonal universities and universities of applied science	15
Allocation to the Confederation / SERI.....	16
5.2 Funding and implementation plans: results.....	16
ETH Domain (as at end of May 2015).....	16
Cantonal universities and universities of applied sciences (as at end of May 2015).....	18
Confederation (as at end of March 2015).....	19
6. Additional infrastructure-related measures	21
6.1 Funding of RIs by the Confederation's funding bodies	21
6.1.1 SNSF	21
6.2 International research infrastructures.....	24
6.2.1 Projects already featured in the existing ESFRI Roadmap	24
6.2.2 Update ESFRI Roadmap 2016	25
Description of ESFRI Roadmap process (criteria, call, results)	25
New potential ESFRI projects in which Switzerland is already involved or where there is interest in Swiss participation:	26
7. Outlook	27
8. Glossary	28
Annex A	
Annex B	

Management summary

Today, the field of research in all disciplines is dependent on excellent research infrastructures as a key basis of its activities. These include, for example, large-scale research facilities (e.g. particle accelerators), e-infrastructures (e.g. supercomputers) and databases. The significance of such research infrastructures is growing, as is the need for new ones. This requires the funding bodies involved to conduct medium- to long-term financial planning, whereby they should not only carefully consider whether to set up new national research infrastructures or whether to participate in international ones, but also whether to set up new research infrastructures or whether to further development or continue existing ones.

This report "Roadmap for Research Infrastructures 2015" provides a general overview of newly-planned research infrastructures in view of the ERI Dispatch 2017-2020, as well as of existing research infrastructures where funding is set to be continued in the upcoming period.

The roadmap process was coordinated by the State Secretariat for Education, Research and Innovation (SERI) on the basis of its legal mandate set out in the Research and Innovation Promotion Act (RIPA). As part of the survey process, the newly-registered research infrastructures were subjected to a two-phase evaluation. In the first phase of the evaluation, the Swiss National Science Foundation (SNSF) assessed the submitted projects based on scientific criteria and prioritised them in three categories (A,B,C). In the second phase of the evaluation process, the projects prioritised in category A were examined by the relevant responsible funding body (ETH Board, universities, universities of applied science, Confederation/SERI) with regard to their integration in the sponsoring institution's strategic planning and financial implementation. A total of 23 new projects have been proposed for implementation by the responsible bodies.

The 2015 Roadmap for Research Infrastructures is a planning instrument and serves as a basis for developing the 2017-2020 ERI Dispatch. The roadmap also provides indicators of where there will be further funding requirements at national and international level with regard to medium-term requirements planning post-2020. The roadmap per se does not contain any funding decisions or decisions on the distribution of any federal funding for the realisation of new research infrastructures to relevant promotional credits.

1. Introduction

1.1 Content of the roadmap report

Compilation of the 2015 Roadmap for research infrastructures was coordinated by the State Secretariat for Education, Research and Innovation (SERI). The report is structured as follows: Chapter 2 starts with a review of the current ERI period, looking at which national and international obligations resulted from the 2011 Roadmap and which of the research infrastructures (RIs) that were planned at the time have been realised. Chapter 3 then presents the defining criteria of an RI as well as the process involved in this roadmap and the corresponding responsibilities. Chapter 4 presents the results of the survey and assessment process (first phase of evaluation) and the RIs proposed for implementation. Chapter 5 describes the assignment to the responsible bodies and the results of in-depth reviews by the responsible bodies (second phase of evaluation). Chapter 6 presents the additional measures aimed at promoting RIs, particularly the planned national infrastructure projects of the funding bodies (SNSF, Academies) and the planned ESFRI schemes as part of the European Roadmap¹ and international research organisations. Annex A details the newly-submitted national RIs of great scientific relevance and the international research organisations that need to be verified. Meanwhile, Annex B (inventory) describes the existing national and international RIs in which Switzerland is involved.

1.2 Aim of the roadmap

Access to excellent research infrastructures is highly important for public and private players in the field of research and innovation. In many disciplines, research infrastructures are a crucial prerequisite for obtaining new scientific findings, developing specialist fields and opening up new research areas. The need for such research infrastructures is growing, and so too is the need for funding. In particular, major research infrastructures of national and international significance with medium- to long-term coordination needs require careful planning in order to employ the limited funds as efficiently and effectively as possible. When it comes to Switzerland participating in international research organisations on the basis of international treaties, there are also legal and foreign policy aspects to take into consideration, which increase the planning and coordination needs even further. In light of this, this 2015 Swiss roadmap for research infrastructures serves as a planning instrument and as one of the foundations on which to base the relevant funding decisions of the Confederation under the ERI Dispatch 2017-2020. The roadmap is not a survey for special funding or a process resulting in direct funding decisions.

The funding decisions for implementing individual research infrastructure projects, provided they come under the Confederation's jurisdiction², are made as part of the ERI Dispatch 2017-2020:

- drawing on the multi-year programmes of the responsible funding and sponsoring institutions;
- based on the results from the two-phase evaluation process and the submitted implementation plans of the responsible bodies in each case;
- based on a review of the effective need for specific federal support in accordance with the Subsidies Act (SR 616.1).
- based on the anticipated total funds available for the 2017-2020 ERI period.

¹ European Strategy Forum on Research Infrastructures (ESFRI).

² For more information on the Confederation's jurisdiction, see Chapter. 5.2.

2. Review of the current ERI period 2013-2016: Roadmap for research infrastructures 2011

The SERI compiled the first Swiss roadmap for research infrastructures, which was approved by the Federal Council on 30 March 2011, as part of a pilot project. It served as a basis for the chapter “Research infrastructures” in the ERI Dispatch 2013-2016. First and foremost, however, it was a response to the ESFRI Roadmap 2008, for which European countries were invited to draw up national roadmaps to better plan and finance extensive, internationally-coordinated research infrastructure projects.

2.1 Inclusion criteria

In order to be included in the Swiss pilot roadmap, the project had to be integrated in either the planning of an international research organisation in which Switzerland is a member, or in the ESFRI Roadmap. Swiss participation in ESFRI projects usually requires national investment in order to subsequently cooperate in European networks. The pilot roadmap therefore primarily focused on developing existing national research infrastructures and positioning them internationally. In addition to these international research infrastructures, the pilot roadmap also featured the following three research infrastructures that fall under the responsibility of the ETH Domain based on decisions already taken in the 2008-2011 ERI period:

- Construction of a national free electronic X-ray source SwissFEL at the PSI;
- The Blue Brain Project at the EPFL (Simulation of the human brain using a supercomputer);
- Strategy for high performance computing in Switzerland³ with the Centro svizzero di calcolo scientifico, CSCS. This supercomputer strategy also included the Swiss National Grid, which forms part of the European Grid Initiative that was co-financed by the 7th Framework Research Programme of the European Union.

2.2 Decisions of the Federal Council and Parliament in the framework of the ERI Dispatch 2013-2016

The Federal Council took note of the final report of the pilot Swiss roadmap for research infrastructures on 30 March 2011 and decided to plan support for new research infrastructures in line with the existing promotional credits as part of the ERI Dispatch for 2013-2016. The Swiss Science and Innovation Council (SSIC) assessed the roadmap process and criteria in an ex-ante assessment. Based on a review of the need for specific federal support and the funding available for the individual promotional credits, the Federal Council asked parliament to support the following RIs:

National RIs

- Completion of the SwissFEL at the PSI (ETH Domain payment framework);
- Implementation of the Strategy for high-performance computing in Switzerland (ETH Domain payment framework);
- FLARE programme: funding for the construction and maintenance of equipment for international research projects in the fields of particle physics, astrophysics and astroparticle physics and for international research organisations in which Switzerland is involved, such as CERN and the ESO (funded as part of the Special Programme in the SNSF payment framework);
- Swiss National Grid Initiative (commitment appropriation for project contributions in accordance with UFundA)⁴;
- Blue Brain at the EPFL (ETH Domain payment framework).

