
Regards croisés on Horizon 2020 and SNSF

FINAL REPORT

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"Discovery consists of seeing what everybody has seen and thinking what nobody has thought."

Albert Szent-Gyorgyi (1893-1986), 1937 Nobel Prize for Medicine
(in 'The Scientist Speculates', Irving J. Good, 1962)

Executive summary

Innovating its way out of the current economic and financial crisis, the European Union (EU) will enter in a new generation of Framework Programme (FP) for Research and Innovation (R&I) entitled 'Horizon 2020', the main financial tool for implementing Europe's future economic growth and jobs in the field of R&I, which will run from 2014 to 2020. As an Associated Country (AC) to the European FP since 2004¹, Switzerland has an interest in getting a better picture of the final outcome of Horizon 2020. Indeed, Horizon 2020 will provide an even increased source of funding through a combination of already-existing and new Research Funding Instruments (RFI) in the case of a Swiss association to the programme, to be negotiated with the EU after Horizon 2020's formal adoption at European level expected in autumn 2013.

Being prepared for Horizon 2020 and staying at the forefront implies getting a good understanding of its corresponding RFI for a leading and well-connected funding organisation like the Swiss National Science Foundation (SNSF), Switzerland's foremost institution in the promotion of scientific research. Therefore, this report aims to provide insight into the interplay between the instruments of the SNSF on the one hand and the ones of Horizon 2020 on the other. This is done through a set of comparisons and considerations on the three-level instruments (national, European and international) of the SNSF.

This report's title therefore alludes to providing an overview of the interaction between Swiss and European RFI, eventually reaching the stage where we can identify communalities, differences and gaps, leading in turn to a set of *regards croisés* on Horizon 2020 and the SNSF.

To do so, a classification model proved necessary. Based on a literature review, a difference was made between two types of classification: the grant-oriented classifications – from a point of view of a researcher – and the goal-oriented classifications. Because we compare RFI in their use for achieving strategic goals, the choice was made to go for the goal-oriented approach developed by the European Science Foundation (ESF) in its 2009 report on 'Evaluation in National Research Funding Agencies: approaches, experiences and case studies'.

The preliminary results showed that there is a high variety of RFI at both national and European levels falling in the category of career development, which regroups instruments designed to attract, develop and retain talented researchers and are often targeted at specific areas of research or specific career stages. Indeed, according to our analyses and partial conclusions, the highest potential for overlap between Swiss and European funding schemes is located in the pillar I of Horizon 2020 'Excellent Science', which aim is to provide a continuous source of world-class research to guarantee Europe's long-term competitiveness. In particular, the Marie Skłodowska-Curie Actions (MSCA) and the European Research Council (ERC) Grants share similar features with a number of SNSF's career development instruments, including in their respective goals.

On their side, the European instruments of relevance for the SNSF that belong to the 'Societal Challenges' pillar showed very few overlap when comparing them to the ones of the SNSF. As a

¹ Please note that researchers from universities and private industry in Switzerland have been involved in European FP since 1987, on a 'project by project' basis.

consequence, this brings the SNSF some opportunities and a considerable amount of challenges in order to achieve best synergies with Horizon 2020's RFI.

With a view of encouraging an optimal Swiss research funding policy and in the light of our observations, this report's final chapter provides practical considerations for action by the SNSF. The propositions are by no means exhaustive or conclusive, but they aim to provide food for thought and reflexion.

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List of abbreviations

Abbreviation	Meaning
AC	Associated Country
AdG	Advanced Grants
Agora	Public science communication projects
APTT	Assistant Professors Tenure Track
BRICS	Brazil, China, India, Russia and South Africa
CA	Coordination Actions
CHF	Swiss Francs
CIP	Competitiveness and Innovation Programme
CoG	Consolidator Grants
COSME	Competitiveness of enterprises and SME
CP	Collaborative Projects
CRUS	Rectors' Conference of the Swiss Universities
CSA	Coordination and Support Action
CTI	Commission for Technology and Innovation
DG EAC	Directorate-General for Education and Culture
DG RTD	Directorate-General for Research and Innovation
DMP	Data Management Plans
EC	European Commission
EI	Emerging Institution
EID	European Industrial Doctorates
EIT	European Institute of Innovation and Technology
EJD	European Joint Doctorates
EP	European Parliament
ER	Experienced Researchers
ERA	European Research Area
ERC	European Research Council
ERCEA	European Research Council Executive Agency
ERI	Education, Research and Innovation
ESF	European Science Foundation
ESFRI	European Strategy Forum on Research Infrastructures
ESR	Early Stage Researchers
ETN	European Training Networks
EU	European Union
FET	Future and Emerging Technologies
FLARE	Funding LARge international REsearch projects
FP	Framework Programme
FP7	Seventh Framework Programme for Research and Technological Development
GERD	Gross Expenditure in Research and Development
GDP	Gross Domestic Product
GRC	Global Research Council
HEI	Higher Education Institutions
Horizon 2020	Framework Programme for Research and Innovation
HSS	Humanities and Social Sciences

ICT	Information and Communication Technologies
IEW	International Exploratory Workshops
IF	Individual Fellowships
INCO	INternational COoperation
IPR	Intellectual Property Rights
ISV	International Short Visits
ITN	Innovative Training Networks
JPA	Joint Programme of Activities
JPI	Joint Programming Initiatives
KIC	Knowledge and Innovation Communities
MFCL	Money Follows Cooperation Line
MFF	Multiannual Financial Framework
MHV	Marie Heim-Vögtlin
MS	Member State
MSCA	Marie Skłodowska-Curie Actions
NCCR	National Centres of Competence in Research
NRC	National Research Council
NRP	National Research Programmes
OA	Open Access
OECD	Organisation for Economic Co-operation and Development
PI	Principal Investigator
PoC	Proof of Concept
R&D	Research and Development
R&I	Research and Innovation
RDI	Research and Development Intensity
REA	Research Executive Agency
R'Equip	Research Equipment
RFI	Research Funding Instruments
RI	Research Infrastructures
RISE	Research and Innovation Staff Exchange
RTD	Research and Technological Development
SA	Support Actions
SDC	Swiss Agency for Development and Cooperation
SERI	State Secretariat for Education, Research and Innovation
SGHRM	Steering Group on Human Resources and Mobility
SNSF	Swiss National Science Foundation
SRA	Strategic Research Agendas
StG	Starting Grants
SyG	Synergy Grants
TFEU	Treaty on the Functioning of the European Union
UK	United Kingdom
USA	United States of America
WG	Working Group
WP	Work Programme

1. On the take-off path: going for wider horizons

Europe's global economic ranking is changing rapidly. By 2050, Europe's share of world Gross Domestic Product (GDP) is likely to be half of today's 29%, reaching the figure of 17% according to the last European Union (EU) predictions (EC, 2013b). Nevertheless, even at a time of fierce global competition and public budget constraints, Europe could defend its position and remains the largest integrated market in the world. With 9% of world's population, it still represents 24% of world's investment in Research and Development (R&D) and 32% of world's publication and patent production, as illustrated in Figure 1-1: Evolution of the share of participation in global R&D between 2000 and 2009 (EC, 2012f, p. 3). Figure 1-1: Evolution of the share of participation in global R&D between 2000 and 2009 also clearly shows that it is in its share of patent production and Gross Expenditure in Research and Development (GERD) that Europe suffers most from global competition, although its position erodes itself at a slower pace than its main competitor, the United States of America (USA). Moreover, Europe's leadership in the creation of scientific knowledge is undermined by its failure to transform this knowledge into products and services that would provide EU citizens with more jobs and growth.

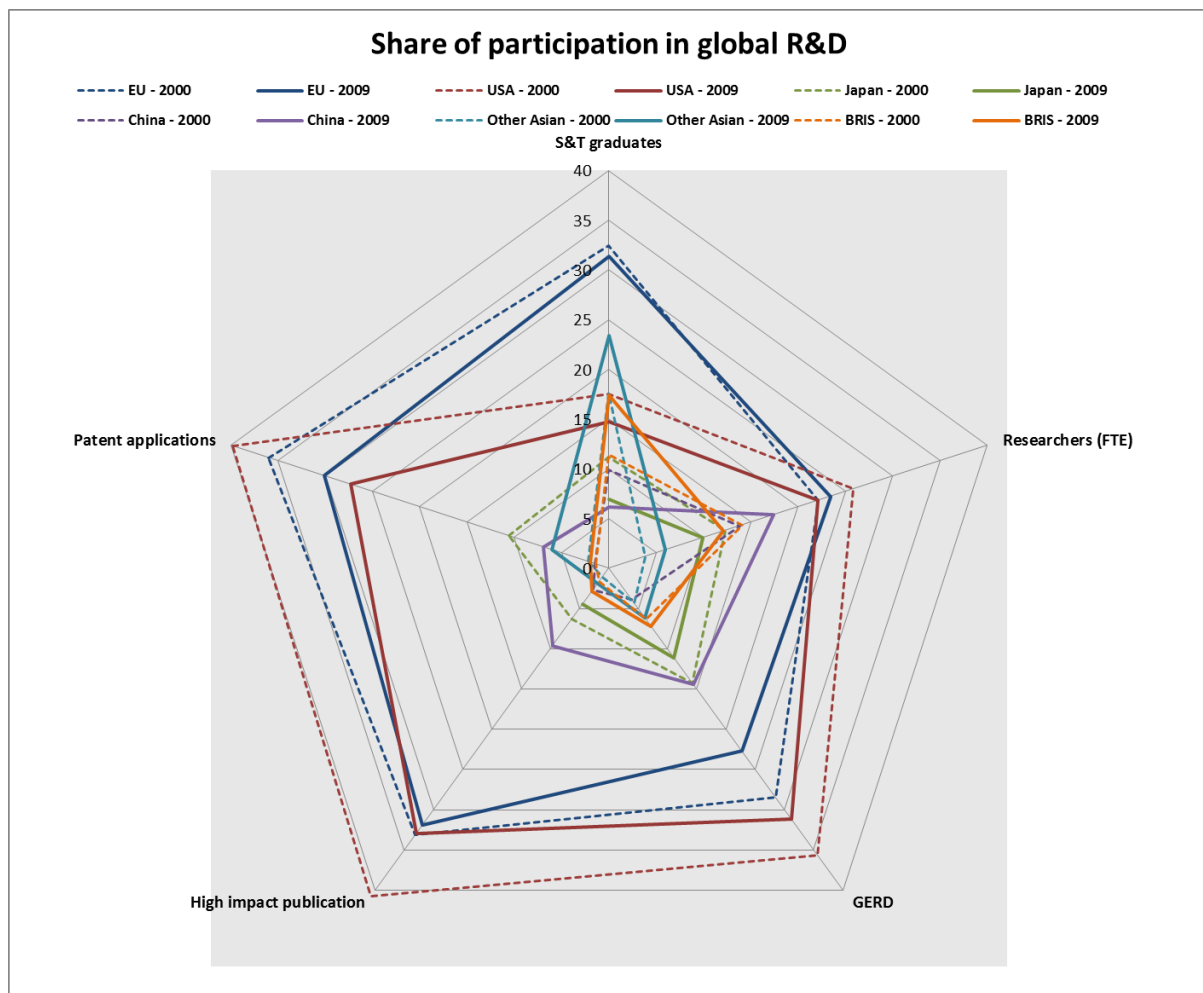


Figure 1-1: Evolution of the share of participation in global R&D between 2000 and 2009.

Europe 2020: a strategy for a smart, sustainable and inclusive economy

The European Commission (EC) proposed measures to tackle these issues and released its strategy to deliver higher levels of employment, productivity and social cohesion and emerge stronger from the current economic and financial crisis (EC, 2010a). This strategy entitled 'Europe 2020' is divided into three mutually reinforcing priorities, namely: 'smart growth', 'sustainable growth' and 'inclusive growth'. The EC proposed as well five measurable head-

line targets for 2020 that should steer the process and be translated into national priorities and adopted at member state level. The target indicators define clear objectives for employment, for Research and Innovation (R&I), for climate change and energy, for education and for the fight against poverty. Furthermore, it is widely accepted among European policy-makers that R&I plays a significant role as driver of economic growth. Researchers are often considered to be at the core for a successful knowledge-based society. The EU needs an estimated one million new research jobs – mostly in the private sector – to achieve investments in R&D of the order of 3% of GDP, which is one of the Europe 2020 objectives (EC, 2011a).

The key component: Innovation

With a view to further foster progress and achieve the Europe 2020 targets, the EC put forward seven flagship initiatives under the Europe 2020 priority themes. These flagships initiatives are the substance of the Europe 2020 Strategy. The priority theme most relevant to this paper, namely ‘smart growth’, is catalysed by three out of the seven flagship initiatives, including the ‘Innovation Union’ which aims to improve conditions and access to finance for R&I and to ensure that research results can be turned more effectively into products and services that create growth and jobs. More concretely, this action-packed initiative for an innovation-friendly Europe aims at achieving:

- more attractive careers for researchers;
- better training of researchers, with a focus on entrepreneurship;
- improved cross-border mobility;
- more open access to research results;
- enhanced public-private collaboration;
- facilitated access to European R&I programmes for all R&I actors in Europe; and
- reduced fragmentation of R&I funding in Europe.

On this last two points, the official public discourse of the EC on the Innovation Union says: “The whole system of support to R&D has become much too complex in Europe. Potential beneficiaries face a multitude of national and intergovernmental initiatives as well as EU funding procedures. The rules and timetables of the myriad existing instruments are not aligned. This creates a huge administrative burden and can discourage participation, particularly by SME, and cross-border cooperation.” (EC, 2011a). Building on these observations, the EC further adds that EU research funding schemes “need to be streamlined and to focus on the objectives of the Innovation Union”. Indeed, there is a strong call for more simplification in EU funding programmes and actions for more integration of national research and innovation funding systems.

The policy agenda

The Innovation Union flagship initiative also led to crucial steps for defining a political framework for the European Research Area (ERA) in which researchers, scientific knowledge and technology would circulate freely. According to the EC, ERA is based on the 27 national research systems of the Member States (MS). In this respect, the overall objective of the ERA framework is to improve the coherence and compatibility of national and EU research policies, programmes and activities, preventing unnecessary duplication of national research and infrastructure investments. A key aim is also to reduce both brain drain of European scientific talent and innovation divide between the regions. Indeed, the ERA framework is rather about research policy and focuses on non-funding measures. With the European Council conclusions of 4 February 2011, MS are committed to ‘completing’ the ERA by 2014 (EC, 2012c). A crucial step in defining objectives for the ERA has been the release by the EC of a communication on the reinforcement of the ‘ERA Partnership for Excellence and Growth’ (EC, 2012a). Within this communication, the EC made clear that it seeks:

- a strengthened efficiency and cross-border collaboration between national research funding agencies;
- an open-labour market for researchers based on transparent and merit recruitment;
- open access to scientific publications and research data;
- research integrity;
- gender equality and gender mainstreaming in research.

To realise the ERA, the EC relies mostly on the Framework Programmes (FP) for Research and Technological Development (RTD) as well as on collaboration with large stakeholders organisation such as the European University Association, the European Association of Research and Technology Organisations, Nordforsk, the League of European Research Universities and Science Europe, which all have agreed to undertake a set of actions to contribute to the building of the ERA. In the context of the ERA, the FP only represent 6% of public research effort in Europe, the rest being funded via national or regional money (EC, 2013b). Therefore, national budgets and policies play a substantial role in the structuring of the European research landscape.

One can conclude from the paragraphs above that policy actions under both the Innovation Union flagship initiative and the ERA framework are derived from the strong will of the EU to have an impact on the structure and the transnational linkage of national research funding organisations. Concrete changes can already be observed with some countries setting up national research funding agencies on the model of the European Research Council (ERC) or designing or modifying existing instruments to address gaps in EU funding and/or benefit from co-financing.

The big tool for financial implementation ...

Currently, most of European research funding comes from the Seventh Framework Programme for Research and Technological Development (FP7) which was funded with €57 billion for the period from 2007 to 2013. It saw among others the creation of the ERC, in which Swiss research organisations are successfully participating, and a steady move toward more open access to publications.

FP7 will be followed by 'Horizon 2020', the next FP for R&I running from 2014 to 2020. The original proposal of the EC (EC, 2011b) proposes both elements of continuity and of changes compared to previous FP, including a comprehensive set of actions for stepping up R&I performance and boost competitiveness in the EU. Horizon 2020 includes European programmes and instruments such as the European Institute of Innovation and Technology (EIT) and parts of the current Competitiveness and Innovation Programme (CIP). There is however a separate Programme for the Competitiveness of enterprises and SME (COSME). Compared to FP7, Horizon 2020 sets in particular a stronger emphasis on innovation (in the sense of bridging the gap between research and commercialisation) and on multidisciplinary research. Broadly speaking, it consists in bringing together R&I in a single programme and simplifying the participation rules for private companies, universities, and other organisations across the EU MS and Associated Countries (AC).

... and its fuel

In the light of the current economic crisis, there is however a controversy and a heated debate with regard to the budget to be allocated to Horizon 2020 within the Multiannual Financial Framework (MFF) for 2014 to 2020. On 8 February 2013, the EU MS ignored the European Parliament's (EP) call for a growth-boosting long-term budget package when they agreed to cut it from its previous level for the very first time in the EU's history. The original budget

proposal of the EC for Horizon 2020 was €80 billion (constant prices). The final amount is distributed across the three pillars. Latest figures indicate €70.2 billion for Horizon 2020, which represent a 14% cut compared to the original proposal.²

If we consider the European research landscape as an aircraft, Europe 2020 would play the role of the runway by pointing the right way ahead for the European research policy and guiding it in 'taking off'. To continue with the aircraft metaphor, the Innovation Union flagship initiative, which we described as Europe 2020's substance, would be the fuselage. ERA provides on its part the policy framework for the Innovation Union. Therefore, it can be seen as the aircraft wings. Several Innovation Union commitments are enacted upon through Horizon 2020, notably: 'more focus on societal challenges' and 'a strengthened approach to Small and Medium-sized Enterprises (SME)' (EC, 2012c). By gathering a number of already-existing and new funding instruments under its wings, Horizon 2020 aims somehow to 'generate propulsion' for the ERA and acts for this reason as the aircraft engines.

1.1 Taking the pulse of European research

As discussed previously, the European research landscape is undergoing an important phase in its development with the adoption of Horizon 2020 and principles for realising the ERA. Considering the strong participation of Swiss organisations to FP7 (see Figure 1-2), the Swiss stakeholders have a strong interest in getting a good understanding of the picture since Horizon 2020 will provide an even increased source of funding in the case of a Swiss association to the programme, which will formally be negotiated with the EU after Horizon 2020's adoption at European level. Several related issues are discussed in the next lines.

