
Reaching for the Stars

European and Swiss International Cooperation
in Science and Technology

«La science ne connaît aucun pays, parce que la connaissance appartient à l'humanité et est la torche qui illumine le monde. La science est la plus haute force d'un pays, quand ce pays restera celui qui supporte le plus les travaux de la pensée et de l'intelligence.»

Louis Pasteur, 1871 (cited in Dubos, 1960, p. 85)

Executive Summary

Demographic change, poverty alleviation, climate change, alternative energies: The 21st century is an era of scientific and technical complexity, where grand problems require global expertise. As Europe struggles to free itself from the fetters of an economic crisis, education, research and innovation – the three pillars of the knowledge society – have become a priority through what can be called the ‘new innovation consensus’.

This report analyses the International Cooperation in Science and Technology (INCO S&T) of Switzerland in comparison to the EU. As a highly competitive economy, Switzerland is in an advantageous position that it needs to secure. With the highest ambitions in science, it attracts scientists from all over the world and seeks to collaborate with the best. But despite generous public funding and a private sector that invests intensely in research, there are only limited resources at the hands of the Swiss research community to engage in INCO S&T.

While Europe has been at the forefront of international cooperation for Swiss researchers and institutions longer already, the EU has undergone an evolution in the past decade. Its research Framework Programmes and the future Horizon 2020 are increasingly open and well funded. Switzerland fares well in many of the programmes. As of FP7 and with a new strategy in 2012, the EU positions INCO S&T as a tool to connect its researchers to the best brains from around the world, in order to increase the excellence of its science base and to boost European competitiveness.

Given this new vigour of European INCO S&T, what opportunities does the internationalised European research policy yield for Switzerland? This question is at the heart of this report and is explored on the basis of a detailed account of the European and Swiss approach to INCO S&T on four levels: policy context, strategy, S&T agreements and instruments.

Today, there is a lot at stake in the widened scope of European INCO S&T: foreign policy and development interests are part of the EU’s dynamic policy framework. Europe does however share an ‘excellent science’ core with regard to the Swiss ambition to enable bottom-up collaboration with the science powers of tomorrow.

Three options for Swiss INCO S&T in light of the European new strategy are identified in this report. Two initial policy options suggest aligning with or increasing autonomy towards European INCO S&T. The comparison of the two strategies to INCO S&T however reveals a preferred line of action: to seize opportunities and shape conditions for Switzerland, thereby contributing as an active member of the European research community. These three dimensions are explained below:

First, Switzerland can make INCO S&T via Europe a valuable addition in resources and expertise to its current bilateral activities in INCO S&T by making optimal use of European activities with third countries including policy dialogue, promotion of Europe as a science economy, collaborative programmes and other instruments such as mobility schemes.

Second, not only thanks to its association to the European Framework Programmes, Switzerland has the opportunity to shape conditions for its involvement in European research programmes and INCO S&T through active participation in European gremia and boards.

Third, seizing opportunities and shaping conditions both amount to an active Swiss contribution to the external dimension of the European knowledge landscape. Swiss experience and excellence are in demand, and through active participation, Switzerland can contribute to making Europe an attractive place for science – with Switzerland as a leader in excellence. The FET Flagship 'Human Brain Project' is a prime example for the strong Swiss role in European research.

Making Europe an integral aspect of extra-European INCO S&T means to connect the dots between Europe, third countries and Switzerland in order to achieve a 'triangular cooperation' approach. This approach is entirely compatible with the spirit and content of the current Swiss strategy for INCO S&T.

To seize, shape and contribute is not only an abstract strategic consideration. This report's final chapter provides practical considerations for action by the State Secretariat for Education, Research and Innovation, the Swiss Agency for Development and Cooperation, the Swiss National Science Foundation, Euresearch and the Swiss universities and Universities of Applied Sciences.

Adopting such a new strategic orientation for Swiss INCO S&T would mean to continue the successful bilateral programmes in place, but to use resources and synergies at the European level to drive the collaboration with Swiss priority countries to new levels of intensity.

This report's title therefore alludes to connecting the Swiss highest ambitions in INCO S&T to the stars of the European flag as an additional way to collaborate with tomorrow's science stars: Reaching out to the Stars!