³ This strategy aims to facilitate the joint use of shared computers and storage capacities in the field of e-infrastructures at national and international level (FC decision 29.5.2009)

⁴ This project could not be realised as the credit for project contributions under the UFundA at the time was already used up when the decisions were taken regarding implementation of the pilot roadmap.

International research organisations

In terms of international research organisations in which Switzerland participates based on international treaties, the following research infrastructures were implemented or continued:

- All research organisations mentioned in the 2011 Roadmap: CERN (including further preliminary work for CLIC), ESO, ESRF, ILL, European XFEL, EMBL, ITER (including further preliminary work for IFMIF).

ESFRI projects

The Confederation is not usually directly responsible for Swiss participation in ESFRI projects, unless an international treaty is required. It should be noted, however, that participation in ESFRI projects has implications for investment in the ETH Domain, for investment in universities and universities of applied sciences and for federal contributions in accordance with Art. 15 RIPA and lastly for tasks that come under the remit of the SNSF or Academies.

The list below shows the ESFRI projects⁵ where the European consortia have already been formed and in which Switzerland is involved:

- **BBMRI**: Networking of bio-databases; CH node: Swiss Biobanking Platform (SNSF payment framework)
- **ECRIN**: Networking of clinical study centres; CH node: Swiss Clinical Trial Organisation SCTO (SNSF payment framework)
- **ELIXIR**: Bio-informatics structures in the framework of the EMBL⁶; CH node: Swiss Institute for Bioinformatics SIB (payment framework Art. 15 RIPA⁷ and Art. 28 RIPA concerning commitment appropriation for international collaboration in research)
- **EPOS**: Earthquake research; CH node: ETHZ / SDS⁸ (ETH Domain payment framework)
- **ICOS**: Atmospheric physics-climate research; CH node: ETHZ and HFSJG⁹ (SNSF payment framework and personal contributions from the institutions of the ETH Domain)
- **CESSDA**: Networking of social science data archives; CH node: FORS¹⁰ (payment framework in accordance with Art. 15 RIPA)
- **ESSurvey**: Long-term social science surveys; CH node: FORS (SNSF payment framework)
- **SHARE**: Long-term social science surveys; CH node: IEMS¹¹ and FORS (SNSF payment framework)

⁵ For further information, see Annex B. The RIs are usually listed under the responsible institutions ("national node").

⁶ European Molecular Biology Laboratory. For further information, see Annex B.

⁷ Based on the completely revised Research and Innovation Promotion Act (RIPA), which entered into force on 1 January 2014, the previous Art. 16 RIPA (subsidiary federal support for non-university research infrastructures) was replaced by Art. 15 RIPA.

⁸ Swiss Digital Seismic Network (SDS).

⁹ High altitude research stations Jungfrauoch & Gornergrat.

¹⁰ Fondation suisse pour la recherche en sciences sociales (FORS).

¹¹ Institut d'économie et de management de la santé (IEMS), University of Lausanne

For the following ESFRI project, an agreement was entered into in the 2013-2016 ERI period:

- **ESS (European Spallation Source):** this international research infrastructure, which aims to develop a neutron source in Lund, Sweden, is to be transferred over to what is known as an ERIC legal form from July 2015. Swiss participation was approved by parliament on 20.3.2015.¹²

Special importance of ERIC for Switzerland

As part of the European ESFRI Roadmap,¹³ the legal form of a European Research Infrastructure Consortium (ERIC) is specifically promoted to give European research associations a stable organisational and legal form that is recognised by all EU member states. This ERIC legal form has been applicable since mid-2009. Ten ESFRI projects have already been transferred over to ERICs: for example, BBMRI, ECRIN, ESSurvey and SHARE.¹⁴

From the point of view of the Confederation's research promotion, ensuring that Swiss research institutions and research groups are not disadvantaged by the founding of ERICs is a high priority. Since RIs that are organised as ERICs will in future be able to apply for EU funding, Switzerland also has a financial interest in being involved in such ERICs. Participation as a full member in a research infrastructure with an ERIC legal form is only possible under state jurisdiction (and not via a participating research institution). For all such ESFRI projects, responsibility would therefore lie with the Confederation, even if it does not reach the critical financial and overall mass at which a commitment at federal level would be justifiable from Switzerland's point of view. The SERI is currently working with the partners involved to identify appropriate solutions.

¹² For detailed information on the ESS, see Annex B.

¹³ ESFRI was set up in 2002 and consists of state representatives from EU member states and countries associated to the EU Research Framework Programme (therefore also including Switzerland).

¹⁴ Submitted by ICOS to the European Commission on 2.4.2014; the Finnish government sent the ICOS ERIC formal request letter to the European Commission in April 2015. EPOS is also planning to do so in 2015. CESSDA is still organised as a consortium (no legal entity), but is also set to be replaced by an ERIC, as agreed in the Memorandum of Understanding (MoU of 5.3.2013) between the consortium partners.

3. Swiss roadmap for research infrastructures 2015

The 2015 research infrastructures roadmap is a development of the 2011 pilot roadmap and provides a look ahead to the upcoming 2017-2020 ERI period. In terms of content, it is more heavily focused on RIs with a nationwide mandate. Nevertheless, most RIs have international links, without being formally integrated in an international context (international research organisations; ESFRI Roadmap). In terms of timing, the 2015 national roadmap is aligned with the ESFRI Roadmap Update 2016 to ensure that the results of the national survey can be incorporated in European planning from Switzerland's point of view and in Switzerland's interest.

3.1 Aim and purpose in accordance with RIPA

This roadmap provides an overview of existing RIs on the one hand and newly-planned ones on the other. It therefore acts as an instrument for needs-based material coordination for consistency between national and international research promotion in accordance with the legal mandate (Art. 41 RIPA).¹⁵ Based on this planning work, the Confederation's national and international research and innovation promotion should be aligned as coherently as possible in terms of RIs with the development priorities of the specialist fields and disciplines in Switzerland and the relevant development priorities in the ETH Domain and at the universities (universities and universities of applied sciences) (Art. 55 V-RIPA).

3.2 Operational definition of an RI

This roadmap is based on the following definition of "research infrastructure"¹⁶:

- The infrastructure makes a key contribution to the development of a particular field of knowledge or research (scientific added value);
- The infrastructure is widely used by researchers in Switzerland (national significance);
- The infrastructure is in principle open to national and international research communities (open access);
- The infrastructure may be situated at a single location or organised in a network with several locations with a centralised management structure.

Characteristically, RIs in Switzerland are publicly or privately owned and are structured/implemented in a medium- to long- term manner (usually more than 10 years). They therefore generally exceed the planning horizon of an individual ERI Dispatch.

Setting up such RIs meets a need of the research community. This creates the foundations on which research can develop and new fields of research can be accessed. An RI does not generally conduct independent research as its primary goal. This is done instead by researchers or research groups from the specialist fields, where necessary in close collaboration with the research infrastructure.¹⁷

¹⁵ For the coordination of cost-intensive research infrastructures required under Art. 41 Para. 4 RIPA, the rectors' conference Swissuniversities that was newly created under the HEdA – based on the preliminary work carried out by CRUS since 2011- submits proposals with regard to the ERI period 2021-2024 for the attention of the Swiss University Council.

¹⁶ This definition corresponds to the one in the pilot roadmap and was therefore also used in the RIs listed in the inventory.

¹⁷ According to the MERIL definition (Mapping of the European Research Infrastructure Landscape), a further distinction is drawn between RIs with a direct research purpose and RIs that serve to coordinate scientific fields. The three main criteria for the acceptance of a research infrastructure in the MERIL database are quality, accessibility and management.