Horizon 2020 consists of three pillars: 'Excellent Science', 'Industrial Leadership' and 'Societal Challenges'. The first one is dedicated to strengthening the excellence of the European science base. It aims to provide a continuous source of world-class research to guarantee Europe's long-term competitiveness. In order to do so, the actions in this pillar should support the best ideas, develop talent within Europe, provide researchers with access to priority research infrastructure (RI), and make Europe an attractive location for the world's best researchers. Specifically, the 'science pillar' aims to:

- support the most talented and creative individuals and their teams to carry out frontier research of the highest quality by building on the success of the ERC;
- fund collaborative research to open up new and promising fields of R&I through support for Future and Emerging Technologies (FET);
- provide researchers with excellent training and career development opportunities through the Marie Skłodowska-Curie Actions (MSCA);
- ensure Europe has world-class RI (including e-infrastructures) accessible to all researchers in Europe and beyond.

The second pillar of Horizon 2020 strives to promote activities where businesses set the agenda. It should provide investment in key industrial technologies and maximise the growth potential of European companies by providing them with adequate levels of finance.

The third pillar brings together resources and knowledge across different fields, technologies and disciplines to deal with major challenges with which the citizens in Europe and elsewhere shall be confronted in the coming years. Actions in this pillar cover activities from research to

² This might change in the coming months with the formal adoption of the MFF.

market with a new focus on innovation-related activities. The following challenges are identified:

- `Health, demographic change and well being`;
- `European Bioeconomy Challenges: Food Security, Sustainable Agriculture and Forestry, Marine and Maritime and Inland Water Research`;
- `Secure, Clean and Efficient Energy`;
- `Smart, Green and Integrated Transport`;
- `Climate Action, Resource Efficiency and Raw materials`;
- `Europe in a changing world - Inclusive, Innovative and Reflective societies`;
- `Secure Societies - Protecting Freedom and security of Europe and its citizens`.

Certain European Research Funding Instruments (RFI) have a long tradition, dating back to early FP, and should continue through Horizon 2020. Other instruments for the funding of excellent and collaborative research will be created or merged into new structures. In this regard, there are still discussions on how best to allocate the money among the different policies of Europe 2020 and within the three pillars of Horizon 2020. Further concerns may arise with regard to the mechanisms and the implementation logic of European and national RFI which can differ, to varying degrees though. One of the main purposes of ERA is to foster cooperation and competition between national research systems. In this newly integrated transnational context, it is of interest for national funding agencies to define how they can optimally adapt their funding effort.

In the perspective of the Swiss National Science Foundation (SNSF), Switzerland's foremost institution in the promotion of scientific research, these developments are of importance. The Swiss institutions are strongly participating in MSCA and are among the strongest beneficiaries of ERC Grants and in the fields of Information and Communication Technology (ICT) and health. Participation of Swiss institutions in the follow-up actions in Horizon 2020 is expected to remain high, even though the increase in funding of Horizon 2020 compared to FP7 is limited and competition is likely to be more intense. The fact that the EC will more rely on the co-funding principle under Horizon 2020 than the precedent FP could have an influence on the instruments of relevance for the SNSF. As stated in its 2012 annual report, the "SNSF is closely following developments both in Switzerland and abroad and adjusting its funding schemes to meet the changing needs of researchers" (SNSF, 2013a, p. 7). Progress on the completion of ERA might as well result in practices and guidelines to which the SNSF could have an interest to shape and/or align itself to. From a point of view of the SNSF, which has committed itself via Science Europe, concrete actions concern the development of open access and research integrity policies, the implementation of instruments promoting gender balance and the attractiveness of research careers, as well as the extension of existing measures supporting the creation of a grant union, such as lead agency arrangements (Science Europe, 2012a) (EC, 2012b).

In a nutshell, there is a need to bring clarification about which and how instruments at European and national levels are interacting. Therefore, the research question can be phrased as: **What are the consequences and opportunities of Horizon 2020 for the research funding instruments of the SNSF?**

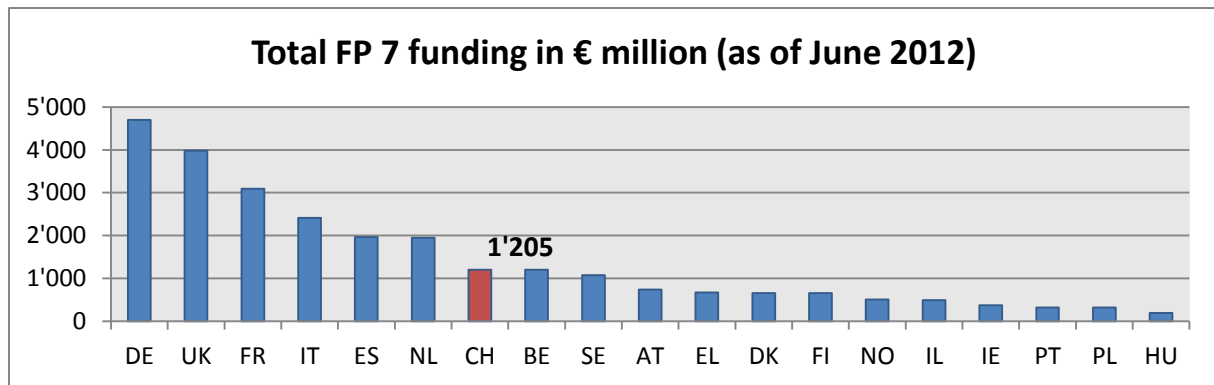


Figure 1-2: Top 20 participating countries to FP7 (SEFRI, 2012).

1.2 Staying at the forefront: a deeper look into the paper's goals

Swiss funding policy in the fields of Education, Research and Innovation (ERI) – the so-called ‘knowledge triangle’ – is based on the “awareness of the fact that Switzerland can only maintain and further consolidate its very competitive and world-class position if it remains a knowledge-based society” (SERI, 2013a). The Federal Council has established three ERI policy guidelines for 2013-2016 along with corresponding objectives. The following objectives are pursued as part of the Guideline for R&I which was entitled ‘Consolidate the high level of grant funding awarded on a competitive basis and further strengthen Switzerland’s internationally competitive position’:

- positioning Switzerland’s international reputation as a competitive location for research and economic activities by increasing the amount of grant funding awarded on a competitive basis for R&I;
- ensuring that Switzerland holds a top position in promising fields through targeted measures to improve research, development and innovation capabilities, while leaving enough room for unconventional research approaches;
- investing in strategically important RI at the national and international levels;
- maintaining the strategic importance of international cooperation and networking with European and non-European countries;
- improving cooperation between research institutes and the private sector.

The SNSF is mandated by the federal authorities to promote and support scientific research in Switzerland. It is based on the principle of scientific self-governance. To ensure its independence, the SNSF was established as a private foundation in 1952. Its present strategic plan for 2012 to 2016 (SNSF, 2013b) focuses on the aim of strengthening research and to contribute to Switzerland’s top position in research. To do so, the financial support requested for 2012 to 2016 comprises CHF2’508 million in project support and CHF877 million in funding for individual scientists. In addition, there will be CHF20 million for publications and conferences.

On 22 February 2012, the Swiss Federal Council released the Dispatch on the Promotion of ERI from 2013 to 2016 (Federal Council, 2012) which lays out that the Swiss knowledge triangle is allocated CHF26 billion, of which CHF3.72 billion go to the SNSF. The dispatch makes explicit references to the need for ‘complementarity’ between the SNSF’s strategy and the European context. It is written (p. 2939): “Le Conseil fédéral s’attend à ce que le SNSF continue d’évaluer périodiquement ces instruments et de les adapter à l’évolution des besoins; il devra leur conserver une souplesse suffisante, et notamment maintenir la compatibilité avec les changements en cours en Europe [...], eu égard à la consolidation de l’espace européen de la recherche, aux encouragements visant spécifiquement la relève scientifique (en particulier

les ERC Starting Grants), et aux investissements accrus que consacre l'UE aux jeunes chercheurs au sein de ses programmes-cadres de recherche."

Another point revealed by the dispatch (p. 2940) is the possible participation of Switzerland in the European Joint Programming Initiative (JPI) through which the EU aims to pool national research efforts and transnational collaboration in order to make better use of Europe's public R&D resources and to tackle common European challenges more effectively in a few key areas.

Swiss researchers from universities and private industry have been involved in the EU research programmes since 1987 on a 'project by project' basis via funding from the State Secretariat for Education, Research and Innovation (SERI). On 1 January 2004, Switzerland further became AC to FP6 with all of the rights and obligations that came with this status. The EU FP have become the main source of public funding in R&D in Switzerland after the SNSF (Federal Council, 2013). Swiss researchers take part in about 600 new projects each year. In the current FP7 generation, Swiss researchers have benefited from funding worth CHF1.6 billion (Federal Council, 2013). Nevertheless, as a non EU MS, Switzerland has limited influence on the design of European research policy and programmes as well as restricted access to some European instruments for participation or funding.

In addition to this, research policy in Switzerland differs from the one at European level. Compared to its neighbouring countries, Switzerland is strongly oriented towards basic research. It is typically based on a bottom-up principle, which means that the State interferes very rarely and focuses on setting the legal framework and providing the required infrastructures for good research. As a consequence, this allows for a large set of research topics.

To sum up, it is the interest for the SNSF to provide optimal interplay with Horizon 2020 in order to maximise the impact of its own funding schemes and respond to the request of the Federal Council. As a means of addressing the problem introduced above and answering the research question at hand, a sub-question has to be defined: **To what extent do the research funding instruments of the SNSF share communalities and differences with the ones of Horizon 2020, and how are they affected by this?**

In the light of these considerations, we develop in the next few lines the exact goals of this paper. First of all, we aim to give a better overall picture of the functioning, exact scope and interplay between national and European RFI. Therefore, instruments of the SNSF have been compared to the ones of Horizon 2020 so as to evaluate how they could best be combined. With this purpose, we provide a comprehensive 'matrix view' by exploring areas of complementarity and redundancy from a Swiss point of view. This report concludes with a set of specific considerations – on the three-level instruments (national, European and international) of the SNSF – in order to encourage an optimal Swiss research funding strategy.

The report:

- provides the SNSF with a wide picture of European research funding schemes under Horizon 2020 in the form of clear and short factsheets;
- offers an overview of communalities and differences, redundancies and likely gaps between Swiss and European research landscapes through a comprehensive classification, with a special attention paid to the political context, the legal framework, the goal(s) of every instrument and the type of beneficiaries;
- clarifies the uncertainty about Horizon 2020 and identifies opportunities for the SNSF;

- discusses issues of special relevance for the SNSF, in particular Open Access (OA) and the reimbursement models in Horizon 2020;
- analyses the implementation of Horizon 2020 and the completion of the ERA framework in view of the European research policy.

In addition to this, it provides **SwissCore** with a stronger knowledge of the SNSF funding activities.

1.3 Between the lines: a parenthesis on the paper's scope

The research project builds on the insight gained by previous studies conducted at **SwissCore** on 'Safeguarding Swiss interests in Rules for Participation in Horizon 2020' (Armendone, 2012) and 'European and Swiss International Cooperation in Science and Technology' (Stäger, 2013).

This paper does not address policy issues; it focuses on facts and aims at providing content-related information. Special attention is paid to the administrative framework lying around the funding schemes and to their mechanisms. The comparison of Swiss and European instruments will therefore take place at implementation and operational levels.

The scope is limited to RFI within Horizon 2020 and the SNSF. Horizon 2020 covers a wide range of funding instruments, including in the innovation-led pillar 'Industrial leadership'. We focus on instruments to support research which have been considered as relevant for the SNSF. They are mostly located in the 'Excellent Science' and 'Societal Challenges' pillars. The research framework is based on the set of instruments and indicators described in the next chapter. In line with the need to compare what is comparable, we do take into consideration only relevant and comparable RFI for the classification and analysis phases.

The research project considers developments at European and Swiss levels until the end of July 2013, i.e. when the traineeship of Daniel Fuhrer comes to an end. Further developments in this respect shall be addressed by the SNSF itself through an 'Analysis of Horizon 2020'. **SwissCore** will however actively follow Horizon 2020's implementation and update its factsheets accordingly (see Annex III).

For the content of the factsheets – relied on information provided by the EU institutions and by the SNSF – information written in red is still susceptible of being modified before the adoption of Horizon 2020.

1.4 What we are talking about: key concepts and definitions

A number of concepts with varying interpretations need to be defined in order to enable a precise discussion of the Swiss and European RFI. For this report, organisations' and institutions' own terminologies have been kept where possible. In comparative or general parts of the report, a few terminological choices were made:

- **ERA:** Europe's international activities in research have been underpinned by general efforts of the EC to establish the ERA since the communication on the ERA in 2000 (EC, 2000). The ERA is a "unified research area open to the world based on the European internal market, in which researchers, scientific knowledge and technology circulate freely." While being based on articles 179 and 182 of the Treaty on the Functioning of the European Union (TFEU), the ERA is at the same time a descriptive concept and an EC policy framework. The idea of a European space of research is however much older and can be

traced back to have been shaped and progressively reinterpreted by Commissioners Ralf Dahrendorf (1970-1974), Antonio Ruberti (1993-1994) and finally Philippe Busquin (1999-2004) until the EC's official introduction of the concept in 2000 (André, 2006).

- **Research** is defined according to the universally accepted definition of the Organisation for Economic Co-operation and Development (OECD) in the Frascati Manual (OECD, 2002, p. 30) as “[...] creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications.” Research can be fundamental or applied.
- **Research funding schemes:** Most research funding agencies organise their funding activities in distinctive and goal-oriented ‘funding schemes’. “Also referred to as ‘funding instruments’ or ‘funding programmes’, funding schemes are often the means through which calls for proposals are solicited, generally with defined eligibility criteria and more or less clear objectives of what the schemes aim to achieve.” (ESF, 2009, p. 33).
- **Innovation:** In this paper, innovation refers to the “creation of new or significantly improved products, processes, marketing and organisation that add value to markets, governments and society.” (EC, 2012d).

This **chapter 1** presented the context around the European and Swiss research funding schemes, introduced the research question and sub-question, specified the research object and defined the key concepts.

Chapter 2 presents the work phases and offers an overview of the methodology, revealing the set of indicators used for the factsheets (to be found in Annex III) and the list of instruments of relevance for the SNSF. It also takes a step towards their classification. **Chapter 3** makes a firm footing into the classification process by developing and improving the chosen model of classification. On the basis of its corresponding categories it conducts comparative analyses and lays out fact-oriented conclusions within each category. Issues of major relevance for the SNSF, like open access to research data and research publications, are discussed as well in the final section. Building upon the analyses in chapter 3, **chapter 4** presents the final set of considerations and actions for the SNSF at a more abstract level. Finally, the **appendices** provide the literature list (I), the list of interviewees (II) and the factsheets for Swiss and European instruments (III).

2. Methodology

As its name indicates, this chapter lays out the methodology of the work carried out. It describes the work phases as well as the indicators used for the factsheets and the analysis of the funding instruments. A literature review of the existing models of classification is then introduced. Finally, the chapter provides a brief description of all Swiss and European RFI chosen for analysis and explains how they integrate in the European and Swiss research landscapes through a short description. In the light of the chosen classification model, we will proceed to the classification of the instruments in the next chapter in order to compare RFI falling in the same category with the set of defined indicators. We will then look at the possible communalities, differences, redundancies and gaps and provide a set of observations and specific conclusions accordingly.

2.1 Outlining key milestones

Following an inductive approach, the research project was divided into four different phases:

- **Phase I:** In a first step, we gathered the evidence through of a thorough literature analysis and desktop research, with particular emphasis on three key features, namely the legal framework, the political context and the goal of the RFI (see section 2.2 for more details). This information was systematically summarised and classified in the form of factsheets that can be found in Annex III.
- **Phase II:** Based on the data collected in phase I, the Swiss and European RFI were ordered in categories depending on the goal of the instrument, therewith enabling a consistent comparison. Semi-structured interviews on draft chapters without transcripts of Swiss and European actors then allowed verifying, complementing and deepening the preliminary results.
- **Phase III:** For each clearly defined category, the Swiss and European instruments were compared by crossing the respective factsheets with the ultimate goal of identifying areas of communalities, differences, redundancies and gaps.
- **Phase IV:** Finally, these comparisons resulted in a set of generic and specific considerations based on a fact-oriented analysis.

2.2 Comparison and classification framework

In order to conduct a systematic and coherent comparison of the Swiss and European RFI, we looked at the following content-related and administrative indicators, therewith enabling a clear and straightforward description of every instrument:

- a) The **legal framework** places the RFI in its environment within Horizon 2020 or SNSF's regulations.
- b) The **political context** explains the reasons lying behind the creation or evolution of the instrument.
- c) The **goal of instrument** explores the objectives and expected impacts of the instrument.
- d) The **instrument duration** shows how long a researcher or project can be supported.
- e) The **size of overall budget** gives an indication on the amount that researchers might obtain.
- f) The **beneficiaries** section typically aims to identify the profile of grantees, e.g. whether a doctoral student or a postdoc.
- g) The **selection procedure** clarifies the steps that should be followed by the applicants from the moment of the publication of the call for proposals to the selection for funding.
- h) The **eligibility** section defines the conditions that applicants must fulfil so as to submit a valid proposal.

- i) The **selection criteria** section enumerates the formal award criteria that applications must meet in order to stand out from their competitors and *in fine* be selected for funding.
- j) The **funding rules** were examined in order to identify eligible costs and their reimbursement rates.
- k) The **Intellectual Property Rights** (IPR) allow to gain insight into the rules determining the ownership of results, the protection and dissemination of valuable foreground, as well as the principles in force with regard to access rights to background data.
- l) The **management** explains in particular how the funding agencies assess and monitor the progress of projects.
- m) The **ethical guidelines** section considers the limits in which the research has to be carried out as well as its impact, not only in terms of scientific advancement but also in terms of human dignity and social and cultural impact.
- n) The **success rate** gives an idea on how competitive the scheme can be.

2.2.1 Setting up an adequate comparison model

Now that the first steps of collection and treatment of data have been specified, let us explore the possible pathways for a comprehensive methodology which allows a good and coherent comparison of the instruments. The evaluation and comparison of research funding schemes and research programmes is still at an early stage (ESF, 2009, p. 5). In fact, there exists relatively few models in the literature on the classification of portfolios of RFI. Still, one can distinguish between two broad types of model. The first is generally found in the documents of the funding agencies and classifies instruments by type of financing (grant-oriented classifications). Thus, it takes the perspective of the researcher. These classification schemes are usually specific to the funding agencies' scientific support strategy and differ depending on the selected agency which makes comparison between different portfolios more difficult. The second is mostly present in the academic literature and describes the instruments according to their goals, and not by a specific type of funding (goal-oriented classifications). These models can be used to compare different portfolios of instruments between different institutions.

2.2.2 Grant-oriented classifications (researcher's perspective)

Research funding organisations can describe their own instruments following a researcher's perspective, i.e. by looking at the funding modes and the reimbursement rates in particulars. Those models are generally tuned to the portfolio of funding instruments of a given organisation. Based on the literature review, the following models of classification are of interest to this work:

Model 1:

The *Deutsche Forschungsgemeinschaft* (DFG) identified the research profiles among Higher Education Institutions (HEI) and non-university research institutions in Germany, and the subjects on which these institutions focus. This resulted in the publication of '[The Funding Atlas 2012](#)' (DFG, 2013) which suggests this classification for RFI:

1. individual grants;
2. coordinated grants;
3. excellence initiatives;
4. others (RI, prizes).