Table of Contents

1.	Introduction.....	9
1.1	Aim and questions of research project at SwissCore	11
1.2	Key concepts and definitions.....	12
1.3	Scope and methodology	13
2.	Europe's R&I to become committed, open and attractive	15
2.1	INCO S&T in ERA's wider policy context.....	15
2.2	EC stepping up its INCO S&T strategy	17
2.3	S&T agreements: facilitating frameworks for intensified cooperation.....	22
2.4	Instruments in Horizon 2020 and other instruments.....	25
2.5	'Alignment' policy option	28
3.	Selective and bottom-up: INCO S&T of Switzerland	29
3.1	INCO S&T in the Swiss political and institutional context.....	29
3.2	SERI Strategy.....	33
3.3	Agreements with scientific powerhouses of tomorrow	36
3.4	Swiss instruments for INCO S&T	37
3.5	'Autonomy' policy option	39
4.	Comparing Europe and Switzerland	40
4.1	Comparative analysis of policy contexts.....	40
4.2	Comparative analysis of Swiss and EU strategies	43
4.3	Comparison of EU and Swiss S&T agreements.....	45
4.4	Analysis of instruments.....	47
4.5	'Seize, shape, contribute' policy option.....	49
5.	Concrete opportunities to seize, shape and contribute	51
	Annexes	56
	Annex I: List of literature	56
	Annex II: List of interviewees.....	60
	Annex III: List of country abbreviations and FP7 status.....	61
	Annex IV: Comprehensive list of EU and Swiss S&T agreements.....	62

List of abbreviations

ASEAN	Association of Southeast Asian Nations	<i>Verband Südostasiatischer Nationen</i>	
AU	African Union	<i>Afrikanische Union</i>	<i>Union africaine</i>
BRICS	Brazil, Russia, India, China and South Africa		
CAP	Common Agricultural Policy	<i>Gemeinsame Agrarpolitik</i>	<i>Politique agricole commune</i>
Council	Council of the European Union	<i>Rat der Europäischen Union</i>	<i>Conseil de l'Union européenne</i>
CREST	Scientific and Technical Research Committee	<i>Ausschuss für wissenschaftliche und technische Forschung</i>	<i>Comité de la recherche scientifique et technique</i>
CTI	Commission for Technology and Innovation	<i>Kommission für Technologie und Innovation</i>	<i>Commission pour la technologie et l'innovation</i>
DCI	Development Co-operation Instrument (DCI)	<i>Finanzierungsinstrument für die Entwicklungs-zusammenarbeit</i>	<i>Instrument de financement de la coopération au développement</i>
DEA	Direction for European Affairs	<i>Direktion für europäische Angelegenheiten</i>	<i>Direction des affaires européennes</i>
EC	European Commission	<i>Europäische Kommission</i>	<i>Commission européenne</i>
EEA	European Economic Area	<i>Europäischer Wirtschaftsraum</i>	<i>Espace économique européen</i>
EEAS	European External Action Service	<i>Europäischer Auswärtiger Dienst</i>	<i>Service européen pour l'action extérieure</i>
EFTA	European Free Trade Association	<i>Europäische Freihandelsassoziation</i>	<i>Association européenne de libre-échange</i>
ENP	European Neighbourhood Policy	<i>Europäische Nachbarschaftspolitik</i>	<i>Politique européenne de voisinage</i>
ENPI	European Neighbourhood and Partnership Instrument	<i>Europäisches Nachbarschafts- und Partnerschaftsinstrument</i>	<i>Instrument européen de voisinage et de partenariat</i>
EP	European Parliament	<i>Europäisches Parlament</i>	<i>Parlement européen</i>
ERA	European Research Area	<i>Europäischer Forschungsraum</i>	<i>Espace européen de la recherche</i>
ERAC	European Research Area Committee		
ERC	European Research Council	<i>Europäischer Forschungsrat</i>	<i>Conseil européen de la recherche</i>
ERDF	European Regional Development Fund	<i>Europäischer Fonds für regionale Entwicklung</i>	<i>Fonds européen de développement régional</i>
ERIAB	European Research and Innovation Area Board		
ESF	European Science Foundation	<i>Europäische Wissenschaftsstiftung</i>	<i>Fondation européenne de la science</i>
ESFRI	European Strategy Forum on Research Infrastructures	<i>Europäisches strategisches Forum für die Forschungsinfrastrukturen</i>	<i>Forum stratégique européen sur les infrastructures de recherche</i>
EU	European Union	<i>Europäische Union</i>	<i>Union européenne</i>
EURO-HORCS	European Heads of Research Council	<i>Europäische Vorsitzende der Forschungsräte</i>	<i>Présidents de conseils de recherche européens</i>
FDFA	Federal Department of Foreign Affairs	<i>Eidgenössisches Amt für auswärtige Angelegenheiten</i>	<i>Département fédéral des affaires étrangères</i>
FOC	Federal Office of Culture	<i>Bundesamt für Kultur</i>	<i>Office fédéral de la culture</i>