A distinction can be drawn between three types of RIs:

- a. Instruments: large-scale equipment, such as particle accelerators, telescopes, research vessels, measuring stations, specific laboratory equipment;
- b. Information and service infrastructures:
 - Research data and data service centres, including scientific data collection and archiving,
 - Archives, libraries and object-related collections,
 - Subject-specific service centres (e.g. in clinical research; for networking scientific fields);
- c. Technical infrastructures: particularly e-infrastructures (supercomputers; grid; software/middleware; digital scientific information networks).¹⁸

The following are explicitly excluded from this definition:

- Research programmes per se,
- University institutes or research establishments per se,
- individual equipment,
- Pilot, demonstration and testing facilities,¹⁹
- Promotional organisations,
- Editions²⁰,
- Scientific secretariats.

3.3 Responsibilities, procedure and inventory

Responsibilities

Under the terms of RIPA, it is primarily the institutions of higher education or their funding councils that are responsible for supporting RIs. The SNSF plays a subsidiary role by funding RIs that serve to develop specialist areas in Switzerland and that do not fall under the responsibility of university research institutions or the Confederation (Art. 10 Para 3 (c) RIPA). Meanwhile, the Confederation is responsible for providing subsidiary support for research infrastructures of national relevance (Art. 15 Para 3 (a) RIPA) and for Swiss participation in internationally-coordinated RIs governed by international treaties (Art. 28 RIPA). The Academies can support data collections, documentation systems, scientific journals, editions or similar facilities that serve to develop specialist fields in Switzerland but do not fall under the funding responsibility of the SNSF or the university research institutions and are not funded by the Confederation (Art. 11 Para 6 RIPA).

Procedure

In order to survey the newly-planned RIs, the SERI and SNSF issued a survey process (“call”) for applications between October 2013 and January 2014. The call was open to members of universities (ETH and research institutes, cantonal universities and universities of applied sciences) individually or grouped into consortia. For the newly-planned RIs, a signed letter of commitment from the relevant university board or director of the research institute in the ETH Domain had to be enclosed, in which the institution committed itself to providing co-financing and/or follow-up financing. The universities therefore played a crucial role from the outset.

¹⁸ The term used by the E-Infrastructure Reflection Group (E-IRG) distinguishes: “The main e-Infrastructure components and services include networking, high-throughput and high-performance computing, data infrastructures, software/middleware (including authentication and authorisation infrastructures) and virtual research environments that are to be used by virtual research communities.”(E-IRG White paper 2013, p. 5)

¹⁹ The roadmap focuses on research-driven RIs of national relevance that are necessary for further developing the relevant research field. Pilot and demonstration projects can be used to prepare for the setup of an RI or the knowledge and technology transfer from applied research to the economic context (market launch), but are not actual RIs in the sense intended here.

²⁰ Up to now, editions have mainly been funded by the SNSF as “long-term projects” due to their direct link to research projects via project funding. From 2017, they will be supported via the SNSF research infrastructure funding. For further information on editions and scientific secretariats, see Chapter 6.1.

The roadmap process is based on a two-phase evaluation process. Following a quality check by the SNSF between January and August 2014 (first phase of evaluation, see Chapter 4), the SERI coordinated with stakeholders regarding allocation of the proposed projects to the relevant responsible bodies for in-depth evaluation and informed them of the next steps in October 2014 (second phase of evaluation, see Chapter 5).²¹

Inventory

At the same time as the survey of new RIs, the SERI also compiled an inventory of existing RIs in a national and international context. This inventory was revised in a two-stage consultation procedure with the universities and funding bodies and completed as far as possible. The first consultation round was completed in August 2014, and the second round with the compilation/completion of budgeted figures in November 2014. In addition to the 26 RIs listed in the original pilot roadmap in 2011, additional RIs were added to the inventory by universities and research bodies provided they met the RI criteria. The inventory currently comprises around 70 existing RIs.

²¹ Under RIPA, the funding bodies are the SNSF, the Academies and the Confederation (for non-university research infrastructures and internationally-coordinated research infrastructures based on international treaties). The sponsoring institutions of newly-planned research infrastructures may be institutions in the ETH Domain, cantonal universities and universities of applied sciences as well as private sponsors and international organisations.

4. First phase of evaluation: survey and evaluation process

4.1 Evaluation process and criteria

As part of the survey process (call for applications), a total of 47 new projects were registered, supported by a relevant letter of reference from the universities. These were then evaluated by the Swiss National Science Foundation (SNSF) on behalf of the SERI based on the criteria below:

Scientific potential/generation of scientific added value in terms of specialist and interdisciplinary aspects:

- How significant and original are the research questions and approaches that the planned RI facilitates?
- To what extent would they achieve added value compared to research that is already being conducted?

Use and accessibility (nationally and internationally, cross-disciplinary):

- Can the planned RI be widely used and is it accessible?
- To what extent do the track records and specialist skills of future users suggest that the planned RI will allow high-quality research to be conducted?
- To what extent will the planned RI and the data it is used to generate be accessible and available to a significant research community?

Feasibility:

- To what extent does the planned RI comply with the current state of research or development in terms of its technical, logistic, methodical and conceptual aspects?

Financing and institutional integration:

- To what extent is the long-term continuation, financing and institutional integration of the planned RI guaranteed?

Significance for Switzerland as a location for science:

- To what extent does the planned RI link up with Switzerland's existing strengths in research or to what extent does it compensate for a weakness?
- To what extent will international links be guaranteed with the planned RI?
- What role would the planned RI play in the training of talented young scientists?

The SNSF submitted its results to the SERI at the end of August 2014. Based on these criteria, the SNSF evaluated 41 of the 47 projects submitted and prioritised them as follows²²:

Priority A	High scientific relevance	20 projects
Priority B	Medium scientific relevance	15 projects
Priority C	Low scientific relevance	6 projects

A total of six projects are not listed. Of these, the SNSF considered it impossible to assess or categorise three projects because the context (distinction from existing RIs or legal framework conditions) was unclear. Three projects could not be reviewed as they failed to meet the formal criteria of the survey procedure.²³

The results of the SNSF evaluation and information on the next steps were sent to the responsible bodies and the submission authors by the SERI on 13 October 2014.

²² This list includes the four e-infrastructures (two A priorities and two B priorities) where there is a fundamental need for coordination.

²³ Contrary to the usual SNSF procedure, the bodies of the specialist departments mandated to conduct the evaluation could not make any funding decisions.

4.2 Overview

The financial volume of all 41 new RIs reviewed by the SNSF was estimated as per August 2014 at around 652 million Swiss francs (total costs for the 2017-2020 period including investment and operating costs)²⁴. Figure 1 below shows how these costs are distributed across the four fields, while figure 2 shows the distribution of the estimated financial volume by prioritisation category. Finally, figure 3 provides an overview of the distribution of prioritisation categories by specialist field.

The 41 RIs reviewed by the SNSF are split as follows across the four main fields²⁵:

- 10 humanities and social sciences
- 16 mathematics, engineering and natural sciences (MINT)
- 11 life sciences
- 4 e-infrastructures

The following sponsoring institutions submitted new projects:

- 6 ETH Domain (in some cases together with universities/universities of applied sciences)
- 30 cantonal universities (in some cases together with the ETH Domain/universities of applied sciences/university hospitals)
- 6 universities of applied sciences (in some cases together with the ETH Domain/universities)
- 5 other institutions (university hospitals/foundations)

To summarise, it can be noted that the projects submitted are distributed across all specialist fields, although the MINT field has the most projects (Fig. 3). In terms of the distribution of financial volume by field (Fig. 1), it is clear that life sciences, MINT and e-infrastructures in particular have the highest costs (as measured by the number of projects). In terms of the distribution of costs by prioritisation category, we can see that almost half of the planned costs are incurred by projects categorised under priority A (Fig. 2).

²⁴ This financing requirement was increased, confirmed or reduced as part of the in-depth evaluation (2nd phase of evaluation) and specified using budgetary clarifications.

²⁵ Figure 3 does not show the uncategorised RIs (three from life sciences and one from the MINT field).