Model 2:

The SNSF has provided a classification in its '[Guidelines for selecting SNSF funding schemes](#)', too. For funding purposes, the SNSF (SNSF, 2013c, p. 3) distinguishes between:

1. project funding;

2. individual grants;
3. National Research Programmes;
4. National Center for Competences in Research;
5. other.

Model 3:

A third model of classification can be found in the [`Federal Council Dispatch for ERI 2013-2016`](#). These are the corresponding categories (Federal Council, 2012):

1. direct project funding;
2. individual grants;
3. thematic research programmes;
4. RI;
5. international cooperation.

2.2.3 Goal-oriented classifications

Model 1:

B. Lepori *et al.* published in 2007 [`Indicators for comparative analysis of public project funding: concepts, implementation and evaluation`](#), which discusses how to develop suitable classifications of project funding instruments producing indicators on public project funding which allow for comparative analysis between different countries and across periods of time. One of the proposed classification (Lepori, B. *et al.*, 2007) is set as follows:

1. **Academic instruments** oriented to the production of scientific results such as publications and PhD. The main allocation criterion is scientific reputation, and beneficiaries are essentially HEI; in many cases there are no preferential research themes, otherwise the budget is divided among scientific disciplines.
2. **Thematic instruments** either on priority subjects for policy reasons (for example social needs) or for economic development (technological programs). Thematic instruments can be divided by subject, but for the time being we limit ourselves to separate space programs only.
3. **Innovation instruments** that are directly oriented to innovation and economic development in companies, normally with a bottom-up approach (or, if a priority is defined, based on economic sectors).

This classification refers to the aims of the instrument and to the allocation criteria, but not necessarily to the type of research performed, in the sense that Lepori *et al.* are considering only the level of the funding instruments and not the actual use of the money. Let us have a look now at other goal-oriented models which have a real focus on the type of research performed.

Model 2:

Investigating the evolution of funding policies of research councils in Austria, Norway and Switzerland and analysing their responsiveness to government and science, S. Slipersæter *et al.* released in 2007 the paper [`Between policy and science: research councils responsiveness in Austria, Norway and Switzerland`](#) (Slipersæter, S. *et al.*, 2007), which considers four categories (together with sub-categories):

1. responsive-mode instruments:
 - a. research projects;
 - b. individual grants;
2. thematic programmes;
3. technological programmes (Networks of Excellence);

4. others.

On a similar basis, other academic literature offers a similar classification methodology, but this time through a broadened perspective:

Model 3:

The following template, based on the report of the European Science Foundation (ESF, 2009, p. 33) '[Evaluation in National Research Funding Agencies: approaches, experiences and case studies](#)', classifies the funding schemes within the organisations into seven different categories (or seven funding modes):

1. **Responsive mode**, which are funding schemes where researchers can apply at regular intervals, in any area and for variable amounts and variable length of funding.
2. **Career development** instruments, which are funding schemes designed to attract, develop and retain talented researchers. They are often targeted at specific areas of research or specific career stages.
3. **Centres of excellence** schemes normally imply heavy long-term investments, and therefore careful *ex ante* selection processes. They may constitute inter-institutional research networks, with researchers working together on jointly agreed work programmes.
4. **Thematic programmes** are funding schemes which define research programmes in a well-defined thematic area.
5. **Knowledge transfer/Cooperation with industry** schemes fund collaboration with industry through knowledge and technology transfer. This category includes instruments aimed to test the marketability of research results with a view to take them through the early commercialisation or roll-out phase.
6. **Infrastructure/Instrumentation** regroups schemes designated to fund big research equipment and infrastructures.
7. **Others** designates any other funding mode under which specific schemes were running and which were not covered by the above-mentioned categories.

The work at hand is of an institutional nature and aims to compare RFI in line with their use for achieving strategic goals. Therefore, a goal-oriented approach better suits the problem. Further explanations and details about the chosen template of classification – among the ones introduced above – will be developed in chapter 3.

2.3 Travelling around European and home research landscapes

Now that we made the first step towards the definition of a model for classifying instruments, we will enumerate the relevant instruments at both levels and locate them in the European and Swiss research landscapes through a short description.

2.3.1 Exploring Horizon 2020 ...

As already mentioned, instruments most similar to the Swiss RFI can be found at European level in the 'Excellent Science' and 'Societal Challenges' pillars of Horizon 2020 and are shortly described below:

Pillar 1: Excellent Science

The first pillar is composed of the European Research Council, the Future and Emerging Technologies, the Marie Skłodowska-Curie Actions and RI.

Marie Skłodowska-Curie Actions (MSCA)

MSCA aim at promoting the international and intersectoral mobility of research staff, making research careers more attractive and improving the gender balance. Under Horizon 2020, MSCA will be composed of the following four instruments:

1. **Innovative Training Networks (ITN)** concern researchers that have not completed a doctoral degree yet, or have less than four years of research experience.³ ITN are composed of European Training Networks (ETN), European Industrial Doctorates (EID) and European Joint Doctorates (EJD).
2. **Individual Fellowships (IF)** offer individual grants to researchers holding a doctoral degree or having more than four years of experience.⁴ IF will cover the existing International European Fellowships (IEF), International Incoming Fellowships (IIF), International Outgoing Fellowships (IOF) and Career Integration Grants (CIG), which will all be merged into two schemes: 'Global Fellowships' and 'Reintegration Fellowships'.
3. **R&I Staff Exchange (RISE)** promotes the international and intersectoral mobility of research staff between academic and non-academic partners.
4. **COFUND** makes possible the co-funding of institutional, national and international levels. Under Horizon 2020, it will be extended to Early Stage Researchers (ESR) targeted by the ITN action.

European Research Council (ERC)

The ERC offers grants to individual researchers carrying out high-risk, high-gain frontier research projects. It aims at encouraging the highest research quality in Europe and making Europe more attractive to top scientists. ERC offers the following grants:

1. **Starting Grants (StG)** offer grants to researchers at the beginning of their research careers. To be eligible, the researchers must hold a doctoral degree and have less than 7 years research experience after their degree has been awarded.
2. **Consolidator Grants (CoG)** offer grants to researchers who are in position of consolidating their independent research team and career (7 to 12 years after doctoral degree).
3. **Advanced Grants (AdG)** offer grants to excellent, leading researchers to pursue field changing research.
4. **Synergy Grants (SyG)** is a new instrument in a pilot phase that has been developed in order to bring together complementary skills, knowledge and resources in new ways with the goal of jointly addressing research problems.
5. **Proof of Concept (PoC)** have been developed with the aim to bring the results of ERC-funded projects closer to the market. It offers ERC grant holders an additional €150'000 over 12 months to investigate business opportunities resulting from an ERC-funded activity.

Future and Emerging Technologies (FET)

Instruments for FET have been designed in order to strengthen European R&I in frontier technologies. Compared to the ERC, the FET offer smaller grants for projects and taking into account the innovation potential of an idea. Under Horizon 2020, FET is not restricted to any particular area of research but "will have a crucial information and communication science and technology research component" (EC, 2013a). FET will be composed of the following three schemes:

1. **FET Open** is fully bottom-up and of funding to radically new and innovative ideas.

³ In MSCA, the Innovative Training Networks (ITN) action is dedicated to Early-Stage Researchers (ESR) only. In this report, we distinguish between ITN as the name of the action and ESR defining the type of beneficiaries for this specific action.

⁴ In MSCA, the Individual Fellowships (IF) action is dedicated to Experienced Researchers (ER) only. In this report, we distinguish between IF as the name of the action and ER defining the type of beneficiaries for this specific action.

2. **FET Proactive** addresses a number of pre-defined exploratory research themes.
3. **FET Flagships** offers funding to large scale, international and multidisciplinary projects which have the potential to achieve significant scientific breakthrough. It is foreseen to allocate up to €100 million per year to a FET Flagship initiative.

European Research Infrastructures (RI)

Horizon 2020 will continue to **support the use and development of RI in Europe**. Albeit the limited budget allocated to RI, Horizon additionally intends to **foster the innovation potential of RI and their human capital**. Moreover, in order to achieve the target of realising 60% of RI on the 2010 ESFRI Roadmap, Horizon 2020 newly will **reinforce consistency and efficiency of members states and EU RI policies**.

Pillar 3: Societal Challenges

The EC has identified seven societal challenges to be addressed by Horizon 2020. They correspond to political priorities of the EU and focus on intersectoral and multidisciplinary collaborative research. The societal challenges were enumerated in the section 1.1 of this paper. The specific project funding instruments within this pillar are listed below:

Collaborative Project (CP)

CP address pre-defined research topics described in so-called Work Programmes (WP). The eligibility criteria require the formation of consortium of at least three partners from different MS or AC. The consortium can consist of academic and non-academic partners. The European contribution is limited to a certain amount, depending on the scale and the objective of the project.

Coordination and Support Actions (CSA)

CSA cover not the research itself but the coordination and networking of projects, programmes and policies. This funding scheme distinguishes between purely Coordination Actions (CA) and specific Support Actions (SA).

As opposed to the above-described RFI, the following funding schemes do not make part of a specific pillar.

Spreading excellence and widening participation

Three instruments are of relevance for the SNSF:

1. **Teaming** which aim to promote and support partnerships between regions, regional research actors and leading research organisations with the goal of creating and developing viable and sustainable scientific institutions of international excellence.
2. **Twinning** consists of structured exchanges between institutions focusing on upgrading knowledge in a particular field of research.
3. **ERA-Chairs** which goal is to support public universities and other eligible research organisations with a demonstrated potential for research excellence in developing their potential so that they can achieve excellence on a sustainable basis. ERA Chairs are also designed to attract outstanding researchers to institutions with a clear potential for research excellence.

ERA-NET

ERA-NET have been created to promote and support the coordination of national and regional research programmes. They offer a framework to research funding organisations to develop joint activities. The main goal of ERA-NET in Horizon 2020 consists of the co-funding of joint

or transnational calls. Most of the countries Switzerland has designated as a priority have a corresponding ERA-NET. So far, the SNSF has been participating in nine ERA-NET.

Joint Programming Initiatives (JPI)

The Joint Programming concept was introduced by the EC in 2008 to support implementation of the ERA. It is a structured and strategic process whereby participating countries agree, on a voluntary basis and in a partnership approach, on common visions and Strategic Research Agendas (SRA).

A more detailed description of the different schemes is provided in the Appendices (see Annex III: Factsheets).

2.3.2 ... and gauging the Swiss National Science Foundation's instruments

The SNSF organises its funding efforts across five main axis: projects, careers, programmes, infrastructures and public science communication. The following research instruments of the SNSF fall within the scope of this research project:

Research Projects

Direct Project Funding

Twice a year, the SNSF issues a call for the funding of research projects for all disciplines. The budget for direct project funding amounts to around half of SNSF's budget.

Sinergia

The SNSF supports small networks where a synergetic approach is needed to venture into promising new research fields, tackle complex research questions and gain pioneering insights.

Doc.CH in the Humanities and Social Sciences (Doc.CH (HSS))

Additionally to direct project funding, the SNSF awards grants to promising researchers who wish to write a dissertation in the Humanities and Social Sciences (HSS).

Careers

Ambizione

This funding scheme is aimed at junior researchers who would like to conduct, manage and lead an independently planned project in all disciplines at a Swiss university. It is especially intended for Swiss researchers that have stayed abroad or foreign researchers willing to carry out their research in Switzerland.

Marie Heim-Vögtlin (MHV)

The MHV grants are used to promote women in academic careers. It specially addresses female researchers that had a break in their career for family reasons. Doctoral and post-doctoral researchers may apply for the grant which covers in particular salary and childcare expenses.

SNSF Professorships

This instrument enables junior researchers with several years of recognised research experience to make a significant step forward in their academic career by working in one of the Swiss universities or Federal Institutes of Technology where they will be active in research, teaching and clinical work and enjoy the status of an assistant professor or equivalent.

Research Programmes

National Research Programmes (NRP)

The NRP follow a top-down approach and address issues defined by the Federal Council. It is the only instrument of the SNSF following this approach. The definition of the research topics and roadmap, as well as the impact assessment procedure are developed closely with the SERI. In 2010, 4% of SNSF's annual budget was affected to NRP which aim at financing transdisciplinary research with clearly pre-defined objectives and goals.

National Centres of Competence in Research (NCCR)

In order to promote long-term research in areas identified as of key importance for Switzerland, the SNSF funds selected NCCR. The programme focuses on the promotion of new innovative and interdisciplinary approaches. 27 NCCR have been founded to date and counted for CHF60 million in 2012. Priority was given to four areas of research: life sciences, HSS, sustainable development and environment, and ICT.

Infrastructures and Science communication

The SNSF offers funding for infrastructures and public science communication covering more or less 5% of its annual budget. Among those instrument lie: **Research Equipment (R'Equip)**, **Funding LArge international REsearch projects (FLARE)** on the one hand, and **Scientific conferences, International Exploratory Workshops (IEW), Publication grants** and **Public science communication projects (Agora)** on the other.

International instruments of the SNSF

Careers

Mobility fellowships

The SNSF funds various mobility schemes for doctoral, junior and ER divided respectively into **Doc.Mobility**, **Early Postdoc.Mobility** and **Advanced Postdoc.Mobility**. The fellowships allow the grantees to stay abroad for different period of times, depending on the chosen scheme.

International Short Visits (ISV)

This instrument allows for researchers working in Switzerland to go abroad or for researchers from elsewhere to come to Switzerland. The application must be submitted by two co-applicants from the two host institutions engaged in the collaboration.

Projects

Mobility grants in projects

The SNSF offers grants to doctoral students for a stay abroad for up to twelve months as a supplementary grant to SNSF-funded projects.

Enlargement contribution

Following the Swiss enlargement contribution to Romania and Bulgaria, the SNSF manages projects focusing on a set of restricted thematic areas together with the two countries.

Scientific co-operation between Eastern Europe and Switzerland (SCOPES)⁵

The SCOPES programme is financed by the SNSF and the Swiss Agency for Development and Co-operation (SDC) and promotes scientific co-operation between research groups and insti-

⁵ Please note that there are different instruments under the SCOPES scheme. Our analysis focuses on the institutional partnerships, which have been introduced to support the development of the institution in Eastern Europe and funds e.g. some curriculum development activities.

tutions in Switzerland and Eastern Europe as well as the 'new independent states' of the former Soviet Union.

Swiss Programme for Research on Global Issues for Development (r4d.ch)

The r4d programme is implemented jointly by the SDC and the SNSF. The joint programme supports relevant research for development aimed at solving global problems in poor countries. It consists of five thematic modules and a module for research without pre-defined topics.

Bilateral programmes to promote research cooperation with priority countries

This type of bilateral programmes allows a group of researchers from Switzerland and a group of researchers from the concerned priority country to jointly investigate a specific question. More concretely, it aims to promote and reinforce research co-operations with non-European countries disclosing high or promising research potential, namely: Brazil, China, India, Russia and South Africa (BRICS).

Agreements of the SNSF in international cooperation

Money Follows Researchers

The process of 'Money Follows Researchers' makes it possible for researchers who move abroad to make a request for their national on-going funding to continue. The project can either continue in the country of origin while being managed from abroad or transferred to the new location.

Money Follows Cooperation Line

The process of 'Money Follows Cooperation Line' (MFCL) makes it possible for smaller parts of national projects to be carried out abroad. Projects clearly focused in one country with only a very small part in a second country may currently be submitted to the main funding organisation. If the proposal is approved, this funding organisation also funds the foreign segment. The foreign segment has to be essential for the successful completion of the project. To date, MFCL is open for Germany and Austria only.

Lead Agency Agreement

The Lead Agency Agreement allows researchers from two countries to submit a common proposal to only one of the funding agencies. The researchers are requested to submit the proposal to the funding agency of the country in which the bigger part of the research would be performed. The lead agency evaluates the whole proposal independently. In case of a positive outcome, the lead agency funds the researchers based in its country. The other agency will recognize the outcome of the evaluation without further evaluation and fund the project partners in its country. To date, the SNSF has Lead Agency Agreements with Austria, Germany and Luxembourg.

This **chapter 2** introduced the research funding schemes at both Swiss and European levels and explored the methodology to be used, informing on the work phases and on the selected indicators for the factsheets. A special attention was paid to the existing models of classification and it was found that a goal-oriented approach was most appropriate for the study carried out in this report.

In **chapter 3** we further develop the classification model with considerations leading to its adoption. We lay out the final categories of classification, which are then approached individually through a comparison of the RFI falling in the same category. We look at the possible

communalities, differences, redundancies and gaps in each category and provide a set of observations and specific conclusions accordingly. In the last section, we tackle a couple of very timely issues at European level, which are of major relevance for the SNSF and which are both related to research funding. **Chapter 4** builds upon the analyses in the previous chapter by providing the SNSF with a set of generic and specific considerations and actions aimed at encouraging an optimal Swiss research funding strategy.

3. Capturing the variety of funding schemes

In this chapter, we elaborate more on the classification method (3.1), reaching the stage where we can conduct a consistent comparison and finally present our findings. Sections 3.2 to 3.9 are dedicated to the categories of comparison whereas the last section (3.10) presents a discussion on two transversal issues of relevance for the SNSF, namely: Open Access (OA) to research data and the reimbursement models in Horizon 2020.

3.1 Choice for the model and final classification

Because the work we carry out is of an institutional nature, it has been decided in conjunction with the SNSF that the comparison through a goal-oriented approach is a more suitable structure in the sense that we compare European and national instruments in their respective use for the achievement of strategic goals. Therefore, the chosen classification follows the goal-oriented approach introduced in chapter 2.

Building upon most recent academic literature, the model developed by the ESF (Model 3) offers an elaborated and appropriate template. Indeed, a number of RFI find their way in its corresponding categories. Moreover, a classification of SNSF's instruments has already been performed in 2009 by the ESF Member Organisation Forum and summarised through this table paving the way for our own analysis:

INSTRUMENTS	SNSF
Responsive mode	Project funding in investigator-driven (basic) research, including interdisciplinary projects Sinergia (collaborative projects in independent research) DORE (DO Research, Funding instrument for application-oriented research at universities of applied sciences and universities of teacher education) Special Programme University Medicine – Building clinical research capacities for the future
Career development	Fellowships for prospective and advanced researchers Marie Heim-Vögtlin Programme Ambizione Prosper (Programme for Social Medicine, Preventive and Epidemiological Research) SCORE (Swiss Clinicians Opting for Research) SNSF Professorships ProDoc Doc.CH MD-PhD programme Individual short visits Exchange programmes
Centre of excellence	National Centres of Competence in Research (NCCR)
Thematic programmes	National Research Programmes (NRP)
Knowledge transfer; Cooperation with industry; Commercialisation of research results	NCCR NRP
Infrastructure; Instrumentation	SNSF provides direct funding on a discretionary basis for RI when it is indispensable for the research project R'Equip FORCE (Fund for Research at CERN) FINES (Fund for Developing Astronomical instruments ESO) Clinical Trial Units

Others	Cohort Studies
	Scientific meetings in Switzerland
	International conferences and seminars
	National Latsis Prize
	SCOPES
	Research Partnerships with Developing Countries
	Publication grants

Table 3-1: Classification of SNSF's RFI by the ESF (ESF, 2009, p. 49).