FOEN	Federal Office for the Environment	<i>Bundesamt für Umwelt</i>	<i>Office fédéral de l'environnement</i>
FOM	Federal Office for Migration	<i>Bundesamt für Migration</i>	<i>Office fédéral des migrations</i>
FOPH	Federal Office of Public Health	<i>Bundesamt für Gesundheit</i>	<i>Office fédéral de la santé publique</i>
FP6	Sixth Framework Programme for Research and Technological Development	<i>6. EU-Rahmenprogramm für Forschung und Technologische Entwicklung</i>	<i>Sixième programme-cadre pour la recherche et le développement technologique</i>
FP7	Seventh Framework Programme for Research and Technological Development	<i>7. EU-Rahmenprogramm für Forschung und Technologische Entwicklung</i>	<i>Septième programme-cadre pour la recherche et le développement technologique</i>
FR	Financial Regulation	<i>Haushaltsordnung</i>	<i>Règlement financier</i>
GDP	Gross Domestic Product	<i>Bruttoinlandsprodukt</i>	<i>Produit intérieur brut</i>
GNI	Gross National Income	<i>Bruttonationaleinkommen</i>	<i>Revenu national brut</i>
GRC	Global Research Council		
ICT	Information and Communication Technology	<i>Informations- und Kommunikationstechnik</i>	<i>Technologies de l'information et de la communication</i>
IDAG	Interdepartmental working group	<i>Interdepartementale Arbeitsgruppe</i>	<i>Groupe de travail inter-départemental</i>
INCO	International cooperation	<i>Internationale Zusammenarbeit</i>	<i>Coopération internationale</i>
IPA	Instrument for Pre-Accession Assistance	<i>Instrument für Heranführungshilfe</i>	<i>Instrument d'aide de pré-adhésion</i>
IPR	Intellectual property rights	<i>Rechte des geistigen Eigentums</i>	<i>Droits de propriété intellectuelle</i>
ITRE	(Committee on) Industry, Technology, Research and Energy	<i>Ausschuss für Industrie, Forschung und Energie</i>	<i>Commission de l'industrie, de la recherche et de l'énergie</i>
JC	Joint Committee	<i>Gemischter Ausschuss</i>	<i>Comité mixte</i>
KFH	Rectors' Conference of the Swiss Universities of Applied Sciences	<i>Rektorenkonferenz der Fachhochschulen der Schweiz</i>	<i>Conférence des Recteurs des Hautes Ecoles Spécialisées Suisses</i>
MDG	Millennium Development Goals	<i>Millennium-Entwicklungsziele</i>	<i>Objectifs du millénaire pour le développement</i>
MEP	Member of the European Parliament	<i>Mitglied des europäischen Parlaments</i>	<i>Député européen</i>
Mercosur	<i>Mercado Común del Sur</i>	<i>Gemeinsamer Markt Südamerikas</i>	<i>Marché commun du Sud</i>
MFF	Multiannual Financial Framework	<i>Mehrjähriger Finanzrahmen</i>	<i>Cadre financier pluriannuel</i>
MIKT	Mexico, Indonesia, South Korea, Turkey		
MSCA	Marie Skłodowska Curie Actions	<i>Marie-Sklodowska-Curie-Massnahmen</i>	<i>Actions Marie Skłodowska Curie</i>
MYP	Multi-Year Programme	<i>Mehrjahresprogramm</i>	<i>Programme pluriannuel</i>
NCCR	National Centres of Competence in Research	<i>Nationale Forschungsschwerpunkte</i>	<i>Pôles de recherche nationaux</i>
NRP	National Research Programme	<i>Nationale Forschungsprogramme</i>	<i>Programmes nationaux de recherche</i>
OECD	Organisation for Economic	<i>Organisation für wirtschaftliche</i>	<i>Organisation de coopération</i>