Fig. 1: Distribution of funds by field

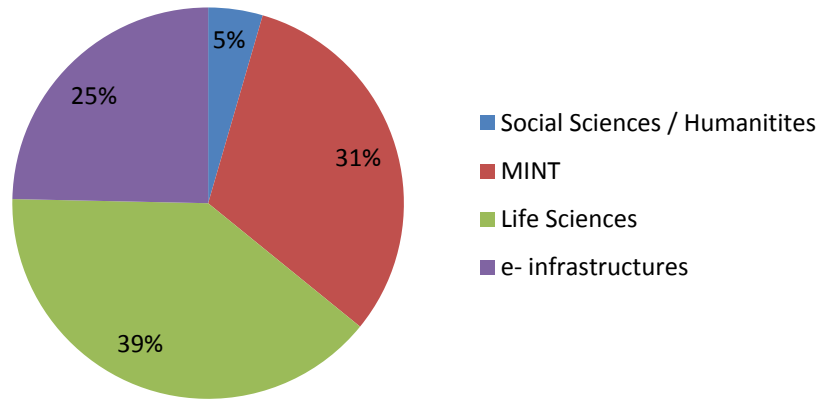


Fig. 2: Distribution of funds by priority (100%= 652 million)

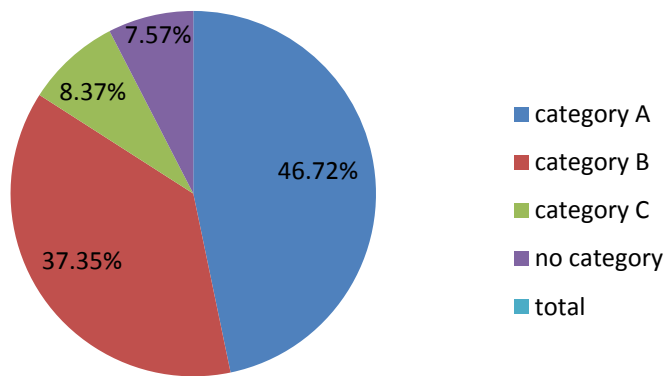
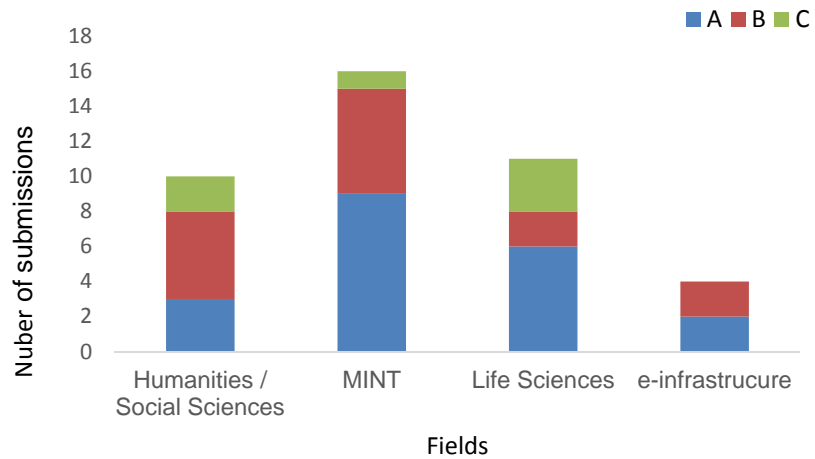


Fig. 3: Distribution of prioritisation categories by field



4.3 RIs put forward for implementation

Of the 41 new projects evaluated by the SNSF, a total of 23 projects were put forward for in-depth review or implementation: in addition to the 20 projects categorised as A priority by the SNSF, three additional projects that were classified as priorities by the responsible bodies.²⁶ The table below provides an overview of the prioritised RIs by specialist field. The estimated total costs for the 2017-2020 period alone would amount to around 337 million Swiss francs for the Confederation (as at October 2014). A detailed description of the RIs that have been put forward for an in-depth review can be found in Annex A.1 of this roadmap.

Specialist field	Institution	Project
Humanities	University of Zurich	The Swiss Art Research Infrastructure (SARI)
Humanities	University of Basel	Swiss Digital Humanities Center (SDHC)
Life sciences	University of Neuchâtel	Swiss Research Centre for Animal Cognition
Life sciences	University of Basel, University of Zurich	Center for Pediatric Systems Pharmacology and Technology
Life sciences	University of Zurich, Balgrist University Hospital	Swiss Center for Musculoskeletal Biobanking and Imaging and Clinical Movement Analysis
Life sciences	University of Neuchâtel	The Neuchâtel Platform for Analytical Chemistry
Life sciences	Universities of Lausanne, Basel, HES-SO,	Information and computational service infrastructure network to support biomedical research in Switzerland (BioMedIT)
Life sciences	University of Basel, ETHZ, University of Zurich	Swiss National 1.2 GHz Solution NMR facility
Life sciences	Universities of Zurich, Basel, Bern, Lausanne, Geneva	SwissPedNet
MINT	University of Lausanne	The Swiss National Ion-microprobe Platform
MINT	University of applied science SUPSI	Swiss Laboratory for the "Advanced Studies on the Dynamic Behavior of Materials"
MINT	University of Zurich	Airborne Research Facility for the Earth System
MINT	Empa, Eawag	Next Evolution in Sustainable Building Technologies NEST
MINT	University of Zurich	The future of dark matter detection with liquid xenon XENONnT and DARWIN
MINT	PSI	ATHOS - extending capabilities and doubling capacities for SwissFEL
MINT	PSI	Swiss Light Source SLS 2.0
MINT	University of Geneva	A Common Data Center Infrastructure (CDCI) for Astronomy, Astroparticle and Cosmology
MINT	Lucerne University of Applied Sciences and Arts	Center for Biomedical Research in Space
MINT	EPFL	New Swiss Plasma Center
Social Sciences	University St. Gallen	Mixed-Reality Lab for Behavioral Research MIRAL
e-infrastructure	CSCS (ETHZ)	HPCN-20
e-infrastructure	Foundation SWITCH - a foundation of all universities	The Swiss edu-ID and the Swiss Academic Cloud based on the Academic Network SWITCHlan
e-infrastructure	EPFL	Swiss Research Cloud (Initiative for Data Science in Switzerland)

²⁶ Of the three projects, two are RIs that were not prioritised by the SNSF (New Swiss Plasma Center und Swiss PedNet) and a B priority RI (Swiss Research Cloud, for which the concept was reworked).

5. Second phase of evaluation: allocation and results

Under the terms of RIPA, it is primarily the institutions of higher education or their funding councils that are responsible for supporting and funding RIs. The Confederation's research promotion bodies (SNSF, Academies) play a subsidiary role in supporting RIs. Meanwhile, the Confederation is responsible for subsidiary funding of research infrastructures with national relevance (Art. 15 Para 3 RIPA) and for Switzerland's participations in internationally coordinated RIs governed by international treaties in accordance with Art. 28 RIPA.

The Confederation is therefore indirectly responsible for

- projects in the ETH Domain: Confederation is the sponsoring body;
- projects at universities (universities and universities of applied science): subsidiary federal support under the terms of the Higher Education Funding and Coordination Act, HEdA;
- projects under the jurisdiction of the research promotion bodies (SNSF, Academies; see Chapter 6.1).

The Confederation is therefore directly responsible for

- research infrastructures established outside of universities: subsidiary federal support in accordance with Art. 15 RIPA ;
- Switzerland's participation in internationally coordinated projects, particularly for international organisations and ESFRI projects, provided they are implemented on the basis of an international treaty (see Chapter 6.2).

5.1 Allocation of newly-planned RIs

Based on the evaluation and the SNSF's allocation recommendations, the SERI designated a responsible body to conduct an in-depth review of the prioritised RIs, after consulting with the representatives of the ETH Board and Swissuniversities.²⁷ This allocation is shown below for the individual projects.