In line with the preliminary results, we considered that adding two more categories to the classification model described in Table 3-1: Classification of SNSF's RFI by the ESF . would bring greater clarity to the comparison. Those categories are:

1. **International cooperation** regroups instruments promoting the engagement of researchers with countries showing great research potential but lacking investment. This can cover low-performing Research and Development Intensity (RDI) EU MS as well as third countries such as BRICS;
2. **Science communication**, which consists of schemes dedicated to the funding of events that contribute to the development of scientific research and to the dissemination of research results, particularly through international scientific exchanges.

The table drawn up by the ESF Member Organisation Forum, dated 2009, has been updated and brought to a level where communalities, differences and gaps can better be identified. The 'Others' category has been removed since all RFI found their way in the remaining categories. The 'Infrastructure/Instrumentation' category has been renamed 'Infrastructures/Equipment' for clarity reasons. The 'Career development' category has been divided into several sub-categories so as to differentiate between funding schemes dedicated to the different research career levels. This was done in line with the 'transition model of academic life' as well as the 'research career structure' produced by the Steering Group on Human Resources and Mobility Working Group⁶ (SGHRM) (WG). They both follow the same line and are briefly illustrated below.

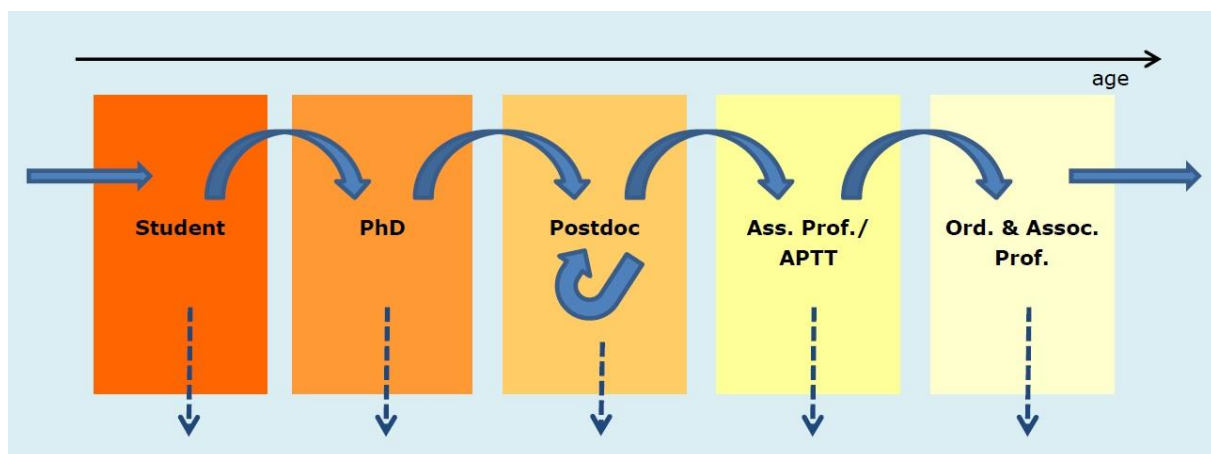


Figure 3-1: Transition model of academic life.

Figure 3-1 shows the possible pathways and transitions in academic life from the stage of student to the stage of full professor and associated professor. In this report the focus is set on the stages in-between, i.e. on doctoral students, on postdoctoral researchers (postdocs) and on assistant professors/Assistant Professors Tenure Track (APTT). Most career development funding instruments listed in section 2.3 of this report belong to the doctoral or postdoc-

⁶ The SGHRM WG gathers representatives of all EU MS and AC as well as from the EC in order to implement the European Partnership for Researchers.

toral levels. The transition model of academic life allows for a clearer approach by pointing out the stage where researchers are better established, namely when they reach the status of assistant professor/APTT. The blue dashed arrows indicate researchers going out of the academic system at any career level, e.g. by joining the industry labour market. The arrow biting its tail in the postdoc box signals that researchers holding a doctoral degree may not advance to the next stage in the academic career.

The SGHRM WG performed a similar work (EC, 2011c) by dividing the career research structure into the following groupings:

- **First Stage Researchers (R1)**: up to the point of a doctoral degree;
- **Recognised Researchers (R2)**: doctoral degree holders or equivalent who are not yet fully independent;
- **Established Researchers (R3)**: researchers who have developed a level of independence;
- **Leading Researchers (R4)**: researchers leading their research area or field.

The categories introduced above fit into our model of classification in the sense that they improve comparability of career development schemes. In particular, the different ERC Grants can now be better classified since they address doctoral degree holders at different research career levels. This in turn leads to the following table, where RFI under Horizon 2020 have been included as well:

Categories	RFI of the SNSF	RFI under Horizon 2020
1. Responsive mode	<ul style="list-style-type: none"> • Direct Project Funding • Sinergia 	<ul style="list-style-type: none"> • FET-Open • ERC Synergy Grants (SyG)
2. Career development	2.0 All career levels: <ul style="list-style-type: none"> • Marie Heim-Vögtlin (MHV) 	2.0 All career levels: <ul style="list-style-type: none"> • MSCA R&I Staff Exchange (RISE) • MSCA COFUND
	2.1 First Stage Researchers: <ul style="list-style-type: none"> • Doc.CH in the Humanities and Social Sciences (Doc.CH (HSS)) • Doc.Mobility • Mobility grants in projects 	2.1 First Stage Researchers: <ul style="list-style-type: none"> • MSCA Innovative Training Networks (ITN)
	2.2 Recognised Researchers: <ul style="list-style-type: none"> • Ambizione • Early Postdoc.Mobility • Advanced Postdoc.Mobility • International Short Visits (ISV) 	2.2 Recognised Researchers: <ul style="list-style-type: none"> • MSCA Individual Fellowships (IF) • ERC Starting Grants (StG)
	2.3 Established Researchers: <ul style="list-style-type: none"> • SNSF Professorships • ISV 	2.3 Established Researchers: <ul style="list-style-type: none"> • ERC Consolidator Grants (CoG) • ERA Chairs
	2.4 Leading Researchers: <ul style="list-style-type: none"> • ISV • Direct Project Funding 	2.4 Leading Researchers: <ul style="list-style-type: none"> • ERC Advanced Grants (AdG)
3. Centres of excellence	<ul style="list-style-type: none"> • National Centres of Competence in Research (NCCR) 	<ul style="list-style-type: none"> • Teaming • Twinning • ERA Chairs • FET Flagships • Joint Programming Initiatives (JPI)⁷
4. Thematic programmes	<ul style="list-style-type: none"> • National Research Programmes (NRP) 	<ul style="list-style-type: none"> • ERA-NET • JPI

⁷ The JPI scheme has been included in the scope of this paper even though it does not belong to Horizon 2020 as such. This instrument is managed by the EU MS and AC, and not by the EC, unlike the other European schemes listed.

5. Knowledge transfer; Cooperation with industry; Commercialisation of research results	<ul style="list-style-type: none"> • Enlargement contribution 	<ul style="list-style-type: none"> • Collaborative Projects (CP)
		<ul style="list-style-type: none"> • MSCA ITN • MSCA IF • MSCA RISE • FET Proactive • FET Flagships • ERC Proof of Concept (PoC) • CP
6. Infrastructures; Equipment⁸	<ul style="list-style-type: none"> • Research Equipment (R'Equip) • Funding LArge international REsearch projects (FLARE) 	<ul style="list-style-type: none"> • Support the use and development of RI in Europe • Foster the innovation potential of RI and their human capital • Reinforce consistency and efficiency of MS and EU RI policies • Infrastructures and equipment costs are also eligible for other instruments
7. International cooperation	<ul style="list-style-type: none"> • Enlargement contribution • Scientific co-operation between Eastern Europe and Switzerland (SCOPEs) • Swiss Programme for Research on Global Issues for Development (r4d.ch) • Bilateral programmes to promote research cooperation with priority countries 	<ul style="list-style-type: none"> • Teaming • Twinning • ERA Chairs
8. Science communication	<ul style="list-style-type: none"> • Scientific conferences in Switzerland • International Exploratory Workshops (IEW) • Publication grants • Public science communication projects (Agora) 	<ul style="list-style-type: none"> • Coordination and Support Actions (CSA)

Table 3-2: Classification of Swiss and European funding schemes following a goal-oriented-approach.

Our classification covers a wide range of instruments. Some of them may repeat because they can be classified into different categories. The Enlargement contribution of the SNSF is e.g. both an instrument of 'International cooperation' and a scheme consisting of 'Thematic programmes'. For this reason, a single instrument can be compared at different levels with different schemes, which might lead to varying observations depending on the proposed pair of RFI and on the chosen set of indicators. A number of instruments from the original ESF classification are outdated and have been removed from this classification (such as ProDoc, a funding scheme that the SNSF does not offer anymore). In addition to these remarks, let's stress that comparison does not make sense for every pair of instruments within each category. Indeed, we compare funding schemes showing the highest similarities.

In line with the approach we have followed, we decided to focus on **three key indicators for the analysis**, namely: the political context, the goal of the instrument and the type of beneficiaries. Other indicators might be included when relevant for comparison.

While there seem to be quite some communalities between Swiss and European RFI in some categories, we enter in detailed analysis of the potential overlap for each of the categories in the sections below. For the analysis that follows, the RFI of the SNSF are taken as reference to which the European RFI are compared to. Please refer to

⁸ Please note that factsheets are not provided for the European RFI falling in this category.

Annex III: Factsheets for a detailed description of each instrument. **Please note that information written in red is still susceptible of being modified during the adoption process of Horizon 2020.**

With a view of ensuring that we compare what is comparable, we listed below the pairs of Swiss and European funding instruments showing the greatest communalities that we selected for analysis.

Categories	Pairs of RFI selected for comparison
1. Responsive mode	<ul style="list-style-type: none"> • Direct Project Funding & FET-Open • Sinergia & ERC SyG
2. Career development	<p>2.0 All career levels:</p> <ul style="list-style-type: none"> • MHV & MSCA ITN/IF • MHV & MSCA COFUND <p>2.1 First Stage Researchers:</p> <ul style="list-style-type: none"> • Doc.Mobility/Mobility grants in projects & MSCA RISE • ISV⁹ & MSCA RISE <p>2.2 Recognised Researchers:</p> <ul style="list-style-type: none"> • Ambizione/Early PostDoc.Mobility/Advanced PostDoc.Mobility & MSCA IF • MHV/Ambizione & ERC StG/CoG • Early Postdoc.Mobility/Advanced Postdoc.Mobility & ERC StG/CoG <p>2.3 Established Researchers:</p> <ul style="list-style-type: none"> • SNSF Professorships & ERC CoG <p>2.4 Leading Researchers:</p> <ul style="list-style-type: none"> • Direct Project Funding & ERC AdG
3. Centres of excellence	<ul style="list-style-type: none"> • NCCR & Teaming/Twinning/ERA Chairs • NCCR & FET Flagships
4. Thematic programmes	<ul style="list-style-type: none"> • NRP & JPI • NRP & CP
5. Knowledge transfer; Cooperation with industry; Commercialisation of research results	None
6. Infrastructures; Equipment	None
7. International cooperation	<ul style="list-style-type: none"> • Enlargement contribution & Teaming • SCOPES & Twinning
8. Science communication	None

Table 3-3: Pairs of Swiss and European RFI selected for comparison.

3.2 Responsive mode

In this category, we distinguish between two pairs of instruments: Direct Project Funding and FET-Open on the one hand, and Sinergia and ERC Synergy Grants (SyG) on the other. The analysis to come in the next section is structured as follows: first, we introduce the pair of RFI selected for comparison, then we provide a table summarizing the main features of interest for the analysis, and finally we present a set of specific observations and partial conclusions

⁹ Please note that ISV are open to all researchers holding a PhD (which means sub-categories 2.2, 2.3 and 2.4), not only First Stage Researchers. It was placed in this sub-category in order not to duplicate the single set of comparison several times in the table.

on their respective interplay. This structure is repeated in every one of the classification categories to come.

3.2.1 Direct Project Funding and FET-Open

52% of SNSF's budget went to **direct project funding** in 2012, i.e. CHF391.4 million (SNSF, 2013a, p. 26). Any researcher working in Switzerland as well as those doing research at specific Swiss institutions abroad are entitled to participate. It is interesting to see that, **according to our classification model, the main RFI of the SNSF has only one equivalent in Horizon 2020, namely FET-Open**, which is a relatively modest RFI if we consider its share of overall funding. Hereunder are the results of our comparison along the main indicators of relevance.

Indicator	Direct Project Funding	FET-Open
Political context	Main RFI of the SNSF.	Identification of the need to generate future game-changing knowledge with a direct technological potential.
Goal of instrument	To fund investigator-driven (basic) research, including interdisciplinary projects.	<ul style="list-style-type: none"> • To attract and stimulate the participation of high-tech SME and young innovative researchers; • To nurture emerging communities along highly innovative ideas; • To create European leadership in innovative fields of research with game-changing potential.
Beneficiaries	Any researcher working in Switzerland as well as those doing research at specific Swiss institutions abroad.	Follows the model of CP.
Eligibility	<ul style="list-style-type: none"> • have successfully carried out research for several years and be capable of running a project under sole responsibility; • certify that: <ol style="list-style-type: none"> a. a substantial contribution to the research project will be made; b. the necessary RI is at disposal; c. they are not bound by research instructions from superiors, namely with regard to the research methods. 	Depending on the focus of the project: <ul style="list-style-type: none"> • at least one SME in project; • project led by a young scientist with less than 6 years after obtaining the PhD.
Selection criteria	<ul style="list-style-type: none"> • S&T quality; • For use-inspired research, the sub-criterion 'broader impact' is included. 	The selection criteria will remain the same as under FP7, namely: <ul style="list-style-type: none"> • S&T quality; • Implementation; • Impact.
Success rate	51% overall.	<ul style="list-style-type: none"> • Latest success rate for short proposals: ratio of 4%. • Latest success rate for full proposals: between 25 and 30% according to the batches.

Table 3-4: Comparison between Direct Project Funding and FET-Open along the main indicators of relevance.

Based on the analysis above, one can observe that Direct Project Funding and FET-Open strongly differ in the set of indicators listed. Indeed, FET-Open has a strong focus on the development of new technologies with a clear potential of market take-up and is purpose-driven. This difference in goal is reflected in the eligibility and selection criteria as well.

3.2.2 Sinergia and ERC Synergy Grants

The SNSF awards **Sinergia** grants for research work carried out collaboratively. In terms of the number of researchers involved and funds required, the networks supported by Sinergia grants are in principle significantly larger than the majority of individual projects in Direct Project Funding and significantly smaller than the smallest NRP or NCCR. With no surprise, **its only equivalent at European level is its homonym from the ERC, namely Synergy Grants (SyG)**.

Indicator	Sinergia	ERC SyG
Political context	Identification of the need to offer a platform for inter-, multi- and multidisciplinary projects through the initiative and collaboration of different research groups.	There was a missing area of support for projects with a wider goal beyond the typical consortia agreement. Launched in 2012 on a pilot basis, no call will take place in 2014.
Goal of instrument	To support small networks where a synergistic approach is needed to venture into promising new research fields, tackle complex research questions and gain pioneering insights.	To enable a small group of PI and their teams to bring together complementary skills, knowledge and resources in new ways, in order to jointly address research problems.
Beneficiaries	Established researchers.	This indicator is not linked to the profile of the researchers; it is more linked to the type of activities foreseen in the project: the principles of co-location and interdisciplinarity are key.
Eligibility	<ul style="list-style-type: none"> generally three to four subprojects under the responsibility of a total of three to four research groups; research groups are generally based at different universities or research institutions in Switzerland; one group may be based abroad. 	<ul style="list-style-type: none"> minimum of two and maximum of four PI and, as necessary, their respective teams; proposals of an interdisciplinary nature are encouraged; host institution should be legally recognised public or private research organisation and be located in one of the EU MS or AC.
Selection criteria	<ul style="list-style-type: none"> value added by the joint research approach; competence, complementarity and collaboration of the groups involved; conceptual and organisational networking of subprojects; promotion of young researchers. 	<ul style="list-style-type: none"> Excellence is the sole criterion of evaluation, both for the research project and the PI in conjunction. The added value of the group and potential impact have to be demonstrated.

Table 3-5: Comparison between Sinergia and ERC SyG along the main indicators of relevance.

As described in Table 3-5, **Sinergia and ERC SyG show strong similarities in the objectives and the type of research they aim at funding**, namely interdisciplinary projects that bring together excellent researchers with complementary skills. An aspect that is missing in ERC SyG is the focus set on the promotion of young researchers by Sinergia. In this sense, Sinergia explicitly includes a career development dimension, which makes it have a potentially stronger impact on the scientific capital of a region. However, one must point out that even if this dimension is missing in the ERC SyG, the size of the grants ensures that researchers at an early stage in their career receive a significant part of funding as well.

3.2.3 Conclusions

The comparison carried out above showed virtually **no overlap between the main instrument of the SNSF, Direct Project Funding, and FET-Open**. This implies that there is in principle no competition between the two instruments and that there is complementarity.

Several similarities have been identified between Sinergia and ERC SyG, showing a high overlap and a potential threat of competition. This being said, the political stability of the instrument is guaranteed at the level of the SNSF, as opposed to SyG where no call is scheduled in 2014. If ERC SyG further develops in the coming years and when first impact of the instrument would be measurable, it might be interesting to consider how both instruments interplay at the level of single institutions and what their respective roles are in the promotion of academic talent.

3.3 Career development

RFI under 'Career development' show **the most potential overlap at Swiss and European levels.** For clarity, we will only conduct the analysis for instruments where the similarities are the highest. We distinguish here between instruments supporting career development from the **MSCA** on the one hand and **ERC** on the other.

3.3.1 Marie Skłodowska-Curie Actions

Switzerland currently ranks sixth in the list of countries receiving most funding from FP7 MSCA, with an amount of €218 million. As of 22 April 2013, 923 fellows had been conducting research within Swiss institutions from 2007 to 2013, which shows the attractiveness of Switzerland for researchers from abroad. Those foreign researchers mainly come from Germany, followed by France, Italy, Spain and the UK.