OMC	Cooperation and Development Open Method of Coordination	<i>Zusammenarbeit und Entwicklung Offene Methode der Koordinierung</i>	<i>et de développement économiques Méthode ouverte de coordination</i>
OPET	Federal Office for Professional Education and Technology	<i>Bundesamt für Berufsbildung und Technologie</i>	<i>Office fédéral de la formation professionnelle et de la technologie</i>
PI	Principal Investigator	<i>Studienleiter</i>	<i>Responsable principal</i>
R&D	Research and (experimental) Development	<i>Forschung und (experimentelle) Entwicklung</i>	<i>Recherche et développement (expérimentel)</i>
R&I	Research and Innovation	<i>Forschung und Innovation</i>	<i>Recherche et Innovation</i>
R4d.ch	Swiss Programme for Research on Global Issues for Development		
RIO	European Research and Innovation Observatory	<i>Beobachtungsstelle für Forschungs- und Innovationspolitik</i>	<i>Observatoire de la recherche et de l'innovation</i>
S&T	Science and Technology	<i>Wissenschaft und Technologie</i>	<i>Science et technologie</i>
SCOPES	Scientific co-operation between Eastern Europe and Switzerland		
SDC	Swiss Agency for Development and Cooperation	<i>Direktion für Entwicklung und Zusammenarbeit</i>	<i>Direction du développement et de la coopération</i>
SECO	State Secretariat for Economic Affairs	<i>Staatssekretariat für Wirtschaft</i>	<i>Secrétariat d'Etat à l'économie</i>
SER	State Secretariat for Education and Research	<i>Staatssekretariat für Bildung und Forschung</i>	<i>Secrétariat d'Etat à l'éducation et à la recherche</i>
SERI	State Secretariat for Education, Research and Innovation	<i>Staatssekretariat für Bildung, Forschung und Innovation</i>	<i>Secrétariat d'Etat à la formation, à la recherche et à l'innovation</i>
SFOE	Swiss Federal Office of Energy	<i>Bundesamt für Energie</i>	<i>Office fédéral de l'énergie</i>
SICA	Specific International Cooperation Actions	<i>Gezielte internationale Kooperationsmassnahmen</i>	<i>Actions spécifiques de coopération internationale</i>
SIRIC	Strategic International Research and Innovation Cooperation		
SNSF	Swiss National Science Foundation	<i>Schweizerischer Nationalfonds</i>	<i>Fonds national suisse</i>
SRIA	Strategic Research and Innovation Agenda	<i>Strategische Forschungs- und Innovationsagenda</i>	<i>Agenda stratégie de recherche et innovation</i>
SSH	Socio-economic sciences and humanities	<i>Sozial- und Geisteswissenschaften</i>	<i>Sciences sociales et humanités</i>
TFEU	Treaty on the Functioning of the EU	<i>Vertrag über die Funktionsweise der Europäischen Union</i>	<i>Traité sur le fonctionnement de l'Union européenne</i>
UAS	University of Applied Sciences	<i>Fachhochschule</i>	<i>Haute école spécialisée</i>
UNASUR	Union of South American Nations	<i>Union Südamerikanischer Nationen</i>	<i>Union des nations sud-américaines</i>
UN COPUOS	United Nations Committee on the Peaceful Uses of Outer Space	<i>Ausschuss der Vereinten Nationen für die friedliche Nutzung des Weltraums</i>	<i>Comité des utilisations pacifiques de l'espace extratmosphérique</i>
VET	Vocational Education and Training	<i>Berufliche Aus- und Weiterbildung</i>	<i>Enseignement et formation professionnels</i>

1. Introduction

This chapter lays out the general theme of the report, introduces the research questions (1.1), defines key concepts and definitions (1.2), delimits the scope of analysis (1.3) and elaborates on the methodology of the report (1.4).

Science is undergoing a **silent revolution** at a global stage. As research and innovation are increasingly interconnected, interdisciplinary and internationalised, not only because of the Information and Communication Technology (ICT) evolution, policy-makers around the world increasingly understand the need for sustainable policies directed towards knowledge societies (European Commission (EC) 1997; United Nations Educational, Scientific and Cultural Organisation (UNESCO) 2005). The increased interest and investment in research and innovation of governments around the world symbolises a '**new innovation consensus**', i.e. a shared global agreement that growth and competitiveness hinge on a strong and internationalised research and innovation policy.