Allocation to the ETH Domain

Within the ETH Domain, the ETH Board coordinated the in-depth reviews of the following six projects:

- Swiss High-Performance Computing and Networking Initiative (HPCN/HPCN-20)
- ATHOS beamline at the Swiss X-ray Free Electron laser SwissFEL
- Swiss Light Source (SLS 2.0)
- Swiss Research Cloud (-> Initiative for Data Science in Switzerland, IDSS)²⁸
- Centre de recherches en physique des plasmas CRPP / Swiss Plasma Center
- Next Evolution in Sustainable Building Technologies (NEST)

Allocation to the cantonal universities and universities of applied science

In terms of universities, the organisation Swissuniversities coordinated the in-depth reviews of the following ten projects:

- Swiss Digital Humanities Center, SDHC: Swissuniversities (with coordination mandate)²⁹
- The Swiss edu-ID and the Swiss Academic Cloud based on the Academic Network SWITCHlan: Swissuniversities (with coordination mandate)
- MIRAL - Mixed-Reality Lab for Behavioral Research: University of St. Gallen

²⁷ The meeting with representatives of the ETH Board took place on 3 September and with representatives of CRUS and KFH (now Swissuniversities) on 8 September 2014.

²⁸ A working group commissioned by the ETH Board reviewed the RIs originally submitted to the SERI in the field of e-infrastructures (HPCN-20, Swiss Research Cloud und The Swiss edu-ID and the Swiss Academic Cloud based on the Academic Network SWITCHlan) with regard to coordination needs and developed an overarching, joint strategy for data sciences. As a result, the Swiss Research Cloud project led by the EPFL and in collaboration with the ETH Zurich was reworked.

²⁹ Swissuniversities also clarified the relationship with the project "The Swiss Art Research Infrastructure" and the SUC P2 programme "scientific information" in the process. The results of the evaluation of the pilot project "Digital infrastructures for the humanities"(see mandate ERI Dispatch 2013-2016) managed by the SAHS were also incorporated in these assessments.

- Airborne Research Facility for the Earth System, ARES: University of Zurich
- A Common Data Center Infrastructure (CDCI) for Astronomy, Astroparticle and Cosmology: University of Geneva
- SwissNIP - the Swiss National Ion-microprobe Platform University of Lausanne
- Swiss Research Centre for Animal Cognition: University of Neuchâtel
- The Neuchâtel Platform for Analytical Chemistry: University of Neuchâtel
- Center for Biomedical Research in Space: Lucerne University of Applied Sciences and Arts (LU Uni)
- Swiss Laboratory for the Advanced Studies on the Dynamic Behavior of Materials: SUPSI

Allocation to the Confederation / SERI

Within the scope of federal government support, the SERI coordinated the formal review of the following six projects based on the Art. 15 criteria:

- Clinical Trial Unit EOC (Ospedale San Giovanni, Bellinzona)
- Swiss Center for Musculoskeletal Research and Development in Zurich (Balgrist Campus)
- The Swiss Art Research Infrastructure (SARI)
- Swiss Research Network of Clinical Pediatric Hubs (SwissPedNet)
- Center for Pediatric Systems Pharmacology and Technology
- Information and computational service infrastructure network to support biomedical research in Switzerland (BioMedIT)
- In addition: The future of dark matter detection with liquid xenon: XENONnT and DARWIN (Review FLARE, funding SNSF)

5.2 Funding and implementation plans: results

The responsible bodies were tasked with reviewing the RIs allocated to them with regard to integration in the relevant strategic planning and the funding required to realise the project in the 2017-2020 ERI period. The evaluation was conducted in accordance with the procedures and criteria of the responsible funding/sponsoring organisation. The results of the second phase of evaluation were submitted to the SERI by the responsible bodies by mid-March 2015 in the form of implementation plans and are summarised below.

ETH Domain (as at end of May 2015)

In line with its strategic planning³⁰ the following RIs are of particular strategic importance for the ETH Board: the Swiss High Performance Computing and Networking Initiative (HPCN-20) at the CSCS at ETH Zurich, the neuroinformatics Blue Brain project at EPFL, ATHOS/SwissFEL at the PSI and the upgrade to the CMS detectors at CERN supervised by ETH Zurich. As part of the roadmap process, HPCN-20 and ATHOS/SwissFEL were submitted as new RIs (see Annex A), while Blue Brain and CMS detectors were incorporated in the inventory as existing RIs (see Annex B).

The ETH Board worked with the sponsoring institutions to check the strategic conformity of the new RIs allocated to the ETH Domain for review and took note of the estimated funding requirement of the institutions in the ETH Domain. The ETH Board supports the inclusion of the following RIs in the roadmap:

³⁰ Strategic planning 2017-2020 of the ETH Board for the ETH Domain, 2014.

No. ³¹	Research infrastructure	Estimated funding requirement 2017-2020 (in CHF millions)	Funding requirement from ETH Domain payment framework 2017-2020 (in CHF millions)	Sponsoring institution with primary responsibility
1	Swiss High-Performance Computing and Networking Initiative (HPCN/HPCN-20)	210	184	ETH Board (ETHZ)
2	ATHOS beamline at the Swiss X-ray Free Electron laser SwissFEL	46	40	ETH Board (PSI)
3	Swiss Light Source (SLS 2.0) ³²	2	2	ETH Board (PSI)
4	Initiative for Data Science in Switzerland (IDSS)	77	64	ETH Board (EPFL/ETHZ)
5	Centre de recherches en physique des plasmas (CRPP) / Swiss Plasma Center	135	85	ETH Board (EPFL)
6	Next Evolution in Sustainable Building Technologies (NEST)	13	2 ³³	ETH Board (Empa/Eawag)

Full implementation of the six new RIs will result in an estimated total funding requirement of 483 million Swiss francs for the 2017-2020 period. CHF 377 million (of which CHF 173 million from the ETH Board) will have to be covered from the ETH Domain payment framework. If the ETH Domain cannot guarantee funding from the ETH Domain payment framework that has yet to be decided by parliament, the ETH Board will take a decision in due time regarding their implementation and financing arrangements within its financial capacity.

Besides investments in new RIs, significant funding will be provided from the ETH Domain payment framework for the operation and further development/upgrade of existing RIs in the 2017-2020 period. In its strategic planning for 2017-2020, the ETH Board is therefore envisaging funding for the development of the neuroinformatics Blue Brain project at EPFL of CHF 88 million in total and for the upgrade of the CMS detectors at CERN supervised by ETH Zurich of CHF 15 million (see Annex B). The total expenditure for the further development/upgrade of these two existing RIs from the ETH Domain payment framework amounts to CHF 115 million for the 2017-2020 period.

Conclusion:

- ⇒ The new RIs listed above and the two existing ones mentioned would result in costs of CHF 492 million for the Confederation (as sponsor of the ETH Domain) for the 2017-2020 ERI period.
- ⇒ The amount of funding available will be stipulated/requested via the ETH financial framework in the 2017-2020 ERI Dispatch.
- ⇒ The decision as to whether and to what extent these RIs will be implemented in the 2017-2020 period will be made by the ETH Board or the institutions of the ETH Domain.

³¹ For detailed information, see Annex A, where the projects are listed in line with this numbering.

³² For SLS 2.0, the design phase is set to take place in the 2017-2020 period with estimated costs of CHF 2 million, the costs of the subsequent implementation phase in the 2021-2024 period are estimated at CHF 83 million.

³³ Plus as yet undefined contributions from the funding aimed at developing measures to strengthen energy research in the ETH Domain in line with the "Coordinated energy research Switzerland" action plan.