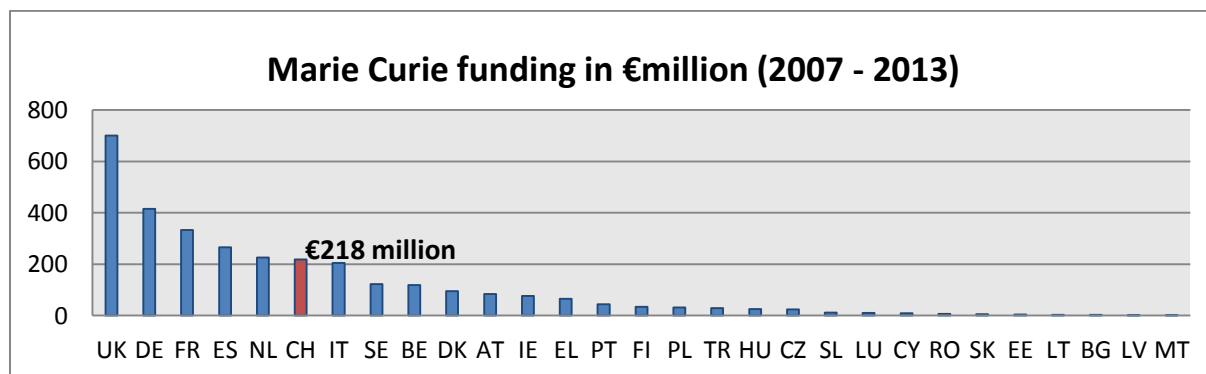


Figure 3-2: Marie-Curie funding received under FP7.

All career levels

Even though the SNSF shows flexibility concerning the eligibility criteria that a researcher must meet when applying for a career grant, in particular with regard to the time elapsed since completion of the doctorate at the moment of submitting the proposal, few SNSF's instruments are open to researchers at all career levels. One of them is **Marie-Heim Vögtlin (MHV)**, which is dedicated to female researchers with excellent scientific qualifications who have had to interrupt or reduce their scientific activities for family reasons. According to the latest statistics, MSCA have strongly supported women's participation in EU-funded research, getting close to the target of 40% by the end of the current FP (it was already standing at 38% at the end of 2012) and improving the gender balance in research is still one of the aims of MSCA. MSCA ITN and IF support researchers at specific career stages, before and after getting their doctoral degree respectively. MSCA COFUND is for its part open to the categories of researchers R1 as well as R2 which were introduced earlier. A discussion on the interplay between MHV and MSCA COFUND will be done in the last part of this section.

Indicator	MHV	1. MSCA ITN
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	2. MSCA IF	
Political context	There is a lack of female researchers in Switzerland, especially at higher level in academia. The SNSF strongly supports gender balance in research.	<ul style="list-style-type: none"> • Europe is a million researchers short and researchers often lack the necessary skills for the market. • European research still suffers from a considerable loss and inefficient use of highly skilled women. • Promotion of ERA principles, including gender balance.
Goal of instrument	<ul style="list-style-type: none"> • To enable female researchers with a non-linear career path to restart or continue their research career in a Swiss host institution. • To increase the number of female researchers in academia. 	1. and 2. <ul style="list-style-type: none"> • To make research career more attractive and support the implementation of the Charter and Code. • To develop skills matching public and private sector needs. • To encourage intersectoral and international mobility. 2. To enhance the competences and the creative, innovative potential of excellent researchers willing to work in the EU.
Beneficiaries	Female doctoral or post-doctoral students in all disciplines in a Swiss host institution.	1. Researchers not yet awarded a doctora degree. 2. Researchers in possession of a doctora degree.
Eligibility	<ul style="list-style-type: none"> • Women only, with no previous MHV. • No age limit. • No pre-defined theme. 	1. <ul style="list-style-type: none"> • No predefined theme. • Researchers in the project must be in the first 4 years of their research careers. • Contains international mobility. • Involvement of private sector is highly encouraged. 2. Researchers must have a PhD or at least 4 years of full-time equivalent research.
Selection criteria	<ul style="list-style-type: none"> • Scientific quality of research. • Reasons for career interruption. • Potential for research career. 	1. and 2. <ul style="list-style-type: none"> • S&T quality. • quality and implementation capacity of applying organisations. • quality of training and transfer of knowledge. • impact. 2. <ul style="list-style-type: none"> • quality of fellow.
Success rate	30.1 % (2012).	1. Current ITN: <10%. 2. Between 15% and 20%.

Table 3-6: Comparison between MHV and MSCA ITN, IF along the main indicators of relevance.

While sharing a similar goal, namely a better gender balance in academia, MHV and MSCA funding schemes described in Table 3-6: Comparison between MHV and MSCA ITN, IF along the main indicators of relevance. **strongly differ in their implementation logic.** This is most marked with MSCA ITN, whose international and intersectoral mobility components obey to different aims. Nevertheless, by offering grants to fellows with a high academic potential, MHV, MSCA ITN and potentially COFUND reach researchers at the same stage in their career. Still, it must be noted that, contrary to the MSCA RFI, MHV does not have any other selection criteria than the scientific excellence and the academic potential of the applicant.

Doctoral level

At doctoral level, the instruments of the SNSF are designed to offer doctoral students the possibility to work abroad while carrying out their research work. The SNSF distinguishes between two instruments, namely **Doc.Mobility and Mobility grants in projects.** Instruments in Horizon 2020 supporting researchers at that stage of their career are MSCA ITN, RISE and potentially COFUND. The next table focuses on MSCA RISE:

Indicator	1. Doc.Mobility 2. Mobility grants in projects	MSCA RISE
Goal of instrument	To make a research stay abroad in order to make progress with dissertation within the scope of the awarded mobility.	<ul style="list-style-type: none"> To stimulate innovation through the cross-fertilisation of knowledge. To enhance international and intersectoral collaboration.
Instrument duration	<ol style="list-style-type: none"> Minimum of 6 months and maximum of 18 months. 6 to 12 months. 	<ul style="list-style-type: none"> Between four weeks and twelve months as a minimum and maximum, respectively. The fellow exchange has to be followed by a minimal six-months engagement at the sending institution.
Beneficiaries	Doctoral students.	Researchers at any career level, whether ESR or ER.

Table 3-7: Comparison between SNSF's career instruments at doctoral level and MSCA RISE along the main indicators of relevance.

Even though MSCA RISE has a strong focus on innovation and thus is more linked with industry, it aims as well to increase international mobility and knowledge exchange between different R&I communities. **Strong difference, however, can be found in the implementation focus of the instruments. The doctoral mobility instruments of the SNSF set the individual research project as core goal, while MSCA RISE aims for broader results,** namely cross-fertilisation of knowledge and enhanced international and intersectoral collaboration.

Postdoctoral level

After completion of the doctorate, the number of SNSF and MSCA RFI increases strongly. Besides MHV that we discussed previously, the SNSF disposes of Ambizione, Early and Advanced PostDoc.Mobility, ISV and SNSF Professorships. The latter will be discussed in section 3.3.2 through the lenses of ERC Grants as it provides more funding than MSCA by supporting a PI's salary and allowing him/her to set up a research team. Also, MSCA sets the emphasis on the training of young researchers whereas SNSF Professorships address more established scientists. The comparison of **Ambizione, Early and Advanced PostDoc.Mobility** and MSCA IF is summarised in the table below along the most relevant indicators. Of course, MSCA COFUND shows potential for interplay with the RFI of the SNSF listed above but for sake of clarity, but this will be included in a separate discussion on MSCA COFUND at the end of this section.

Indicator	1. Ambizione 2. Early PostDoc.Mobility 3. Advanced PostDoc.Mobility	MSCA IF
Goal of instrument	<ol style="list-style-type: none"> To attract the best, next-generation foreign and Swiss talents to carry out research work in Switzerland. and 3. To allow young researchers to make a stay abroad. 	<ul style="list-style-type: none"> To enhance the creative and innovative potential of ER at multi- or interdisciplinary level through advanced training, international and intersectoral mobility. To develop or help to restart the careers of individual researchers showing great potential. To provide opportunities to acquire new knowledge and to work on research projects in or outside Europe. To support the reintegration of researchers currently outside Europe who have previously worked here.
Instrument duration	<ol style="list-style-type: none"> 12 to 36 months. 18 months. 	12 to 24 months and an additional 12 months for Global Fellowships.

Beneficiaries	3. 12 to 36 months.	
	1. Generally up to 5 years after doctorate.	ER in possession of a doctoral degree.
	2. Up to 2 years after doctorate.	
Eligibility	3. Up to 5 years after doctorate.	
	1. • Up to five years after PhD.	Researchers holding a PhD.
	• After PhD, research activities of at least twelve months at a university other than where the candidate obtained the doctorate.	
Success rate	2. Up to two years after PhD.	
	3. Up to five years after PhD.	
	1. 19.4%	Between 15% and 20%, depending on mode.
	2. 62%	
	3. 53%	

Table 3-8: Comparison between Ambizione, Early and Advanced PostDoc.Mobility and MSCA IF along the main indicators of relevance.

Table 3-8: Comparison between Ambizione, Early and Advanced PostDoc.Mobility and MSCA IF along the main indicators of relevance shows quite some similarities for the indicators and the RFI selected, including the goals that are pursued. While the SNSF introduces an eligibility difference for Early and Advanced PostDoc.Mobility, MSCA IF is in principle open to all researchers holding a doctoral degree. This flexibility allows the SNSF to better support researchers at a crucial moment in their academic careers, namely just after their doctoral degree. Another important difference is the success rates, which above 50% for the mobility schemes and equal or under 20% for MSCA IF. **The Global Fellowships supported by MSCA IF are conditioned by a mandatory return at a host institution** in Europe at the end of the grant. The grant management and the contract are signed with the host institution as well. **The SNSF's schemes, however, are directly bound to the researchers who have no obligation to return to Switzerland once the scholarship is finished.**

As regards Ambizione, the success rate is similar to MSCA IF but the grants period is longer. Moreover, Ambizione targets researchers abroad for a stay in Switzerland, which is comparable with MSCA IF. In conclusion, **Ambizione and MSCA IF show quite some overlap when considering the set of indicators studied.**

Last but not least, unlike SNSF Professorships, HEI select and hire assistant professors under their responsibility. Therefore, the SNSF does not fund their salaries. **Funding such a position through flexible funds would be contrary to the current consensus on the division of tasks between universities (capacity building) and the SNSF (individual encouragement of young researchers).** This would also constitute a risk for APTT holders not to get tenure at the end of SNSF's support for financial reasons (not scientific ones), which is not a sustainable situation from the perspective of the SNSF.

International Short Visits (ISV) allow for researchers working in Switzerland to go abroad or for researchers from elsewhere to come to Switzerland. In this sense, an equivalent at European level would be MSCA RISE.

Indicator	ISV	MSCA RISE
Goal of instrument	<ul style="list-style-type: none"> To initiate or to consolidate international collaborations through short research projects between the host institute and the visiting fellow which should be carried out during the stay. Exchange of knowledge beneficial to both co-applicants and their institutions. 	<ul style="list-style-type: none"> To stimulate innovation through the cross-fertilisation of knowledge. To enhance international and intersectoral collaboration by involving institutions from the academic and non-academic sectors based in and outside Europe. To provide a single eligibility rule for

Beneficiaries	Researchers holding a doctoral degree.	international and intersectoral consortia. Researchers at any career level, whether ESR or ER.
Eligibility	<ul style="list-style-type: none"> No geographical limitations. The visiting fellow must: <ol style="list-style-type: none"> hold a doctorate (or an equivalent degree); be employed as a researcher in his/her country of origin before, during and after the visit; aim to initiate or consolidate, thanks to his/her visit, a continued collaboration between both labs/institutes; not already have received ISV support within the last three years. The host must: <ol style="list-style-type: none"> have the approval from the director of the host institute to invite the visiting fellow; hold a research/faculty position at the host institute; guarantee having the needed capacities (e.g. working space); must not have had an ISV-funded researcher within the last two years. The attendance of congresses, conferences, workshops or seminars is not covered. 	<ul style="list-style-type: none"> Researchers from any part of the world, of any nationality, at any career level. Three participants from three different countries of which two are established in different MS or AC. Secondment period within the fellowship duration between four weeks and twelve months as a minimum and maximum, respectively. The fellow exchange has to be followed by a minimal six-months engagement at the sending institution. Non eligible secondments: exchanges between institutions from the same sector; institutions established in the same MS or AC; institutions ensued from different parts of the same mother institution legally dependent to each other; secondments between two third countries.
Selection criteria	<ul style="list-style-type: none"> quality of the proposed scientific activity; scientific track record of the guest; suitability of the host institute for the proposed scientific activity; mutual benefits for each of the two co-applicants; potential for a long-term co-operation. 	<ul style="list-style-type: none"> scientific and/or technological excellence; quality and implementation capacity of the applicants (researchers/organisations); quality of the proposed activity in scientific training and/or transfer of knowledge; impact.

Table 3-9: Comparison between ISV and MSCA RISE along the main indicators of relevance.

With a view of **promoting a culture of innovation that welcomes and rewards creativity and entrepreneurship and helps to turn creative ideas into innovative products, services or processes, MSCA RISE distinguishes itself from ISV**, which set the focus on the sharing of knowledge through short research projects. As illustrated in the previous table, ISV and RISE do not reach researchers at the same stage since RISE is open to both doctoral students and postdocs while ISV is dedicated to researchers holding a doctoral degree. We conclude that **both instruments, while having significant overlap in technical criteria, differ fundamentally in the goals they aim to achieve.**

Considerations on the suitability of MSCA COFUND for SNSF's RFI:

Compared to other countries in Europe, **Switzerland is the country that benefited most from MSCA COFUND under FP7, with close to €60 million** awarded by the EC since 2007. This is remarkable considering that the SNSF is not co-funding any COFUND projects. This implies that COFUND plays an important role in the institutional strategies of Swiss research organisations.

Indicator	MHV	MSCA COFUND
Political context	There is a lack of female researchers in Switzerland, especially at higher level in academia. The SNSF strongly supports	<ul style="list-style-type: none"> Europe is a million researchers short and researchers often lack the necessary skills for the market.

Goal of instrument	gender balance in research.	<ul style="list-style-type: none"> • European research still suffers from a considerable loss and inefficient use of highly skilled women. • Promotion of ERA principles, including gender balance.
	<ul style="list-style-type: none"> • To enable female researchers with a non-linear career path to restart or continue their research career in a Swiss host institution. • To increase the number of female researchers in academia. 	<ul style="list-style-type: none"> • To stimulate regional, national and international programmes to foster excellence and the training of researchers. • To spread best practices of MSCA in terms of international mobility, research training and career development. • To increase numerical and structural impact of MSCA.
Beneficiaries	Female doctoral or post-doctoral students in all disciplines in a Swiss host institution.	Research organisations, research funding organisations, private organisations, as well as other legal entities managing or financing fellowship programmes for ESR as well as ER
Eligibility	<ul style="list-style-type: none"> • Women only, with no previous MHV. • No age limit. • No pre-defined theme. 	Research performing and funding organisations as well public bodies (regions, ministries, etc.) and international organisations.
Selection criteria	<ul style="list-style-type: none"> • Scientific quality of research. • Reasons for career interruption. • Potential for research career. 	<ul style="list-style-type: none"> • S&T quality. • quality and implementation capacity of applying organisations. • quality of training and transfer of knowledge. • impact. • quality of the selection process for the fellows under the programme. • in line with the Charter and Code.

Table 3-10: Comparison between MHV and MSCA COFUND along the main indicators of relevance.

The analysis carried out in the previous sections revealed strong overlap for the selected pairs of instruments. For example, it was shown in Table 3-10 that Ambizione and MSCA IF share similar characteristics. It is therefore a legitimate question to ask **whether Ambizione could be extended via the MSCA COFUND scheme.** Indeed, MSCA COFUND could provide up to €10 million additional funding to Swiss institutions over a period of up to 10 years. Considering that Ambizione has received CHF34.1 million in 2012 and with regard to the relatively low success rate of the instrument, the additional funding from COFUND could provide support to more excellent researchers. In their actual configuration, the other career development schemes of the SNSF would need some adjustments to be considered as eligible for a combination with MSCA COFUND. Notably, **the fact that the Early and Advanced PostDoc.Mobility schemes are individual scholarships and not bound with a contract to a host institution in Switzerland makes them not eligible for MSCA COFUND as such, because they are not in line with the European Charter and Code for researchers.**

3.3.2 European Research Council Grants

Switzerland has been among the main beneficiaries of ERC StG under FP7, ranking fifth after the United Kingdom, France, Germany and the Netherlands. The same applies to AdG where the Swiss institutions again performed well in the 2012 call with 26 proposals accepted for funding, i.e. around 8.6% of the total. Compared to other countries, Switzerland is fifth in terms of number of grants awarded and fourth when counting the total number of AdG since the first call in 2008. Of all small and medium sized countries and for the 2012 AdG call, Switzerland is in absolute terms outperformed by the Netherlands only.

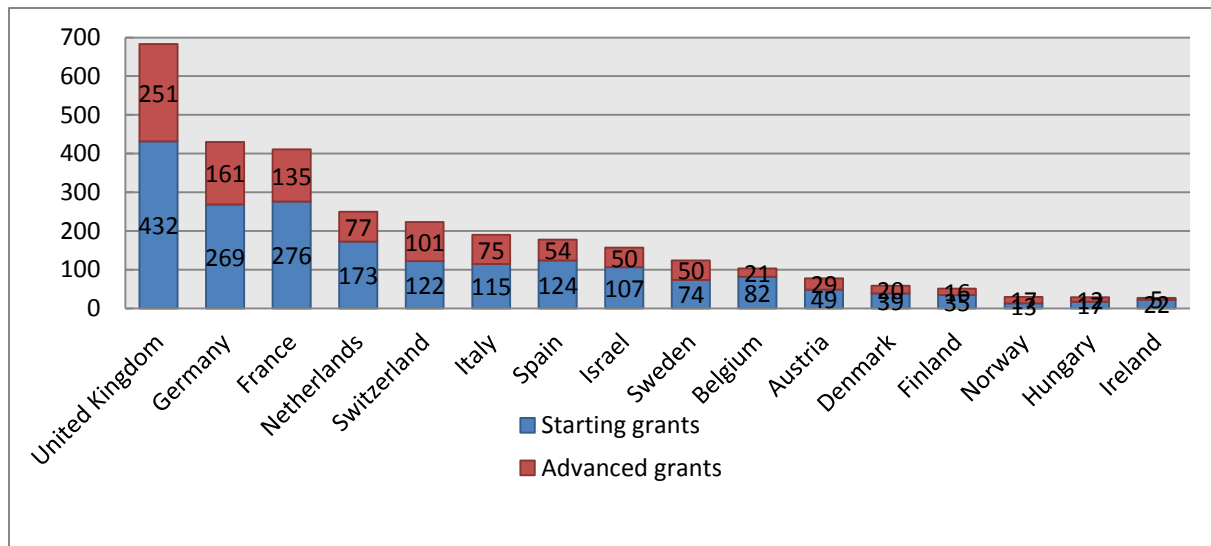


Figure 3-3: Number of ERC Grants per country of host institution (as of May 2013, source ERC).

The next four tables cover ERC Grants from the perspective of SNSF’s career development instruments. Particular attention is paid to the **Consolidator Grants** (CoG) which are at the intersection of the categories R2 and R3 by targeting researchers having seven to twelve years of experience after their doctoral degree and comes into play at a critical stage in researcher’s career.