This innovation consensus, measurable through the Gross domestic Expenditure on R&D (GERD) as percentage of Gross Domestic Product (GDP), finds its justification in a series of empirical data (Coccia, 2007; World Economic Forum, 2011, p. 8) and recent theories that underline the **effectiveness of state intervention in the innovation system** (Aghion & Romer, 1992; Calderini, Catalano, & Ricci, 2003; Nelson, 1990; Romer, 1991). The Global Competitiveness Report presents innovation as the **sole pillar of competitiveness without long-term diminishing returns**, and therefore research and resulting innovation are the key drivers of sustainable growth (World Economic Forum, 2011, p. 8). Switzerland's success however isn't unexplainable – there is a clear pattern that **richer countries spend more of their GDP on R&D** than poorer ones, and that the private sector is investing more in richer countries (EC & Technopolis, 2009, p. iii). Besides nationally or regionally centred assessments, the internationalisation of a research and innovation system becomes more and more a necessary condition for success in a globalised world. As an innovation frontrunner, Switzerland is leading in broadening existing knowledge, and due to the increased complexity of modern science, there is an **intrinsic scientific value of cooperation** with other researchers around the globe. It is under this premise that any establishment of a framework for international cooperation in science should be undertaken.

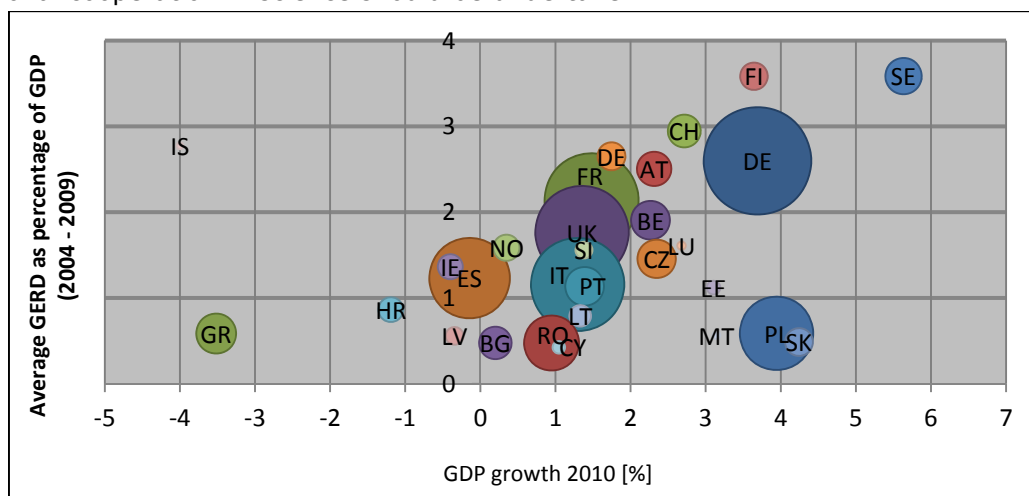


Figure 1.1: Economic growth as function of average gross domestic expenditure on R&D (GERD) for the countries participating in FP7. Source: UNESCO Institute of Statistics