Cantonal universities and universities of applied sciences (as at end of May 2015)

As part of its strategic planning, the Swissuniversities rectors' conference (formerly CRUS and CUAS) put forward the following 13 projects for implementation:

No.	Research infrastructure	Estimated funding requirement 2017-2020 (in CHF millions)	Planned funding requirement from PC promotional credit under Art. 59 HEdA (in CHF millions)	Sponsoring institution with primary responsibility
7	The Swiss edu-ID and the Swiss Academic Cloud based on the Academic Network SWITCHlan	89	24.5	Swissuniversities
8	Swiss Digital Humanities Center	8.58	2.626 (+ 4 applied for under Art. 11 RIPA)	Swissuniversities University of Basel
9	The Swiss Art Research Infrastructure	4.5	1.513	University of Zurich
10	Center for Pediatric Systems Pharmacology and Technology	3.2	1.067	University of Basel
11	The Swiss National Ion-microprobe Platform (SwissNIP)	6.3	1.5	University of Lausanne
12	Swiss Laboratory for the Advanced Studies on the Dynamic Behaviour of Materials	6.774	1.36	SUPSI (University of Applied Sciences and Arts of Southern Switzerland)
13	Swiss Research Centre for Animal Cognition	2.47	0.823	University of Neuchâtel
14	Airborne Research Facility for the Earth System (ARES)	22.7	7.6	University of Zurich
15	Mixed-Reality Lab for Behavioral Research MIRAL	2.564	0.855	University of St. Gallen
16	The Neuchâtel Platform for Analytical Chemistry (NPAC)	3.153	1.05	University of Neuchâtel
17	Proposal for a Swiss National 1.2 GHz Solution NMR facility	21.34	7.126	University of Basel
18	A common Data Center Infrastructure (CDCI) for Astronomy, Astroparticle and Cosmology	5.4	1.867	University of Geneva
19	Center for Biomedical Research in Space	0.6	0.2	Lucerne University of Applied Sciences and Arts (LU Uni)

The overall funding requirement for implementing these RIs in full is estimated at around CHF 180 million. Of this, a total of around CHF 52 million of funding has been applied for from Swissuniversities as part of the ERI loans for project contributions (PC) under the HEdA.³⁴ According to the decision of Swissuniversities, the projects listed can be funded with a maximum of one third PC, while the rest must be guaranteed by the sponsoring institutions. All these projects must go through the normal PC contributions process. How many of the projects will be implemented depends on the decision of the

³⁴ According to the application from Swissuniversities, the SUC approved the submitted projects (including the research infrastructures summarised as a project with CHF 27,586,682) in its decision of 28.5.2015 in accordance with Art. 59 HEdA. Swissuniversities must submit the definitive project proposals by the end of February 2016. The funding decision is due in September 2016. The application from Swissuniversities to the Swiss University Council of 7.4.2015 comprises the amount for RI projects No. 8-19 with CHF 27.5 million. In addition, CHF 24.5 million was applied for by SWITCH as part of the follow-up project to P-2 for No. 7, which equates to a total of CHF 52 million PC funding for RI projects.

Swiss University Conference (SUC) on the one hand; and on the funding decisions in favour of PC credits as part of the ERI Dispatch 2017-2020 on the other.

Conclusion:

- ⇒ Full implementation of these new RIs would result in costs totalling CHF 52 million for the Confederation via funding for project contributions in accordance with HEdA for the 2017-2020 ERI period. These costs cover a maximum of one third of the total costs (primarily the investment costs in the start-up phase) for new RIs; the ongoing (operating) costs for the subsequent ERI periods must be borne by the sponsoring institutions/universities in accordance with PC regulations.
- ⇒ The amount of funding available will be stipulated/requested via the PC promotional credit in the 2017-2020 ERI Dispatch.
- ⇒ The decision as to whether and to what extent these new RIs will be implemented will be made by the Swiss University Conference (PC funding) or the universities.

Confederation (as at end of March 2015)

The Confederation may, under Art. 15 RIPA, provide subsidiary funding to research facilities of national relevance if they make a significant contribution to creating scientific added value in specific specialist fields and meaningfully complement the research activities at the universities and in the ETH Domain. Federal support also requires universities, cantons, other public administrations and private institutions to make significant contributions (at least 50 per cent) to basic funding.

The SERI started by reviewing the projects allocated to the Confederation for the second phase of the evaluation with regard to the need for specific federal support and compliance with the formal criteria of Art. 15 and reached the following conclusion:

- The project “The Swiss Art Research Infrastructure (SARI)” and the “Center for Pediatric Systems Pharmacology and Technology (CPSPT)” do not meet the formal requirements for funding under Art. 15 RIPA. They should be funded by the competent sponsoring organisations, the University of Zurich for SARI and the University of Basel for CPSPT.
- For the project “The future of dark matter detection with liquid xenon: XENONnT and DARWIN”, the SERI clarified the partial financing of the RI through the FLARE SNSF funding instrument.³⁵ The remaining funds must be guaranteed by the participating universities themselves or via third party funds.
- The project “Clinical Trial Unit EOC” cannot be funded as a CTU by the Confederation/SERI, but must instead be reviewed as part of the planned research infrastructure, the SCTO network³⁶, in accordance with Art. 15.

³⁵ For more information on Flare, see Chapter. 6.1.1. SNSF.

³⁶ The Swiss Clinical Trial Organisation (SCTO) was set up in 2009 as a national cooperation platform for clinical research (Clinical Trial Units, CTU) . The SCTO is currently part of the SNSF portfolio, but is intended to be consolidated in the upcoming ERI Dispatch in line with the test mandate in the 2013-2016 ERI Dispatch and funded directly by the Confederation under Art. 15 RIPA.

The following RIs need to be further reviewed by the SERI in the context of funding in accordance with Art. 15 RIPA:

No.	Research infrastructure	Estimated funding requirement 2017-2020 (in CHF millions)	Planned funding requirement from promotional credit Art. 15 RIPA (in CHF millions)	Sponsoring institution with primary responsibility
21	Swiss Center for Musculoskeletal Biobanking and Imaging and Clinical Movement Analysis	104.8	23.1	SERI (University of Zurich, Balgrist University Hospital)
22	Swiss Network of Clinical Pediatric Hubs (SwissPedNet)	14.49	7.4	SERI (SCTO/Swisspednet)
23	Information and computational service infrastructure network to support biomedical research in Switzerland (BioMedIT)	37.4	18.5	SERI (SIB)

The three new RIs must go through the usual application procedure³⁷ for federal contributions under Art. 15 RIPA. For new applications, there is an in-depth scientific review by the SSIC and other bodies may also be involved (SNSF, Rectors' Conference). Based on these reviews and the relevant recommendations, the Department then decides in accordance with the legal provisions about the amount, duration and any requirements of federal support or in the case of a negative decision, to reject the application.

The SwissPedNet project, together with the planned SCTO research infrastructure, is therefore to be reviewed as one application, as is the new BioMedIT project with the SIB research infrastructure (as planned sponsoring institution of BioMedIT) that is already funded under Art. 15. The Swiss Center for Musculoskeletal Biobanking project is a new, independent research infrastructure, which has already been built using private funds.

Conclusion:

- ⇒ Full implementation of these new RIs would result in costs of CHF 49 million for the Confederation for the 2017-2020 ERI period through contributions under Article 15 RIPA. These costs cover a maximum of 50 per cent of the total costs of the new RIs. The amount of funding available for federal contributions to research facilities of national relevance under Article 15 RIPA is set out or requested in the ERI Dispatch 2017-2020.
- ⇒ The decision whether and to what extent these new RIs will be implemented depends on the payment framework for Article 15 facilities set out or approved in the ERI Dispatch 2017-2020, the result of the in-depth scientific review by the SSIC and on the financial participation of the universities involved.

³⁷ Art. 12 of the EAER Ordinance on Research and Innovation Promotion (SR. 420.111).

6. Additional infrastructure-related measures

6.1 Funding of RIs by the Confederation's funding bodies

Besides the primary responsibility of universities and/or their funding councils for financing RIs, the funding bodies of the Confederation, in particular the SNSF and the Academies, have a subsidiary funding mandate in this area under the terms of RIPA. They have already submitted their plans for 2017-2020 within the framework of their multi-year planning (MYP).