Indicator	1. MHV 2. Ambizione	1. ERC StG 2. ERC CoG
Goal of instrument	<ol style="list-style-type: none"> <ul style="list-style-type: none"> To enable female researchers with a non-linear career path to restart or continue their research career in a Swiss host institution. To increase the number of female researchers in academia. To attract the best, next-generation foreign and Swiss talents to carry out research work in Switzerland. 	<ol style="list-style-type: none"> To support up-and-coming research leaders about to establish a proper research team and to start conducting independent research in Europe. To support researchers at the stage at which they are consolidating their own new and independent research team/ programme.
Beneficiaries	<ol style="list-style-type: none"> Female doctoral or post-doctoral students in all disciplines in a Swiss host institution. Generally up to 5 years after doctorate. 	<ol style="list-style-type: none"> At least two and up to seven years of experience since completion of PhD (or equivalent degree). At least seven and up to twelve years of experience since completion of PhD (or equivalent degree).
Selection criteria	<ol style="list-style-type: none"> <ul style="list-style-type: none"> Scientific quality of research. Reasons for career interruption. Potential for research career. <ul style="list-style-type: none"> quality, originality, relevance and independence of the research project; scientific autonomy of the applicant at the host institute; applicant's scientific track record, in particular research work and resultant publications; personal suitability of the applicant for a high-level career in academic/clinical research; proof of mobility of the applicant prior to the submission of the proposal and with regard to the choice of workplace; 	<ul style="list-style-type: none"> Excellence is the sole criterion, both for the research project and the PI in conjunction. The research project has to: <ol style="list-style-type: none"> be of a ground-breaking nature, ambitious and feasible; show its potential impact; show its scientific approach; show the added value of the group. The PI has/have to show: <ol style="list-style-type: none"> intellectual capacity; creativity; commitment.

- potential for integration in the Swiss scientific community.

Table 3-11: Comparison between MHV, Ambizione and ERC StG, CoG along the main indicators of relevance.

The individual grants of the SNSF described in Table 3-11, Ambizione and MHV, fulfil very specific objectives, namely attracting the best scientific talents into Switzerland and providing support to women in academia. **Although the goal of StG is not specifically linked to attract scientific talents to Europe, it has been intensively used by the EC for the promotion of Europe as an attractive scientific place.** The ERC has been used in that sense around the world. Therefore, beyond the official goals, Ambizione and ERC StG and CoG share strong communalities in their respective goals.

Indicator	SNSF Professorships	ERC CoG
Goal of instrument	To fund the establishment of an independent team to implement a research project. In addition, it also enables researchers to resume their careers at a Swiss HEI on returning from a stay abroad.	To support researchers at the stage at which they are consolidating their own new and independent research team/programme.
Beneficiaries	Researchers with no less than two years and no more than nine years of experience after doctorate.	At least seven and up to twelve years of experience since completion of PhD (or equivalent degree).
Selection criteria	<ul style="list-style-type: none"> • Key scientific assessment criteria: <ol style="list-style-type: none"> Scientific value and relevance of the project; Originality of research objectives; Adequacy of methodical approach; Feasibility of the project; Scientific track record of the applicants; Applicants' expertise in relation to the project. • Special attention is paid to: <ol style="list-style-type: none"> exceptional scientific ability; candidates' suitability and commitment to teaching. • The NRC may stipulate further criteria in the regulations and terms of the calls for proposals. 	<ul style="list-style-type: none"> • Excellence is the sole criterion, both for the research project and the PI in conjunction. • The research project has to: <ol style="list-style-type: none"> be of a ground-breaking nature, ambitious and feasible; show its potential impact; show its scientific approach; show the added value of the group. • The PI has/have to show: <ol style="list-style-type: none"> intellectual capacity; creativity; commitment.

Table 3-12: Comparison between SNSF Professorships and ERC CoG along the main indicators of relevance.

In the light of the indicators chosen, **SNSF Professorships, ERC StG and ERC CoG show very similar characteristics both in their goals** (see Table 3-12) **and in the career stage in which they provide support.** Providing funding to researchers with between two and nine years of experience after doctorate, SNSF Professorships cover a larger career span than either ERC StG or ERC CoG. Let us recall that the ERC Scientific Council recently decided to reduce the period of required career years for applying to ERC StG and introduced the ERC CoG to cover the remaining years of the original instrument because of the finding that young researchers applying to the grant had less chance to succeed due to the competition with more experienced researchers. It might be interesting to investigate whether the SNSF Professorships also tend to support more experienced researchers. **Depending on the outcome, and if the SNSF Professorships eventually turn to be more similar to the ERC StG scheme, the experience years in the eligibility criteria of SNSF Professorships could be revised to better suit young researchers** in their transition from post-doctoral researchers to Assistant Professors or APTT. This could be further evaluated within the SNSF's Career division.

A last point of divergence between SNSF Professorships and the instruments of the ERC is that the former includes ‘candidates suitability and commitment to teaching’ in their selection criteria. Indeed, ERC Grants only require research activities and no link to teaching is made at all. On the other side, SNSF Professorships grant holders should dedicate 80% of their time to the research and 20% to teaching. **Bearing in mind that the primary mission of the SNSF is to support the Swiss science system, the focus on the teaching made by the SNSF Professorships clearly responds to this fundamental objective.** By encouraging the training of the next generation of scientists, **SNSF Professorships strengthen not only the Swiss research system but also the whole knowledge society of the country.** Note, nevertheless, that ERC Grants are not prohibiting teaching *per se*, but leave this aspect of an academic career to be sorted out between the Principal Investigator (PI) and the host institution. Considering that the SNSF is in dialogue with the Rectors’ Conference of the Swiss Universities (CRUS) and may consult the rectors in the development of instruments such as SNSF Professorships, contrary to the ERC that proactively avoids to involve itself into the bilateral link between the PI and the host institution, it could be useful to ask why this compulsory teaching dimension has been set.

Indicator	1. Early Postdoc.Mobility 2. Advanced Postdoc.Mobility	1. ERC StG 2. ERC CoG
Goal of instrument	To enable young scientists who wish to pursue an academic career in Switzerland after obtaining their doctorate to make a research stay abroad in order to acquire more in-depth knowledge and enhance their scientific profile.	<ol style="list-style-type: none"> To support up-and-coming research leaders about to establish a proper research team and to start conducting independent research in Europe. To support researchers at the stage at which they are consolidating their own new and independent research team/programme.
Beneficiaries	<ol style="list-style-type: none"> Up to 2 years after doctorate (and up to 6 for medical researchers after state examination). Up to 5 years after doctorate (and up to 9 years for medical researchers after state examination). 	<ol style="list-style-type: none"> At least two and up to seven years of experience since completion of PhD (or equivalent degree). At least seven and up to twelve years of experience since completion of PhD (or equivalent degree).
Selection criteria	<ul style="list-style-type: none"> the quality, originality and topicality of the research project to be carried out during the research stay; the scientific track record of the applicants; the likelihood of the applicants successfully completing the planned further education; the personal aptitude of the applicants for a research career; the quality of the intended research location, i.e. the working conditions, possibilities for professional supervision and further education, and the expected extent of mobility. the coherence of mobility measures in the case of fellowship stays split into two parts or more. 	<ul style="list-style-type: none"> Excellence is the sole criterion, both for the research project and the PI in conjunction. The research project has to: <ol style="list-style-type: none"> be of a ground-breaking nature, ambitious and feasible; show its potential impact; show its scientific approach; show the added value of the group. The PI has/have to show: <ol style="list-style-type: none"> intellectual capacity; creativity; commitment.
Success rate	<ol style="list-style-type: none"> 62% (2012). 53% (2012). 	<ol style="list-style-type: none"> Overall success rate from 2007 to 2012 of 10.7%. In comparison, Switzerland has an overall success rate of 22% for the same period. Not available.

Table 3-13: Comparison between Early and Advanced Postdoc.Mobility and ERC StG, CoG along the main indicators of relevance.

Advanced Postdoc.Mobility shows an interesting interplay with both ERC StG and CoG when it comes to the type of beneficiaries by targeting researchers up to five years after their doctorate degree, i.e. in-between both ERC Grants. Besides the difference in terms of goal (ERC StG and CoG set the focus on researchers in the process of becoming fully independent), there is a **big difference as regards the respective success rates**: while it is above the line of 50% for Early and Advanced Postdoc.Mobility (for 2012), the ERC StG is just above 10% for the period between 2007 and 2012. In this regard, let us add that **Switzerland recorded a better performance than the vast majority of EU MS by reaching an overall success rate of 22% for the same period**. Last but not least, there is a **difference in terms of fame and visibility** between the instruments under review purely given the fact that there is a strong competition in the calls for ERC Grants which *a priori* makes them more important for the career in the CV than the SNSF fellowship.

A last pair of RFI showing interest for comparison is **Direct Project Funding** coupled with the **ERC Advanced Grants (AdG)**. Indeed, both instruments are dedicated to researchers of any nationality able to conduct research independently.

Indicator	Direct Project Funding	ERC AdG
Political context	Main RFI of the SNSF.	The idea for establishing the ERC first came out of widespread discussions at a time when no clear European mechanism to support basic research on a broad front existed.
Goal of instrument	To fund investigator-driven (basic) research, including interdisciplinary projects.	To allow exceptional established and independent research leaders to pursue groundbreaking, high-risk projects that open new directions in their respective research fields or other domains.
Beneficiaries	Any researcher working in Switzerland as well as those doing research at specific Swiss institutions abroad.	Scientifically independent researchers with a profile which identifies them as leaders in their respective field(s) of research.
Eligibility	<ul style="list-style-type: none"> • have successfully carried out research for several years and be capable of running a project under sole responsibility; • certify that: <ol style="list-style-type: none"> a. a substantial contribution to the research project will be made; b. the necessary RI is at disposal; c. they are not bound by research instructions from superiors, namely with regard to the research methods. 	<ul style="list-style-type: none"> • Researchers of any nationality and age, scientifically independent, with recent research track-record and profile which identifies them as leaders in their respective field(s) of research; • Research must be conducted in a public or private research organisation located in one of the EU MS or AC.
Selection criteria	<ul style="list-style-type: none"> • S&T quality; • For use-inspired research, the sub-criterion 'broader impact' is included. 	<ul style="list-style-type: none"> • Excellence is the sole criterion of evaluation, both for the research project and the PI in conjunction. • The research project has to: <ol style="list-style-type: none"> (a) be of a ground-breaking nature, ambitious and feasible; (b) show its potential impact; (c) show its scientific approach. • The PI has/have to show: <ol style="list-style-type: none"> (a) intellectual capacity; (b) creativity; (c) commitment.
Success rate	51% overall.	Overall success rate from 2008 to 2012 of

14.2%. In comparison, Switzerland has an overall success rate of 27.6%.

Table 3-14: Comparison between Direct Project Funding and ERC AdG along the main indicators of relevance.

As shown in Table 3-14, **Switzerland performed very well in the ERC AdG since the first call in 2008, with a success rate well above the average** (27.6% for Switzerland compared to 14.2% overall). Taking into account that the ERC AdG is clearly restricted to independent and leading researchers while Direct Project Funding is open to any researcher working in Switzerland and having successfully carried out research for several years and capable as well of running a project under sole responsibility, **the success rate of Direct Project Funding above the line of 50% and the good performance of Switzerland at European level in this competitive scheme indicate that there is a potential for complementarity between them by providing funding to the same researchers at different career stages.**

3.3.3 Conclusions

The SNSF and the ERC share strong complementarities in their goals even though they provide support for researchers that are in a different stage of their career. In particular, SNSF Professorships and Postdoc.Mobility fellowships share several communalities with the ERC StG and CoG. On top of that, SNSF Professorships show strong overlap with the ERC CoG in their goals, eligibility criteria and types of beneficiaries. It has been shown that SNSF Professorships include a teaching dimension that is absent from the ERC Grants. This unique difference makes SNSF Professorships a relevant instrument to the Swiss science system.

In addition to this, **considering the very low success rate of SSH researchers in the ERC, the SNSF Professorships provide vital funding from researchers in this area in Switzerland.** In this sense, SNSF Professorships could be used to provide additional support to researchers at the most sensitive level in their careers, namely the transition from a post-doctoral researcher to an assistant professor or APTT. It must be seen, however, how SNSF Professorships holders perform in the following step in their career, when they apply to the ERC AdG, and how SNSF Professorships interplay with ERC StG, CoG and AdG career ladder schemes. This analysis could be undertaken by differentiating between field of study to understand the cause of the low success of SSH researchers¹⁰.

Finally, it is worth pointing out that **several research funding organisations in Europe** like e.g. the Research Foundation Flanders (from 2007 only for StG), the Swedish Research Council (only for StG), the Research Council of Norway (only for StG) or the Science Foundation Ireland¹¹ **have decided to fund researchers that are positively evaluated by the ERC, but were beneath the funding line.** In line with the expected rise in submission numbers to ERC Grants, the success rates are expected to further drop.

¹⁰ Please note that this is underway: an analysis is currently performed by a working group.

¹¹ These examples were provided by the EC as of July 2013 as part of a **non-exhaustive list** which included as well a number of organisations that have funded researchers who were positively evaluated by the ERC but who could not be funded through the ERC, namely: the Academy of Finland, the National Research Fund of Luxembourg, the Ministry of Education, Youth and Sports of the Czech Republic, the Ministry of Science and Higher Education of Poland, the General Secretariat for Research and Technology of Greece, the Romanian Executive Agency for Higher Education, Research, Development and Innovation Funding.

3.4 Centres of excellence

The completion in 2013 of the first series of **National Centres of Competence in Research (NCCR)** after twelve years of research work and the launching in 2014 of new NCCR within the scope of the fourth call make of this year a turn-over year for Swiss Centres of excellence. By sustainably influencing and structuring the Swiss research landscape in areas of major strategic importance, NCCR can be compared to varying degrees to the instruments of the EU for 'Spreading excellence and widening participation', namely **Teaming, Twinning and ERA Chairs**, as well as to **FET Flagships**.

3.4.1 NCCR and Spreading excellence and widening participation instruments

Indicator	NCCR	1. Teaming 2. Twinning 3. ERA Chairs
Political context	Several goals were not reachable with the predecessor of NCCR, namely SPP, in the late 1990's. Therefore, a follow-up programme was put in place in order to better differentiate with NRP.	Europe is being held back by persistent disparities in its R&I capabilities which are the key to future prosperity. Many regions in Europe are underperforming on research, both in terms of their overall output and in terms of their participation in EU-funded research.
Goal of instrument	<ul style="list-style-type: none"> To promote scientific excellence in areas of major strategic importance for the future of Swiss research, economy and society. To contribute to a better structuring of the Swiss research environment, and to optimised task assignment between research institutions. To create networks devoted to scientific co-operation and partnerships in academia as well as with the public and private sector. 	<ol style="list-style-type: none"> Creation of new (or significant upgrade of existing) centres of excellence in low-performing RDI MS and regions. To establish, reinforce and develop viable and sustainable partnerships between regional research actors and leading scientific institutions in Europe. To stimulate the networking of an Emerging Institution (EI) and improve its exposure through links with at least two internationally-leading institutions. To significantly strengthen a defined field of research and establish, reinforce and develop partnerships. To limit the brain drain, improve participation of less performing regions in the European framework programmes for R&I and promote scientific excellence across the whole EU.
Instrument duration	12 years.	<ol style="list-style-type: none"> 18 months to develop the required deliverables, in particular the business plan, and a longer period for the implementation phase. More or less 2 years. Up to 5 years.
Beneficiaries	PI and researchers.	<ol style="list-style-type: none"> and 2. Internationally-leading institutions with EI. Public universities and other eligible research organisations.

Table 3-15: Comparison between NCCR and Teaming, Twinning and ERA Chairs along the main indicators of relevance.

While the goal of improving a defined field of research and establish, reinforce and develop partnerships is stressed by both NCCR and the instruments under Spreading excellence and widening participation, **there seems to be significant differences in their respective scope and in the means provided**. NCCR last for twelve years whereas their equivalent at

European level have a shorter duration of up to five years for ERA Chairs. Moreover, even though the NCCR contain a capacity building dimension by targeting structural change at institution, NCCR are attributed mostly following scientific criteria of excellence. This instrument is about linking good institutions to each other. And especially it is about working on topics of strategic importance to Switzerland. This is not a case for **Teaming and Twinning, where explicit references to low-performing regions and links with Cohesion funds are encouraged**. The similarity to the **FET Flagships** seems more interesting in the sense that no reference to low-performing regions is made.

3.4.2 NCCR and FET Flagships

Indicator	NCCR	FET Flagships
Political context	Several goals were not reachable with the predecessor of NCCR (SPP) in the late 1990's. Therefore, the NCCR scheme was launched in 2001 as a follow-up programme in order to better differentiate with NRP.	FET Flagships seek impact on science, but also on technology and society, with long-term results. They are meant to bridge the science pillar and the two other pillars.
Goal of instrument	<ul style="list-style-type: none"> • To promote scientific excellence in areas of major strategic importance for the future of Swiss research, economy and society. • To contribute to a better structuring of the Swiss research environment, and to optimised task assignment between research institutions. • To create networks devoted to scientific co-operation and partnerships in academia as well as with the public and private sector. 	<ul style="list-style-type: none"> • To shape, build and realise 'a truly ERA'. • To avoid spreading S&T basic research funding too thinly at national and EU levels by coordinating efforts. • To create a framework in which scientists and technologists can tackle problems in a multidisciplinary approach. • To help to link scientific and technological research to innovation, and eventually towards commercialisation.
Instrument duration	12 years.	Expected long term commitment over a period of at least 10 years.
Size of overall budget	Annual contribution assumed by the SNSF of CHF3 to CHF5 million per NCCR.	Up to €100 million per year per initiative where appropriate.
Beneficiaries	PI and researchers.	<ul style="list-style-type: none"> • The main contribution goes to the Collaborative Projects (CP) and Coordination and Support Actions (CSA). • Funds are also available for Support Actions for the ERA-NET.
Success rate	About 10%.	6 potential initiatives were identified out of 23 proposals as part of the 2010 call for 'Flagship Pilots'. 2 of these initiatives have been selected for launch in 2013, which means a success rate of 8.7%.

Table 3-16: Comparison between NCCR and FET Flagships along the main indicators of relevance.

There are strong communalities between NCCR and FET Flagships in the sense that they both fund bottom-up projects which aim at having a structural impact on the regional research landscapes. The NCCR is very much about strengthening the Swiss research landscape and structure. The high commitment of applicants, their considerable investments and the low success rate for FET Flagships makes it an instrument that has impact on research organisations even before the final funding has been awarded. **However, an evident difference exists in the scope, in the amount of funds and in the size of consortia foreseen by both schemes.**

3.4.3 Conclusions

While differences were stressed concerning the interplay between NCCR and Spreading excellence and widening participation instruments, FET Flagships shows interesting communalities with the NCCR scheme, even though the scope and dimension given to FET Flagships under Horizon 2020 is on another level. **The low success rate of FET Flagships and the fact that several potential initiatives of a high quality were not selected for launch as part of the pilot call make it an instrument of interest for the reception at national level.** A couple of other schemes that are comparable to FET Flagships would be worth a comparison with NCCR, in particular **the JPI and the Knowledge and Innovation Communities** (KIC) which are allocated an important budget as well.