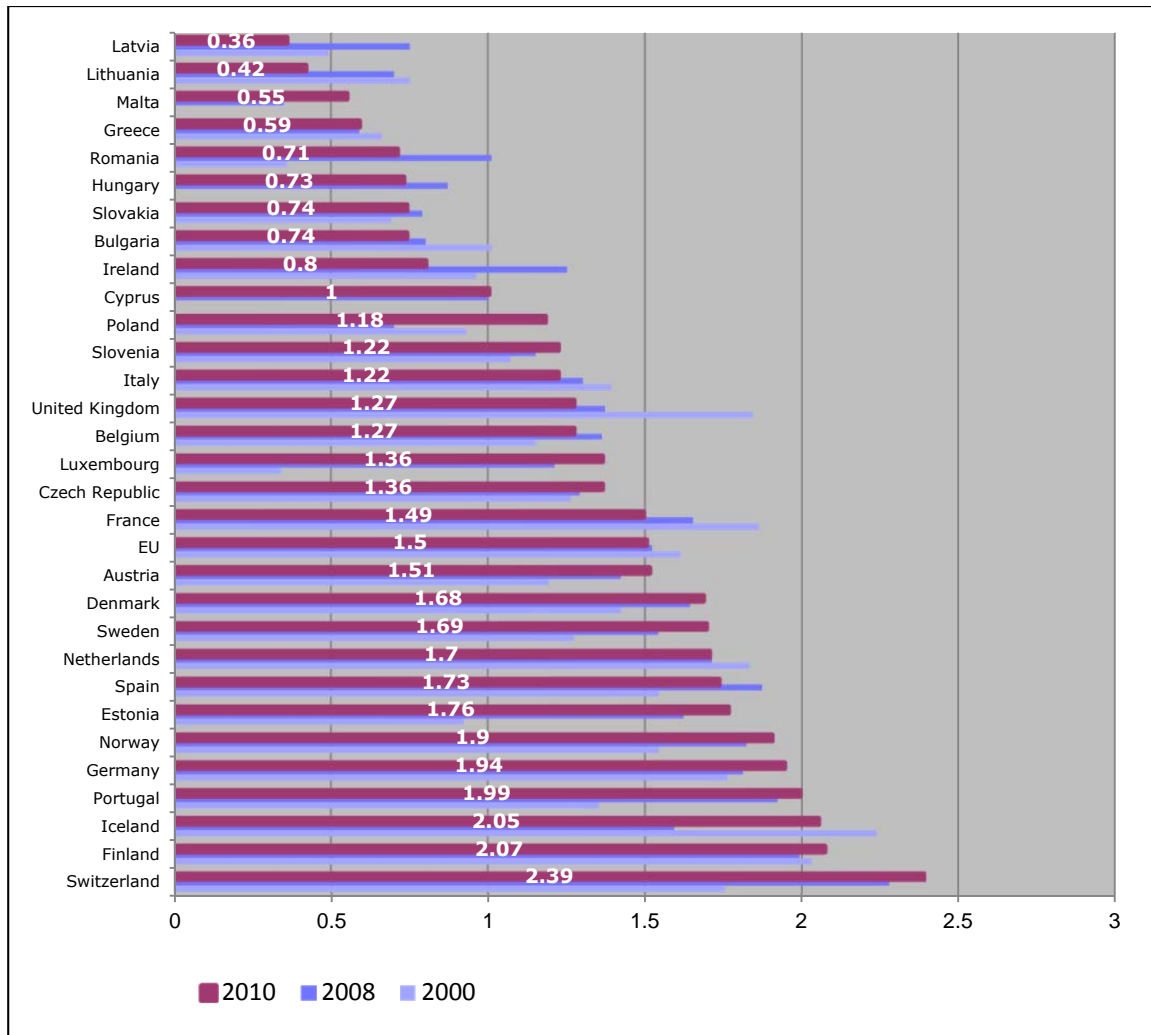


Figure 1.2: Government Budget Appropriations or Outlays on R&D (GBAORD) as % of general government expenditure in 2000 (blue) and in 2008 (orange). Source: Eurostat

Strengthened by the Treaty on the Functioning of the European Union (TFEU) 2009, the EC has reaffirmed its **leading role in setting the pace and scope of the internationalisation of European science** by releasing a communication laying out its future International Cooperation strategy in Science and Technology (INCO S&T) (EC, 2012a). The communication complements the development of the European Research Area (ERA) and will first be implemented through the next Framework Programme for Research and Innovation (Horizon 2020) from 2014 to 2020 by focusing on selective cooperation in key areas and with key countries.

The EC aims at streamlining its INCO S&T activities, improving the coordination of the INCO S&T strategies of the member states, developing common approaches and addressing global societal challenges. A **general opening of participation** of researchers from around the globe, combined with **no automatic funding** for economically well-performing third countries, is to ensure global participation and improve European competitiveness. The EU's INCO S&T has as further goals to develop global research infrastructures, to intensify brain circulation into Europe and to widen the international dimension of the ERA. The implementation of the new strategy will rely on the strategic Forum for International Science and Technology Cooperation (SFIC) as the EU's primary coordinating body with member states.

To date, the EU has carried out **S&T agreements** with 20 third countries grouped into emerging scientific powers (BRICS = Brazil, Russia, India, China and South Africa), near-

neighbour countries (the Balkan and Mediterranean regions) and leading states (South Korea, Japan and the United States of America). These agreements constitute a framework and a privileged forum to identify common interests, priorities and the necessary instruments for S&T collaboration and to carry out policy dialogue. Moreover, the EC currently has nine S&T Counsellors in eight Missions of the European Union (EU) around the globe and actively engages in science diplomacy in collaboration with the European External Action Service (EEAS).

On the other hand, **Switzerland** is a committed member of the European knowledge landscape and is active in research worldwide. It has recently revised its national strategy for INCO S&T with a clear set of geographical priorities and original implementation concepts that meet the requirements: its limited resources and thematically open scientific culture (SER, 2010). Switzerland also runs a worldwide network of S&T Counsellors combined with innovative 'swissnex' offices, which promote the Swiss science and high-tech society.

In light of a new European strategy for INCO S&T, the longstanding relation and involvement of Switzerland in the European research scene is a fundamental principle for the Swiss research and innovation system. Since 1987, Swiss researchers have been participating in the EU's Framework Programmes (FP) and Switzerland is associated to the FP since 2004. However, as a non-member state, Switzerland not only has limited influence on the design of European research policy and programmes, but also not all instruments of the EU are open to Swiss researchers for participation or funding. The Swiss strategic orientation therefore benefits from a carefully refined stance on European research and innovation policy.