6.1.1 SNSF

Support of RIs by the SNSF usually takes place on the basis of specific, earmarked funding for a limited period of time. The role of the SNSF in funding research infrastructures is directly linked to its main task of competitive research funding. In this respect, the SNSF sees its RI funding only as start-up financing that usually lasts a maximum of ten years, provided the follow-on funding is secured and that the infrastructure is aligned with the national and international portfolio. In the current 2013-2016 ERI period, the SNSF will probably not launch specific calls for RIs. For the 2017-2020 ERI period, the intention is to only launch calls for proposals in a very limited context and with a focus on heavily research-driven infrastructures.

In connection with the funding of research infrastructures, the SNSF is planning to continue funding longitudinal studies, biobanks³⁸, scientific editions and R'Equip in the 2017-2020 period. In addition, there is the federal mandate for FLARE. The planned expenditure for research infrastructures including FLARE according to the MYP amounts to around CHF 50 million per year.

Infrastructure	Budget 2017-2020 in CHF millions (according to MYP)
Research infrastructures and R'Equip	131.6
Editions (new projects)	8
Longitudinal studies	40
Biobanks	9.6
FLARE (additional task)	38.4
total	227.6

In the case of what are known as longitudinal studies, the SNSF funds multi-centric, population-based and disease-oriented studies³⁹ with a longitudinal design. In the 2017-2020 ERI period, coordination of these studies is set to be enhanced with further ongoing medical projects (in the field of personalised medicine) and in particular with the bio-database funded by the SNSF⁴⁰. Through the R'Equip funding scheme, the SNSF receives applications for funding to set up and develop large-scale research equipment every year. Within the framework of FLARE, the SNSF supports the use of international research infrastructures in the fields of particle physics, astrophysics and astro particle physics on behalf of the Confederation, in particular involvement in experiments at CERN in Geneva and the European Southern Observatory in Chile. The SNSF is keen to improve the overall coherence and quality of research decisions in these specialist fields, which are characterised by high infrastructure costs, international collaboration and long-term commitments.

³⁸ For 2015 the SNSF is planning a call for biobanking linking-up funds.

³⁹ The SNSF is supporting a total of 10 such longitudinal studies, based on the evaluation conducted in 2013, for the time being limited to a two-year period (budget CHF 27 million).

⁴⁰ The SNSF is supporting the setting-up of a Swiss bio-database in order to coordinate, harmonise and standardise biobanks in Switzerland that are relevant to research and also to supplement the European research infrastructure BBMRI at national level. The official launch of the bio-database is planned for 2015.

Excursus: humanities editions and scientific secretariats

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 competences and tasks of the funding bodies involved and the long-term consolidation of the relevant funding measures in the field of humanities editions and scientific secretariats. With regard to editions, there will in future be a criteria matrix 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 a term of more or less than 10 years⁴¹. Corresponding regulations are also due to be developed and implemented by the SNSF and the Swiss Academy of Sciences (SCNAT) for scientific secretariats⁴².

Conclusion:

- ⇒ The implementation and/or support of RIs that fall under the jurisdiction of the SNSF is carried out within the scope of the total funds provided to the SNSF in the ERI Dispatch 2017-2020 (payment frameworks).

6.1.2 Academies

Within the framework of the MYP 2017-2020, the **SAHS** is planning to fund the following RIs⁴³:

Infrastructure	Budget 2017-2020 in CHF millions (according to MYP)
Swiss National Dictionaries	21.83
Diplomatic documents of Switzerland	3.25
Annual Yearbook of Swiss Politics	2.4
Swiss Inventory of Coin Finds	2.1
Infoclio.ch	1.88
Collection of Swiss Law Sources	2.23
Swiss Historical Dictionary	8.24
Data and service centre ⁴⁴	4.12
total	46.05

⁴¹ Edition projects lasting less than ten years that are of a project nature fall under the jurisdiction of the SNSF (funded by the SNSF); editions lasting more than ten years should, provided they are of national relevance, be transferred from the SNSF to the SAHS (at the earliest ten years after the launch of the edition).

⁴² With regard to scientific secretariats (coordination platforms), a fundamental transfer of tasks to the Academies is planned. From 2017, the SNSF will no longer be responsible for funding in this area.

⁴³ These RIs – with the exception of the Collection of Swiss Law Sources and the Data and service centre – are listed in Annex B.

⁴⁴ Content-wise this corresponds to the project re-submitted by the University of Basel as part of this roadmap "Data and Service Centre for the Humanities", see Annex A.1, no. 8. The evaluation of the pilot project submitted by the SAHS envisages a shared funding model (SAHS via Art. 11 RIPA, personal contribution from universities/PC under HEdA; total costs estimated at around CHF 8 million).

Within the framework of the MYP 2017-2020, the **SCNAT** is planning to fund the following RIs⁴⁵:

Infrastructure	Budget 2017-2020 in CHF millions (according to MYP)
High Altitude Research Station Jungfrauoch	0.06
Swiss Optical Ground Station and Geodynamics Observatory Zimmerwald; Swiss GNSS reference network; Swiss National gravity network	0.08 ⁴⁶
Geological Mapping: geophysical and geotechnical series	0.11
GLAMOS Glacier monitoring Switzerland; PERMOS Permafrost- monitoring Switzerland	0.32
National park research data series	0.6
total	1.37

Conclusion:

- ⇒ The implementation/support of RIs under the jurisdiction of the Academies is carried out within the scope of the total funds provided to the Academies under the ERI Dispatch 2017-2020 (payment framework).

⁴⁵ These RIs – with the exception of the geological mapping and high altitude research station Jungfrauoch – are listed in the inventory (Annex B).

⁴⁶ In coordination with the financial information in the inventory, see Annex B.

6.2 International research infrastructures

6.2.1 Projects already featured in the existing ESFRI Roadmap

Of the projects already featured in the ESFRI Roadmap, most were transferred to an ERIC legal framework (see Chapter 2.2). This has been done for the DARIAH humanities network and is planned for the medical Euro-Biolmaging network.

- **DARIAH-ERIC** (Digital Research Infrastructure for the Arts and Humanities)⁴⁷, has featured on the ESFRI Roadmap since 2006
- **Euro-Biolmaging** has featured on the ESFRI Roadmap since 2008.

Potential Swiss involvement under the aegis of the interested research organisations as part of the ERI Dispatch 2017-2020 will need to be reviewed.

The research community is interested in Switzerland being a member of the following existing ESFRI projects⁴⁸, which are expected to be organised in the form of international treaties (see Annex A.2).

- **ELI** (Extreme Light Infrastructure): on the ESFRI Roadmap since 2006
- **CTA** (Cherenkov Telescope Array): on the ESFRI Roadmap since 2008
- **SKA** (Square Kilometre Array): on the ESFRI Roadmap since 2006
- **Neutrino Physics Programme at Fermilab** (Chicago, USA)

Potential Swiss involvement in these RIs under the jurisdiction of the Confederation will need to be reviewed as part of the 2017-2020 ERI period.

Conclusion:

- ⇒ The decision as to whether and to what extent Switzerland can participate in these new RIs will be based on the results of the SERI evaluation in the 2017-2020 ERI period and the relevant definition of the Confederation's strategic priorities regarding the involvement of Switzerland in the RI projects of international research organisations. In this connection, the long-term funding commitment in particular also needs to be considered.

⁴⁷ DARIAH is the most important network in this field and currently involves 15 European countries. Full membership in DARIAH-ERIC is a major need of the Swiss research community. In Switzerland, the universities of Lausanne, Basel, Bern, Geneva and Zurich are included as cooperating partners. The current situation does not offer any coordinated, nationally established link to DARIAH-ERIC, however. Full membership would allow Switzerland to represent its interests in a targeted way to DARIAH-ERIC and help shape the activities in its spheres of activity and supervise them. This would grant Swiss researchers access to resources and highly specific expertise. The planned research infrastructure "Data and service centre for the humanities" could serve as a national point of contact. Besides in-kind payments, full membership would require annual contributions of CHF 45,000 to be paid.

⁴⁸ The CTA, SKA and Neutrino Physics projects were submitted as part of the roadmap process and evaluated by the SNSF (B prioritisation).