The EIT is creating a new European way to deliver essential economic growth through innovation. The KIC as the operational parts of the EIT aim to foster innovation in order to increase competitiveness in Europe and tackle societal challenges, therewith developing the EIT as a true 'innovation impact investor'. Based on the experience of the three already-existing KIC, the EIT needs now structures in place like a good venture capitalist, not only providing the money, but also the networks and the connections. Horizon 2020 will provide money for developing the ongoing KIC but also for implementing another two waves of KIC.

3.5 Thematic programmes

Our comparison focuses on **National Research Programmes** (NRP) which provide scientific contributions towards solutions to urgent problems that are of national importance, whether they relate to society, politics or the economy. Indeed, they are the only funding scheme of the SNSF whose topics and budget are defined by the Federal Council. In accordance with our classification model, two sets of comparison are developed in the next lines: the JPI on the one hand and the CP on the other.

3.5.1 NRP and Joint Programming Initiatives

Through the NRP the SNSF supports researchers' participation in JPI (SNSF, 2013b, p. 11). Indeed, Switzerland is member of five out of ten JPI launched between 2009 and 2012.

Indicator	NRP	JPI
Political context	NRP were created in 1975 in order to better address and steer research topics of relevance for the society.	The concept was introduced by the EC in 2008 to support implementation of the ERA, which stresses the need for a reciprocal opening-up of national research programmes.
Goal of instrument	<ul style="list-style-type: none"> • To achieve an overall goal whose topics and budget are defined by the Federal Council. • To provide the political authorities with scientific background in order to tackle societal issues or needs. • Focus set on transdisciplinarity and on impact. 	<ul style="list-style-type: none"> • To develop critical mass to address major societal challenges more effectively in a few key areas. • To pool national research efforts in order to make better use of Europe's public R&D resources by concerted and joint planning, implementation and evaluation of NRP.
Beneficiaries	Mainly university professors, as well as HEI and private research organisations.	Regional, national and European stakeholders, including where appropriate the private sector besides scientific communities and funding agencies.
Selection procedure	The selection process is launched by SERI. Selected topics are submitted to the Federal Council. A feasibility study is carried out in	<ul style="list-style-type: none"> • Joint Programming is a process that is led by the MS/AC, which submit thematic proposals evaluated by the High Level Group

	<p>order to evaluate the suitability of the instrument and the potential in Switzerland. Federal offices then participate in the selection process together with the steering Committee and international panels of experts from abroad.</p>	<p>for Joint Programming (GPC) through peer review procedures.</p> <ul style="list-style-type: none"> • The role of the EC is only to facilitate the Joint Programming process if MS wish so.
Eligibility	<p>NRP usually requires an interdisciplinary research approach and practical know-how on the part of researchers. Nevertheless, there are no formal eligibility criteria.</p>	<p>The criteria for the identification of specific areas are that they should address a pan-European/global socio-economic or environmental challenge, there is a clear added value in the area and it is sufficiently focused so that clear realistic objectives can be met.</p>
Selection criteria	<ul style="list-style-type: none"> • scientific quality and originality; • feasibility and compliance with the programme's goals; • implementation and valorisation of the project; • team and infrastructure (including inter-disciplinarity). 	<ul style="list-style-type: none"> • Sufficient and effective commitment of the MS/AC concerned. • The theme addresses a European or global challenge and is sufficiently focused so that clear and realistic objectives can be laid down and followed up. • Clear added value as regards both economies of scale and better thematic coverage. • Relevant regional, national and European stakeholders, including where appropriate the private sector besides scientific communities and funding agencies. • Potential of translating the output of good public research into benefits for European citizens and European competitiveness, and of increasing the efficiency and impact of public R&D financing.

Table 3-17: Comparison between NRP and JPI along the main indicators of relevance.

According to the selected set of indicators, the table shows little similarity between the two schemes. **In both cases, the state is fully involved in the definition of the topic and the implementation of the project**, in a top-down manner. As shown by Table 3-17 in the selection procedure section, this has to be balanced with the fact that NRP follow a bottom-up line when it comes to the call for proposals. **Each JPI is in principle free to select the appropriate funding tools that best fit**, depending on conditions and circumstances while avoiding any unnecessary proliferation of approaches. This is translated into a varying geometry depending on every launched initiative. Moreover, **the purpose of JPI is precisely to align national programmes without providing additional money from the EC** (except for the support of coordination actions through CSA). In any case, JPI consists of 'aligned' NRP; the comparison is therefore not really possible, especially because the choice is made between the MS and not dictated by the EC.

3.5.2 NRP and Collaborative Projects

Indicator	NRP	CP
Political context	<p>NRP were created in 1975 in order to better address and steer research topics of relevance for the society.</p>	<p>CP under Horizon 2020 will foster free movement of ideas, knowledge and talented researchers.</p>
Goal of instrument	<ul style="list-style-type: none"> • To achieve an overall goal whose topics and budget are defined by the Federal Council. • To provide the political authorities with scientific background in order to tackle 	<p>CP are research projects carried out by consortia aiming at developing new knowledge, new technology, products, demonstration activities or common resources for research.</p>

	societal issues or needs.	
	<ul style="list-style-type: none"> • Focus on transdisciplinarity and on impact. 	
Beneficiaries	Mainly university professors, and HEI and private research organisations as well.	Consortia made up of participants from different countries, industry and academia.
Eligibility	NRP usually requires an interdisciplinary research approach and practical know-how on the part of researchers. Nevertheless, there are no formal eligibility criteria.	<ul style="list-style-type: none"> • For large scale integrated research projects: At least five independent legal entities, each of which is established in a EU MS or AC, and no two of which are established in the same country; • For small or medium-scale focused research projects: At least three independent legal entities, each of which is established in a MS or AC, and no two of which are established in the same country; • For small or medium-scaled focused research projects for specific co-operation action dedicated to international co-operation: At least four independent legal entities, two of which are established in a MS or AC, and none of which are established in the same country. The other two must be established in different ICPC.
Selection criteria	<ul style="list-style-type: none"> • scientific quality and originality; • feasibility and compliance with the programme's goals; • implementation and valorisation of the project; • team and infrastructure (including inter-disciplinarity). 	<ul style="list-style-type: none"> • scientific and/or technological excellence; • relevance for the aims of the SP; • potential impact through development, dissemination and use of project results (including the innovative dimension); • quality and efficiency of implementation and management of projects.

Table 3-18: Comparison between NRP and CP along the main indicators of relevance.

Collaborative Projects (CP) are the main funding instrument under the Societal Challenges pillar of Horizon 2020. In this sense, CP are also used to address projects on pre-defined topics, on a smaller scale than NRP. This is explicitly stated in the selection criteria of the CP by 'relevance for the aims of the Specific Programme (SP)'. The additional criteria in CP to have international consortia of partners from at least three different countries is also a significant difference with the way NRP work. But most fundamentally, the goals of NRP and CP differ, with the first addressing national priorities and the second a set of challenges identified in Horizon 2020, with an additional focus on innovation.

3.5.3 Conclusions

Even though JPI show an interesting potential, it should be highlighted that their geometry can change to varying degrees depending on every initiative that is launched. In this regard, let us add that the societal challenges approach that Horizon 2020 follows marks a strong paradigm shift in the way research is seen by the EC. Indeed, the **societal challenges break traditional research silos and target solution-driven interdisciplinary actions**, which is at odds with the structure of the SNSF.

3.6 Knowledge transfer; cooperation with industry; commercialisation of research results

In the perspective of the EU, knowledge transfer has an increasing importance for research, especially in all fields of transdisciplinary and cross-border research. The EC stated that "improving knowledge transfer between universities, public research organisations and industry is

essential for ensuring that publicly funded research results contribute to economic output and can effectively support innovation and the development of new services and products.” (EC, 2012e, p. 9). Even though some Swiss instruments allow for a stay in a ‘non-academia’ host institution, there is no instrument with strong industrial component.

As expressed in its Action Plan 2013-2016, the “SNSF concentrates on funding basic research rather than use-inspired research, the objective of which is to make direct use of findings for commercial purposes. [...] The objective is to close the gaps between the funding of pure basic research (usually financed by the SNSF) and direct use-inspired research (often financed by the Commission for Technology and Innovation (CTI))” with a view of overlapping funding (SNSF, 2013b, p. 10).

In light of our classification model, no instrument may compare adequately to those at European level dedicated to bringing research closer to market. **Horizon 2020 offers plenty of instruments that are not available in Switzerland and Swiss SME and industry will have to do a great effort to participate in these instruments.** Further consequences are developed in the next chapter.

The ERC, with its Proof-of-Concept (PoC) idea, showed that it is possible to link support to curiosity-driven basic research with more market-oriented activities. The suitability of such an instrument for the SNSF would be worth investigating.

3.7 Infrastructures; equipment

Activities for RI in Horizon 2020 aim at completing 60% of the infrastructure identified in the 2010 European Strategy Forum on RI (ESFRI) Roadmap by 2015. In this regard, latest studies stress the need to progress in terms of implementation. **These developments are of big importance for the SNSF.** Indeed, there might be a need for the SNSF in the future to ‘harmonise’ national funding of RI in the European and global contexts. The roadmap focuses as well on the **training of human resources** and **providing access to the infrastructures.**

The SNSF, on its side, provides via FLARE additional resources to permit and optimise the use by Swiss researchers of international RI in very specific fields: particle physics, astrophysics and astroparticle physics. There is, however, no instrument at European level specifically aiming at funding equipment although this is included in their direct costs.

3.8 International cooperation

Three instruments have been placed under this category as regards the SNSF: **the Enlargement contribution, SCOPES and r4d.** SCOPES contributes to further increasing the performance and competitiveness of Eastern European partners, in preparation for future collaboration in EU FP, while in r4d the focus is on reducing poverty and protecting public goods in developing countries in Africa, Asia and Latin America. Last but not least, Switzerland contributes to the EU’s new MS in the East through the Swiss Enlargement contribution. In this respect, there is an **important distinction to make between international cooperation (INCO) at a global level and INCO limited to the European continent.** The first section concentrates on instruments at European level whereas the second section draws attention to opportunities for the SNSF at a global level.

European level

3.8.1 SCOPES and Twinning

Indicator	SCOPES (institutional partnerships) ¹²	Twinning
Political context	Eastern European research institutions are supported in their transition process towards international standards.	Europe is being held back by persistent disparities in its R&I capabilities which are the key to future prosperity. Many regions in Europe are underperforming on research, both in terms of their overall output and in terms of their participation in EU-funded research.
Goal of instrument	To promote scientific co-operation between research groups and institutions in Switzerland and Eastern Europe as well as the new independent states of the former Soviet Union.	<ul style="list-style-type: none"> • To stimulate the networking of an Emerging Institution (EI) and improve its exposure through links with at least two internationally-leading institutions. • To significantly strengthen a defined field of research and establish, reinforce and develop partnerships.
Beneficiaries	<p>There are two categories of partner countries:</p> <ul style="list-style-type: none"> • A first group (category A) featuring the West Balkan States (Albania, Bosnia-Herzegovina, Kosovo, Macedonia, Montenegro, Serbia), South Caucasus (Armenia, Azerbaijan, Georgia) and Central Asia (Kyrgyzstan, Tajikistan, Uzbekistan) as well as Moldova and the Ukraine • A second group (category B) featuring the Eastern European members of the EU (Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia) as well as Croatia and Russia. 	Internationally-leading institutions with EI.

Table 3-19: Comparison between SCOPES and Twinning along the main indicators of relevance.

Both SCOPES (institutional partnerships) and Twinning promote scientific cooperation with countries falling in principle in the same category, although the SNSF has set up a clear list of beneficiaries as opposed to the Twinning instrument where the term ‘Emerging Institution’ is not defined through a list of targeted countries. Indeed, **unlike FP7, Horizon 2020 does not allow for discrimination between MS.**

3.8.2 Enlargement contribution and Teaming

Indicator	Enlargement contribution	Teaming
Political context	Switzerland participates in the reduction of economic and social disparities in the enlarged EU. Romania and Bulgaria benefit from that contribution. Scientific research is one of the chosen areas of co-operation. The Swiss Agency for Development and Cooperation (SDC) has mandated the SNSF to conduct the two programmes.	Europe is being held back by persistent disparities in its R&I capabilities which are the key to future prosperity. Many regions in Europe are underperforming on research, both in terms of their overall output and in terms of their participation in EU-funded research.
Goal of instrument	To support the efforts to reduce economic and social disparities within the EU through	<ul style="list-style-type: none"> • Creation of new (or significant upgrade of existing) centres of excellence in low-

¹² Please note that there are different instruments under the SCOPES scheme. Our analysis focuses on the institutional partnerships, which have been introduced to support the development of the institution in Eastern Europe and funds e.g. some curriculum development activities.

	<p>project following one of five overarching project objectives:</p> <ol style="list-style-type: none"> promoting economic growth and improving working conditions; improving social security; improving public safety; protecting the environment; strengthening civil society. 	<p>performing RDI MS and regions.</p> <ul style="list-style-type: none"> To establish, reinforce and develop viable and sustainable partnerships between regional research actors and leading scientific institutions in Europe.
Beneficiaries	Groups of researchers from Romania/Bulgaria, jointly with groups of researchers from Switzerland.	Internationally-leading institutions with EI.

Table 3-20: Comparison between the Enlargement contribution and Teaming along the main indicators of relevance.

As shown by the table above, both the Enlargement contribution and Teaming aim at closing the innovation divide in Europe and are linked to the discussion of the Cohesion funds. **Teaming allows to combine Horizon 2020 funding with cohesion money, whereas projects under the Enlargement contribution are directly funded under the Cohesion funds paid by Switzerland to the EU.**

Global level

Beyond Europe, there are also chances to take for INCO at a global level, whether in a bilateral or multilateral way. The previous report of SwissCore on INCO in S&T has developed on a line of action to seize opportunities and shape conditions for Switzerland. "The practical implication of the 'seize, shape and contribute' policy option developed by Stäger would be that **the European instruments are an additional opportunity to realise the Swiss INCO S&T strategy while at the same time contributing to the integration of the Swiss research system in the European landscape.**" (Stäger, 2013, S. 51)

In Horizon 2020 the EU MS will be involved in the identification of areas for INCO and the development of multi-annual roadmaps for cooperation in R&I with key partner countries and regions. In parallel to bilateral state agreements, INCO with BRIC(S) countries shall not be funded under Horizon 2020, with an exception in the case of South Africa though. It would be interesting to compare this situation in line with the new role for the SNSF in the Swiss bilateral programmes. More related considerations are provided in the next chapter.

Capacity building projects in higher education with neighbourhood countries of the future European programme for education, training, youth and sport 2014-2020 'Erasmus+' **is another European instrument comparable to SCOPES which could bring other opportunities to the SNSF.**

3.8.3 Conclusions

Going beyond what is offered at the European level, the opportunities for INCO at a global level are also a chance for the SNSF to **show that Switzerland is engaging itself with other countries of less research-intensive activity, therewith working on the misperception in Europe of Switzerland plundering EU R&I funds.**

3.9 Science communication

Science communication encourages researchers to present their projects and findings and to engage in exchanges with the public. This category covers four instruments as regards the SNSF: Scientific conferences, International Exploratory Workshops, Publication grants and

Agora, which all together represented 1% of SNSF's budget in 2012 (SNSF, 2013a, p. 26). No instrument at European level with such a focus allows for a coherent comparison.

3.10 Transversal issues

We develop in the next table the main differences that apply at a more general level between the SNSF and Horizon 2020. This allows for a better overview of the transversal principles lying behind the Swiss and European research landscapes, prior to the discussion of two major and timely issues, namely: OA to research data and the reimbursement models in Horizon 2020. This is done through the comparison of their respective funding rules, overall budgets and Intellectual Property Rights (IPR).

Indicator	SNSF	Horizon 2020
Funding rules	The overhead rate compensating for indirect expenses at institutions of higher education will not be raised to 20% as initially intended, but remain at the current 15%; the overhead contributions will not be extended to the NCCR. Compensation for indirect expenses will therefore remain low by international standards.	100% (70% for innovation activities) direct costs and flat rate of 25% of the direct costs for the indirect costs.
Size of overall budget	CHF3.7 billion for the period 2013-2016, i.e. around CHF900 million less than the amount applied for in its multi-year programme.	Latest figures indicate €70.2 billion in constant 2011 prices – i.e. without taking the inflation into account - which represents a 14% cut compared to the original proposal.
Intellectual Property Rights (IPR)	In addition to data intended for publication, grantees are obliged to share additional research data as part of the reporting and monitoring procedures. The duty to supply information and data continues to apply for a maximum of three years after completion of the research.	Each participant shall ensure that the foreground it owns is disseminated as swiftly as possible. Access rights to background data (art. 42-43-44-45 RfP) may be requested by any participant if it needs them for carrying out its own work under the project.

Table 3-21: Transversal principles along the main indicators of relevance.

3.10.1 Considerations on Open Access

Research builds on former work and depends to a certain extent on scientists' possibilities to access and share scientific information. As stated by the EC, the "advent of the Internet and electronic publishing has resulted in unprecedented possibilities for the dissemination and exchange of information." (EC, 2012e, p. 9). However, the access to and use of EU-funded research results is limited.

It was mentioned previously that the ERA consists of a single space in which researchers, scientific knowledge and technology can circulate freely. OA, which is defined as free access over the Internet to scientific data and scientific publications generated by public funding, aims to promote the dissemination of knowledge, "thereby improving the efficiency of scientific discovery and maximising the return on public investment in R&D" (EC, 2012e, p. 9). The main advantages of OA that are foreseen by the EC are in particular:

- foster R&I and improving return on investment;
- allow the benefits of science to be exploited by all (researchers, industry, citizens) and give equal access in all MS;
- give free access to results of publicly-funded research; and
- drive down the costs for dissemination without sacrificing quality.

Obviously, there are some barriers to change: the long-term preservation of private data and the case of OA to data (as opposed to OA to publications) are considered as a problem.

The EC has announced **pilot calls in Horizon 2020 with mandatory provisions for OA to research data**. Stakeholders within the European research community are discussing at the moment the possibility for research data underlying publications to be made available as general rule.

As an example, funders in the United Kingdom (UK), in particular the UK Research Councils (UKRC) and the Wellcome Trust, already have policies on data management and on OA to research data. Also, the Swedish Research Council and The Netherlands Organisation for Scientific Research (NWO) are in the process of designing guidelines on OA to research data. When applying to the UKRC for funding, researchers must include DMP in the application. The UKRC OA policy is built on seven principles:

- a) Data stemming from publicly funded research is a public good and must be openly accessible.
- b) Institutional and project specific data management policies and plans should be done in accordance with relevant standards and community best practices.
- c) Research data should be made easily accessible and sufficient metadata made available to understand and make use of the data.
- d) Constraints on OA to research data must be maintained to protect legitimate commercial, legal and ethical interests.
- e) Originators of datasets must keep the rights of first use.
- f) Re-users have responsibilities to acknowledge and cite the sources of the data.
- g) Data sharing is not free and the costs must be covered by research funders.