1.1 Aim and questions of research project at **SwissCore**

As evidenced in section 3.1, Switzerland has a historic and contemporary record for excellence in research, competitive research funding and internationalisation of research. Switzerland is one of the countries with the highest GERD among all countries of the Organisation for Economic Co-operation and Development (OECD), as the R&D expenditure was at 3% of the GDP in 2011 (EC, 2012b). At the same time, more than two thirds of R&D funding comes from the private sector (ERAWATCH, 2013) and as a pronounced knowledge society, Switzerland should seek further growth of the sector. Initiatives such as the swissnex network, the Swiss S&T Counsellors and the successful association to the FPs exemplify how Switzerland has set itself the means to reach zealous goals in research and innovation. Especially INCO S&T is a promising tool to support the momentum and diversity on which the Swiss scientific ambitions hinge. As a small nation with limited resources, however, safeguarding Swiss interests also means to increase Swiss competitiveness at large. The problem at hand therefore is how to **conciliate Switzerland's highest ambitions in INCO S&T with its limited size and resources at a time when Europe is refocusing its INCO S&T activities. The new European strategy presents the opportunity to reconsider Swiss INCO S&T.** The communication of the EC, while continuing the direction of its earlier strategy (EC, 2008a), represents an important impetus towards the further convergence of the INCO S&T in Europe, i.e. in EU member states and associated countries including Switzerland. The main interest in the realm of the EU and Swiss INCO S&T strategies therefore is to **identify opportunities that the new European INCO S&T strategy provides for the Swiss INCO S&T.**

In order to address the problem introduced above and to answer the research question at hand, a number of sub-questions have to be answered:

1. What is the context and content of the EU's INCO S&T strategy, the content of its S&T agreements and the link to Horizon 2020?

2. What are the reactions of the Council of the European Union (Council) and the European Parliament (EP)?
3. What is the context and content of the Swiss INCO S&T strategy, the Swiss S&T agreements and the relevant SNSF instruments?
4. What can be said about the interplay between the Swiss and the European strategies, S&T agreements and instruments? To what extent are they complementary?
5. What are the EC's communication's implications for the implementation of the Swiss INCO S&T strategy? What concrete opportunities does the European INCO S&T strategy offer to Switzerland?

In the course of a 6-months traineeship at **SwissCore** in Brussels, the author undertook a study of policy documents, reports and other sources with a high degree of detail. The proximity to European institutions further allowed for in-depth interviews with representatives from key institutions dealing with European INCO S&T. **SwissCore** is ideally situated at the intersection of European and Swiss research policy and is therefore in an optimal position to inform Swiss actors about potential opportunities at European level. This report therefore sets the framework from a European perspective for a fine-tuned Swiss INCO S&T

1.2 Key concepts and definitions

A number of concepts need to be defined in order to enable a precise discussion of INCO S&T. 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:

- **Research** is defined according to the universally accepted definition of the 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. **Innovation**, on the other hand, should be understood in a more implementation-oriented sense: "Technological innovation activities are all of the scientific, technological, organisational, financial and commercial steps, including investments in new knowledge, which actually, or are intended to, lead to the implementation of technologically new or improved products and processes. R&D is only one of these activities and may be carried out at different phases of the innovation process. It may act not only as the original source of inventive ideas but also as a means of problem solving which can be called upon at any point up to implementation" (op. cit., 18).
- **INCO S&T** is traditionally thought of as being limited to science and technology, thereby excluding Social Sciences and Humanities (SSH). The concept is however evolving into a more general notion of 'international cooperation in research and innovation', but it continues to imply a certain bias in strategic interests towards more application-oriented research. Also, INCO S&T is defined here as a policy-level concept rather than the international collaboration between individual researchers or research organisations.
- An **INCO S&T strategy** is, in this sense, **coordinated policy action by public bodies that seeks to influence the intensity, content and direction of collaboration of research across borders** (cf. EC & Technopolis, 2009, p. 7).
- The use of the abbreviations **R&D** and Research and Technological Development (**RTD**) in this report will be limited to enhance the readability of the report, but 'research' could often be substituted with the two abbreviations.
- Some more traditional abbreviations like S&T or RTD have been completed to become **STI** and **RTDI** (by adding Innovation) in the current literature, which is in line with the general trend of policy alignment between the fields of research and innovation. Swiss and

European interview partners have agreed that this idea is currently more developed on a conceptual than on a policy level.