6.2.2 Update ESFRI Roadmap 2016

Description of ESFRI Roadmap process (criteria, call, results)

The ESFRI forum⁴⁹ launched a call for the submission of proposals for new research infrastructures⁵⁰ or for the major upgrade of existing infrastructures⁵¹ in order to update the ESFRI Roadmap on 25 September 2014. ESFRI delegations and members of the EIRO forum⁵² were allowed to submit proposals until 31 March 2015⁵³. The ESFRI Board formally reviewed the proposals, in particular to check whether they were supported by at least three different EU member states or associated countries⁵⁴. At least one of these countries must express a formal financial commitment to the submitted project, while the other countries should provide a written declaration of intent to demonstrate their political commitment. If a proposal is submitted by a member organisation of the EIRO forum, a Council resolution expressing financial commitment must be submitted.

The proposals are currently being reviewed with regard to scientific quality by the Strategy Working Group (SWG). The new research infrastructures and major upgrade plans must be perfected from an organisational and financial perspective. The proposals are therefore being reviewed with regard to this aspect in parallel by the ESFRI “implementation” working group.

The updated roadmap is due to be published at the beginning of 2016 and should contain the following:

- a landscape, gap and scenario analysis;
- a list of around 25 active projects and justifications for their selection;
- a list of ESFRI landmarks.

It should be noted that projects featured on the ESFRI Roadmap that are still not implemented after ten years are automatically deleted from the list of active projects. To reactivate projects after ten years, they must be formally re-submitted as new proposals, either with a different concept or correcting any shortcomings. If applicable, they may be entered in the list of ESFRI landmarks.

ESFRI will review the active projects with regard to their implementation status every two to three years. In preparation for the 2018 ESFRI Roadmap (update), the ESFRI working group will evaluate the implementation of all projects in the 2016 ESFRI Roadmap in 2017. In summary and as a result of the 10-year rule, it is certain that at least ten projects will disappear from the roadmap in 2017 and around six additional projects in 2019.

ESFRI received a total of 22 proposals as part of the 2016 Roadmap Update, of which 20 have been classified as “eligible” by the authoritative strategy working group (as at 17 April 2015) and transferred to the next stage of the evaluation process:

- 2 projects in the field of energy,
- 3 projects in the field of the environment,
- 6 projects in the field of health and food,
- 6 projects in the field of physics and technology,
- 3 projects in the field of social and cultural innovation.

⁴⁹ http://ec.europa.eu/research/infrastructures/index_en.cfm?pg=esfri

⁵⁰ According to the Horizon 2020 definitions, research infrastructures (including e-infrastructure) are facilities, resources and services that are used by research communities to conduct research and innovation in their fields. (H2020 Framework Programme Regulation No. 1291/2013 - Article 2(6)). These infrastructures comprise: major scientific equipment or sets of instruments; knowledge-based resources, such as collections, archives or scientific data; e-infrastructure such as data and computing systems and communication networks; any other infrastructure of a unique nature essential to achieve excellence in research and innovation.

⁵¹ Major upgrades are intended to achieve a transformative change in scientific output or a complete change of technical approach. They are specifically not routine maintenance or gradual improvements.

⁵² <http://www.eiroforum.org/>

⁵³ Detailed guidelines for applicants and online submission form at http://ec.europa.eu/research/infrastructures/index_en.cfm?pg=esfri-roadmap

⁵⁴ An authoritative list of countries associated to Horizon 2020 can be found at http://ec.europa.eu/research/participants/data/ref/h2020/grants_manual/hi/3cp/h2020-hi-list-ac_en.pdf. Switzerland is deemed an associated country as it has participated in all activities of the so-called first pillar of Horizon 2020 since 15 September 2014.

Positive evaluation of the proposals is a precondition for being included in the 2016 ESFRI Roadmap.

New potential ESFRI projects in which Switzerland is already involved or where there is interest in Swiss participation:

The Swiss research community is interested in participating in four new ESFRI projects, which are to be evaluated by ESFRI by the end of 2015 and then published on the 2016 ESFRI Roadmap.

The SERI has pledged a - financial but non-compulsory - support for the projects vis-à-vis the ESFRI decision-making bodies (such support was a precondition for the proposals to be authorised for evaluation with regard to inclusion in the 2016 ESFRI Roadmap).

In the case of two other potential new ESFRI projects, Switzerland already participates as part of an international research organisation. The projects were re-submitted because additional funds had to be applied for due to a planned upgrade.

Conclusion:

- ⇒ The decision whether and to what extent Switzerland can participate in these RIs will be made – following the evaluation by the ESFRI – based on the results of the SERI evaluation in the 2017-2020 ERI period, as well as the definition of the Confederation's strategic priorities with regard to Swiss participation in ESFRI projects. In this connection, the long-term funding commitment in particular also needs to be considered.

7. Outlook

The research infrastructures put forward for implementation in this roadmap reflect the state of planning at the end of March 2015. The roadmap per se is a planning instrument and does not contain any funding decisions or any decisions with regard to the distribution of any federal funds to promotional credits in the 2017-2020 ERI Dispatch, which are relevant for the realisation of new RIs. It is therefore not possible to state conclusively which of these new projects will definitely be implemented in the 2017-2020 ERI period based on the current state of planning. The decision whether and to what extent a new RI will be implemented is the responsibility of the relevant sponsoring institution (usually the universities). The Confederation funds RIs based on the subsidiarity principle in accordance with the relevant legal provisions (Art. 59 HEdA, Art. 15 and Art. 28 RIPA) within the framework of the available ERI funds for 2017-2020.

The roadmap provides the research community and the affected decision-makers with an overview of newly-planned and existing RIs. This 2015 Roadmap also serves as a basis for the necessary coordination of national planning in the field of RI with the relevant planning at European level in line with the European ESFRI Roadmap instrument.

Experience gained during the current roadmap process (2015 update) has shown that the Swiss roadmap for research infrastructures instrument should be developed and optimised in collaboration with stakeholders in preparation for the next update.

8. Glossary

In italics: historical bodies/legal bases

Abbreviation	Meaning
CERN	European Organisation for Nuclear Research (Organisation européenne pour la recherche nucléaire)
<i>CRUS</i>	<i>Rectors' Conference of the Swiss Universities (under HEdA now Swissuniversities)</i>
<i>CUAS</i>	<i>Conference of the Swiss Universities of Applied Sciences (under HEdA now Swissuniversities)</i>
EAER	Department of Economic Affairs, Education and Research
Empa	Swiss Federal Laboratories for Materials Testing and Research (-> ETH)
EPFL	Federal Institute of Technology Lausanne (École polytechnique fédérale de Lausanne)
ERI	Dispatch on the promotion of education, research and innovation
ERIC	European Research Infrastructure Consortium
ESFRI	European Strategy Forum on Research Infrastructures
ESO	European Southern Observatory
ETHZ	Federal Institute of Technology Zurich
FC	Federal Council
FLARE	Funding Large international Research Projects (->SNSF funding scheme)
HEdA	Federal Act on the Funding and Coordination of the Higher Education Sector, SR 414.20
MYP	Multi-year plan
PC	Project contributions
PSI	Paul Scherrer Institute (-> ETH)
RI	Research infrastructure
RIPA	Federal Act on the Promotion of Research and Innovation, SR 420.1
SAHS	Swiss Academy of Humanities and Social Sciences
SCNAT	Swiss Academy of Sciences
SCTO	Swiss Clinical Trial Organisation
SERI	State Secretariat for Education, Research and Innovation
SIB	Swiss Institute of Bioinformatics
SNSF	Swiss National Science Foundation
SSIC	Swiss Science and Innovation Council (formerly SSTC)
SUC	Swiss University Conference (in accordance with HEdA)
Swissuniversities	Rectors' Conference of Swiss Universities (in accordance with HEdA)
<i>UFundA</i>	<i>University Funding Act (now HEdA)</i>
Uni	University
<i>USG</i>	<i>Swiss Conference of Higher Education Institutions (now SUC)</i>