On its part, the SNSF already jointly signed the 'Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities' with other scientific organisations in Switzerland in 2006. In doing so, it underlined its intention to support the efforts towards establishing OA in Switzerland. Since its consultation with the CRUS, the SNSF issued regulations on OA in 2007.

The SNSF maintains a web-based, publicly accessible database on research projects, in line with its open data policy. Before starting, during and after completing a project, grantees are obliged to supply the SNSF with the required information and data to feed in the publicly accessible project database pursuant to Article 33 and 44 of the 'Funding Regulations of the SNSF on research grants'. Based on Article 46 of the above-mentioned Funding Regulations, the NRC of the SNSF issued 'Regulations on information, valorisation and rights to research results' in 2008 which state that the duty to supply information and data continues to apply for a maximum of three years after completion of the research as from the date indicated on the final report. In addition to data intended for publication, grantees of the SNSF are obliged to share additional research data as part of the reporting and monitoring procedures.

Nevertheless, Switzerland is still running behind compared to European countries like the UK and the Netherlands. As a strong trend towards OA to research data establishes itself in Europe, **it is in the interest of the Swiss science system that similar values are embraced by researchers at Swiss institutions in order to facilitate their participation in European projects** and be well prepared when DMP become a mandatory eligibility criterion.

Further considerations on OA to research data are provided in the next chapter.

3.10.2 Considerations on the reimbursement models

EU research grants are based on the reimbursement of direct and indirect costs incurred by the beneficiaries for their projects. In FP7, both direct and indirect costs are generally reimbursed on the basis of actual costs. For Horizon 2020, the EC has proposed to simplify the grant management for the beneficiaries by reimbursing indirect costs in the form of a flat-rate.

Direct costs are defined as those incurred that are 'necessary' for the project or incurred 'during' the investigation as well as being 'directly linked to the implementation of the project'. **Direct costs shall be covered by a 100% reimbursement for R&D projects and by 70% for closer-to-market initiatives. All indirect costs are set to be covered by a flat rate of 25% of the direct costs.**

Article 24 of the RfP in Horizon 2020 states: "Indirect eligible costs shall be determined by applying a flat rate of 25% of the total direct eligible costs, excluding direct eligible costs for subcontracting and the costs of resources made available by third parties which are not used on the premises of the beneficiary, as well as financial support to third parties. By way of derogation, indirect costs may be declared in the form of a lump sum or unit costs when provided for in the WP or work plan." (COREPER, 2013) The possibility will exist as well to declare costs related to the use of large infrastructures as direct costs.

As regards the SNSF, the amount of the flat-rate contribution for indirect costs (also called 'overheads') depends on the Federal funds available per year and on the maximum rate set periodically by the Swiss Parliament. According to article 8 of the 'Regulations on overhead contributions' which entered into force on 1 January 2012, the percentage rate for flat-rate overheads reimbursement "must not exceed 20%" (SNSF, 2012).

Article 4 states that funding schemes are not eligible for overhead contributions "if they involve the use of funds outside Switzerland [...] or if they do not incur any substantial indirect research costs". This does not allow for co-funding and threatens the success of researchers settled in Switzerland when applying for EU funding.

As a former report of [SwissCore](#) on the RfP in Horizon 2020 (Armendone, 2012) has developed, "This discussion on whether the proposals for direct and indirect costs lead to an increase or loss of participation, should not be overlooked." The development of the next reimbursement models are therefore of strong importance for the SNSF.

The decision on the exclusion of full costing for the reimbursement of costs in Horizon 2020 is therefore in line with the policy of the SNSF...

Further considerations on the reimbursement models are provided in the next chapter.

In **chapter 3** we presented the final classification model and its corresponding categories. We proceeded to a comparison of the RFI falling in the same category and sharing a number of similar features, to varying degrees though. We evaluated the potential for 'overlap' between Swiss and European instruments through a set of specific conclusions within each category and concluded the chapter with considerations on the development of OA in the EU and on the reimbursement models of Horizon 2020, in contrast with their current state in Switzerland.

In light of the analyses provided in the previous chapter, **chapter 4** lays out in a first section generic considerations on SNSF's opportunities arising from Horizon 2020, therewith answering the research question. To do so, we focus on the opportunities for the SNSF within the pillars of Horizon 2020. In a second section, we draw attention to more specific considerations on the pairs of RFI analysed in chapter 3 and suggest a set of actions to encourage an optimal Swiss research funding policy.

4. From words to deeds

In this final chapter, we reach a higher level of abstraction by discussing the generic consequences and opportunities of Horizon 2020 from the perspective of the SNSF, therewith answering the research question. In a first part, we evaluate those opportunities within each of the pillars of Horizon 2020, taken as a reference point. In the second section, we present a set of specific considerations and actions for encouraging an optimal Swiss research funding strategy at both European and global levels. This will be the answer to the sub-question introduced in chapter 1 and serve as a conclusion to the work at hand.

We distinguish in the lines to come between three types of considerations, from a generic level to a more specific level:

- change/safeguard the administrative interests of the SNSF (section 4.1);
- identify the strategic research priorities for the SNSF (4.1);
- encourage optimal interplay between Swiss and European RFI (4.2).

4.1 Generic consequences and opportunities for the SNSF

In light of our analysis in the previous chapter, considerations on the three pillars of Horizon 2020 can be summarised as follows:

- **Although Pillar I shows some overlap** between the RFI of the SNSF and Horizon 2020, the clear **added value of the SNSF in the years to come is to do 'more and better'** than the EU, therewith reinforcing the Swiss research system from within. The discussion on the interplay between SNSF's instruments and MSCA and ERC showed that there is room for the SNSF to provide better synergies. Some European instruments can help support national instruments, in particular the ERC Grants, e.g. by providing additional funding to the same researchers at a later stage of their career. Indeed, the evidence shows that the ERC Grants are important for the career development of most promising researchers. **Precise opportunities and challenges for the SNSF will be discussed in section 4.2.**
- **Considerations on pillar II have not been treated deeply in this report.** As stated in section 3.6, there is through Horizon 2020 a big opportunity for Swiss SME and industry to get funding from the EU. The innovation-led pillar offers a platform for them that does not exist as such at national level. This can turn into a very profitable opportunity for Swiss SME and industry if they make good turn-overs with EU money. The SNSF could **enter into dialogue with other multipliers taking full advantage of what is offered at European level, in particular for SME and industry, by linking with other actors of the Swiss R&I landscape** such as the Commission for Technology and Innovation (CTI) and Euresearch. This would ensure consistency and coherence between the instruments and the approaches used by the SNSF and the other actors.
- **Pillar III shows no overlap**, which means that there is in principle an extended room for complementarities between Swiss and European RFI in that field. As a consequence, this brings **a number of opportunities and challenges to the SNSF in order to ensure best interplay with European RFI.** Especially the societal challenge approach, or the move-away from thematic-driven research projects, challenges the way research is thought about at the SNSF. For the SNSF, this implies to **also embrace the other way of thinking in order to better identify opportunities lying in the European programmes.**

Referring to our observations on OA to research data and on the reimbursement models of Horizon 2020, the SNSF, as a well-connected and esteemed research funding council:

- could **confirm its active leading role in setting standards and shaping trends at the European and global levels** in organisations like Science Europe and the Global Research Council (GRC).

In particular, the SNSF:

- should **play, via Science Europe, a role in shaping the conditions in which OA to research data will be implemented, funded and evaluated** by research funding bodies across Europe in order to safeguard its position and interests.
- could **include requirements on OA to research data when evaluating proposals to anticipate developments at European level**, which would train researchers to be more aware of OA and to be better armed to apply to European funding in the years to come.

It was said earlier in this report that the decision on the exclusion of full costing for the reimbursement of costs in Horizon 2020 is in line with the policy of the SNSF. However, the SNSF:

- must **do more and communicate on its administrative principles to be at the forefront of the debate on research funding in Europe**. Indeed, clear principles are needed to respond to the coming challenges at European and global levels.
- should **ensure that there are favourable IPR frameworks ventilated at European level**, e.g. through the GRC.

4.2 Closing remarks and specific considerations

The analysis of Swiss and European RFI in chapter 3 shows that there is relatively few overlap when considering the goals of the RFI. The recommendations given in this section build upon the partial conclusions developed in every single comparison category of chapter 3. The high variety of career development RFI, even though they do not intervene at the same career level, need further study in order to understand their interplay and impact for the Swiss science system. To achieve this, discipline-differentiated statistics on the development paths of individual researchers could be collected and analysed.

As an independent and well-connected funding organisation, the SNSF:

- could consider **fine-tuning its Mobility fellowships in line with what is being done by the ERC**. Postdoc.Mobility fellowships and SNSF Professorships, which share several interesting features with ERC StG and CoG, could turn to be a real stepping stone before applying to an ERC Grant.
- should **follow the development of the ERC SyG** in the years to come in order to evaluate whether the identified overlap with Sinergia is worth a questioning on the need to have this instrument at both national and European levels. Taking into account the low success rate of the ERC Grants and the strong overlap in goal with SyG, **Sinergia could serve as a fall-back option** in order to bring a real Swiss added value.
- considering the high overlap and the lack of complementarity with the MSCA IF, and considering its very low success rate and the budget allocated, **the participation of Swiss institutions in all MSCA schemes could be threatened in the future. Therefore, the SNSF should actively reconsider its corresponding instruments in order to foster a level of complementarity with MSCA and make a smart use of the**

COFUND action which could bring up €10 million in additional funding.

- could **consider adapting Ambizione to cover gaps in the Swiss science system**, by using the instrument to fund excellent researchers with significant Swiss track-record, while MSCA IF could provide support to a broader set of researchers. The expected increased submission rate for MSCA IF and the low success rate that would follow need to be taken into account to see whether this action would provide enough support to researchers at Swiss institutions.
- should use MSCA COFUND in order to strengthen instruments that share similarities with MSCA (such as Ambizione or MHV), which means **adapting its own instruments so as to make them eligible for a combination with MSCA COFUND**.
- could **further analyse the interplay between SNSF Professorships, ERC StG and ERC CoG** and their impact on research careers. This would require the collecting of statistics on the personal career development of SNSF-funded researchers and could e.g. be done via an SNSF alumni network.
- could **evaluate as well the difference in impact SNSF Professorships, ERC StG and ERC CoG have on the training of the next generation of researchers and more generally on the knowledge society**, as SNSF Professorships explicitly include a teaching dimension that is absent in ERC Grants. This could be done by explaining well the respective context and the role played by the SNSF at national level, pointing out what the ERC on its side might not be able to apply at European level.
- could **consider including an instrument with similar aims to ERC PoC** to improve the success rate of researchers at Swiss institutions and encourage the diffusion of research into society.
- could **consider readjusting its RFI for infrastructures in order to enable groundbreaking research and make them a fall-back option for unsuccessful proposals in more competitive schemes at European level**. In particular, FLARE could be extended to other disciplines. Also, the SNSF should engage more at national and global levels in RI.
- considering that we could not possibly find any type of overlap between SNSF's instruments and European instruments falling in the category of cooperation with industry, and even though it is not its mission to step in there, the SNSF should **seek dialogue with innovation funders to ensure coherence in the actions**.
- could **consider making NCCR a fall-back option for failed FET Flagships initiatives** of high scientific quality (e.g. FuturICT).
- in line with the short analysis we provided on NCCR, could **look more into detail at European schemes that are allocated a large budget like the FET Flagships, JPI and KIC** in order to clearly evaluate opportunities.
- should **engage in JPI on a case-by-case basis**. Due to their stronger flexibility and inclusion of additional European funds, **an approach based on ERA-NET could be favoured**.
- as the EU also makes the link between cohesion funding and programmes for R&I, the SNSF could **communicate better its experience with the Enlargement contribution, therewith working on the misperception in Europe of Switzerland plundering EU R&I funds**.
- could **take a deeper look at teaming and twinning when comparing them to SCOPES** in order to clearly evaluate opportunities.
- considering what has been said about INCO, in particular with BRICS countries, could also **draw its attention to the strategic roadmaps and proceed to a comparison in line with the new role played by the SNSF in the Swiss bilateral programmes**. This would allow identifying fields of cooperation in EU thematic programmes and the respective funding opportunities for Switzerland.

In addition to this, looking back to the previous report of **SwissCore** on Swiss and European international cooperation in S&T (Stäger, 2013), a set of actions has already been suggested in that field, which might offer opportunities to 'seize, shape and contribute' to the European level:

- The "SNSF could **support Swiss researchers in intensifying Swiss participation in ERA-NET in coordination with SERI in order to make optimal use of the intelligence and contacts** in these networks and by increasing the flow of information between different networks."
- The "SNSF could **consider fine-tuning its instruments, both SCOPES and projects from the Swiss contribution to EU enlargement, in order to provide Swiss added value to the financially strong ENP** [European Neighbourhood Policy] support from Europe. This is particularly true for the 'ERA Chairs'."

Finally, let's stress as well that **there might be similarities to explore between SCOPES and capacity building projects (higher education) with neighbourhood countries of the future European programme for education, training, youth and sport 2014-2020 'Erasmus+'.**

Annex I: Literature list

- Armendone, D. (2012). *Safeguarding Swiss interests in Rules for Participation in Horizon 2020*. SwissCore.
- COREPER. (2013). *REGULATION of the European Parliament and of the Council laying down the rules for participation and dissemination in Horizon 2020*. Council of the European Union.
- DFG. (2013). *Funding Atlas 2012*. Deutsche Forschungsgemeinschaft.
- EC. (2010a). *COMMUNICATION FROM THE COMMISSION 'EUROPE 2020: A strategy for smart, sustainable and inclusive growth'*. Retrieved from <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:2020:FIN:EN:PDF>
- EC. (2011a). *Europe 2020 Flagship Initiative Innovation Union*. European Commission.
- EC. (2011b). *Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL establishing Horizon 2020 - The Framework Programme for Research and Innovation (2014-2020)*. Retrieved from [http://ec.europa.eu/research/horizon2020/pdf/proposals/com\(2011\)_809_final.pdf](http://ec.europa.eu/research/horizon2020/pdf/proposals/com(2011)_809_final.pdf)
- EC. (2011c). *TOWARDS A EUROPEAN FRAMEWORK FOR RESEARCH CAREERS*. European Commission.
- EC. (2012a). *A Reinforced European Research Area Partnership for Excellence and Growth*. European Commission.
- EC. (2012b). *Joint Statement by the European Association of Research and Technology Organisations (EARTO), the European University Association (EUA), the League of European Research Universities (LERU), Nordforsk, Science Europe and the European Commission on working in*. European Commission.
- EC. (2012c). *State of the Innovation Union 2011*. European Commission.
- EC. (2012d). *Innovation Union: A pocket guide on a Europe 2020 initiative*. European Commission.
- EC. (2012e). *Areas of untapped potential for the development of the ERA*. European Commission.
- EC. (2012f). *Staff Working Document on Enhancing and Focusing EU International Cooperation in Research and Innovation*. European Commission.

- EC. (2013a). *Draft Work Programme 2014 – 2015 for FET, PPP and e-infrastructures in Horizon 2020*. European Commission.
- EC. (2013b). Visit of DG RTD organised by IGLO trainees.
- EC. (2013c). *FP7 People Marie-Curie Actions: Country factsheet Switzerland*. European Commission.
- ESF. (2009). *Evaluation in National Research Funding*. European Science Foundation.
- Federal Council. (2012). *Message relatif à l'encouragement de la formation, de la recherche et de l'innovation pendant les années 2013 à 2016*. Retrieved from <http://www.admin.ch/opc/fr/federal-gazette/2012/2857.pdf>
- Federal Council. (2013). *Continuing successful participation in EU Framework Programmes*. Retrieved from <http://www.news.admin.ch/message/index.html?lang=en&msgid=47933>
- Lepori, B. et al. (2007). Indicators for comparative analysis of public project funding. *Research Evaluation*.
- OECD. (2002). *Frascati Manual: Proposed Standard Practice for Surveys on Research and Experimental Development*. Organisation for Economic Co-operation and Development.
- Science Europe. (2012a). *Statement on the European Research Area*. Retrieved from http://www.scienceeurope.org/uploads/Public%20documents%20and%20speeches/120717_Science_Europe_ERA_Statement.pdf
- SERI. (2013a). *Promotion of education, research and innovation for 2013-2016*. Retrieved from <http://www.sbf.admin.ch/org/01645/index.html?lang=en>
- Slipersæter, S. et al. (2007). Between policy and science: research councils' responsiveness in Austria, Norway and Switzerland. *Science and Public Policy*.
- SNSF. (2012). *Regulations on overhead contributions*. Swiss National Science Foundation.
- SNSF. (2013a). *Annual Report 2012*. Retrieved from http://www.snf.ch/SiteCollectionDocuments/inb_jb_12_e.pdf
- SNSF. (2013b). *Action Plan 2013–2016*. Swiss National Science Foundation.
- SNSF. (2013c). *Guidelines for selecting SNSF funding schemes*. Swiss National Science Foundation.

Stäger, U. (2013). *European and Swiss International Cooperation in Science and Technology*.
SwissCore.

Annex II: List of interviewees

Interviews at Swiss level

Operational level, 29 and 31 May 2013

Name, Surname	Organisation, Division	Position
Evelyne Glättli & Dominique Stutz	SNSF, International Co-operation division	Scientific Officer; Scientific assistant
Inés de la Cuadra	SNSF, Careers division	Scientific Officer; Deputy Head of Division; Head of Unit for Professorships/Ambizione/MHV
Daniel Sebastiani	SNSF, Careers division	Scientific Officer; Head of Fellowships/Doc.CH
Urs Christ	SNSF, Programmes division, National Centres of Competence in Research (NCCR)	Head of Section
Christian Mottas	SNSF, Programmes division, National Research Programmes (NRP)	Head of Section; Deputy Head of Division
Jean-Luc Barras	SNSF, International Co-operation division	Head of Division

Political level, 26 June 2013

Daniel Höchli	SNSF, Management	Director
Jean-Luc Barras	SNSF, International Co-operation division	Head of Division

Interviews at European level

Operational level, May and June 2013

Name, Surname	Organisation, Division	Position
Alessandra Luchetti & Martin Lange	EC, DG EAC, Unit People Programme	Head of Unit; Policy Officer
Ales Fiala	EC, DG RTD, Unit FET Proactive Initiatives	Head of Unit
Wolfgang Boch	EC, DG RTD, Unit FET Flagships	Head of Unit
Theodore Papazoglou	ERCEA, Support to the scientific council	Head of Unit
Stefaan Hermans	EC, DG RTD, Unit Skills (ERA Chairs)	Head of Unit
Dimitri Corpakis	EC, DG RTD, Regional Dimension of Innovation (twinning & teaming)	Head of Unit

Political level, 21 May 2013

Herman van der Plas	EC, DG RTD, Unit ERA	Policy Advisor Science, Research and Innovation Policy
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Annex III: Factsheets

Please note that SwissCore relied on information provided by the EU institutions and by the SNSF.

Information written in red is still susceptible of being modified before the adoption of Horizon 2020.