- **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 TFEU, the ERA is at the same time a descriptive concept and an EC policy framework. INCO S&T has been strongly embedded within the realisation of ERA, also through an ERA Partnership on INCO S&T (EC, 2012c). 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).
- In EC and SERI documents, there is no systematic distinction between cooperation, coordination and collaboration and the three notions are mostly used interchangeably. It is useful to think of **cooperation** as more short term, informal and without formulation of joint goals. **Coordination** is longer term, more formal and hinges on the mutual communication of goals. Finally, **collaboration** is most intense, more pervasive and marked by a shared goal. This distinction will be valuable when characterising the Swiss and European INCO S&T strategies.

On 1 January 2013, the State Secretariat for Education and Research (SER) and the Federal Office for Professional Education and Technology (OPET) were merged into the SERI. All documents are referred to by using the real author's denomination at the date of publication, the institution *per se* will be referred to as SERI.

1.3 Scope and methodology

This report concentrates on four levels of analysis that touch upon the most important dimensions of INCO S&T. These different layers are interconnected through the general research question and the sub-questions identified in section 1.1.

Firstly, the **policy context** will be laid out in order to situate INCO S&T within the policy framework, to identify interlinking policy fields and in order to give an overview of the historical development of INCO S&T in the respective institutions. Main institutions and policies will be introduced in an interest to clearly delineate the *locus* of INCO S&T.

Secondly, the scope of analysis lies on the **strategic documents** brought forward most recently, namely the EC's communication (EC, 2012a) and Switzerland's international strategy (SER, 2010). The content and evolution of the strategies are analysed in depth with regard to strategic choices and their corresponding rationales.

Thirdly, an additional level of analysis is provided by a comparison of a limited number of EU and Swiss **S&T agreements with third countries**. The selection will be limited to countries that both Switzerland and Europe have.

Fourthly, this reports offers a general overview of the EU's and Swiss main **research funding instruments** implementing the respective strategies.

The analysis carried out in this study firstly relies on a thorough literature analysis and desk research (see Appendix I: List of literature). The preliminary findings were verified with relevant Swiss and European actors through semi-structured interviews (see Appendix II: List of interviews). This dual approach ensured balanced and in-depth analyses. The interviews revolved around the EU's or the Swiss strategy as seen by the respective staff and firstly aim to verify the analysis of official sources and provide insight into the drivers of INCO S&T policies, S&T agreements and instruments. As a second-order appeal, these interviews provided insight into future strategic developments and helped to identify opportunities for Swiss INCO S&T. The interviews were not used to acquire neither confidential intelligence about decision-making processes nor (on-going) negotiations with partners.

This **Chapter 1** specified the research object and defined key concepts. **Chapter 2** will present the analysis of the European INCO S&T policy context, strategy, S&T agreements and relevant Horizon 2020 research funding instruments, **Chapter 3** deals with Swiss INCO S&T, on the same four levels of analysis, namely policy context, strategy, S&T agreements and instruments. **Chapter 4** conducts comparisons on the basis of the same levels of analysis. The **Appendices** provide references to the works cited (I) and the interviews held in preparation of this report (II).

2. Europe's R&I to become committed, open and attractive

This chapter explores the **context** of INCO S&T at European level with a focus on the different policies and drivers of INCO S&T (2.1), analyses the EC's new **strategy** for INCO S&T (2.2), discusses the EU's approach to **S&T agreements** (2.3) and introduces the **instruments** of Horizon 2020 and other European research funding instruments relevant for INCO S&T (2.4). As an intermediary conclusion, a **policy option 'alignment'** for any European country, including Switzerland, will be presented, which suggests to make more use of the political scope, financial resources and added value of European-level INCO S&T through further integration into the European-level programmes and activities.

2.1 INCO S&T in ERA's wider policy context

The EU's increased strategic interest in research and innovation, both in an internal and external policy perspective, is marked by several **policy drivers** that take a stake in the policy developments of the last few years: the completion of the ERA, the mobility of researchers, global societal challenges, the fast rise of emerging economies and the 'new innovation consensus'. On a more political level, the scarce financial resources and variable geometry, the differentiated member state involvement at European level, have a strong impact on European INCO S&T policy.

2.1.1 First policy driver: ERA and Innovation Union

Europe's international activities in research have been underpinned by intensified efforts of the EC to **establish the ERA**, officially since the communication on the ERA in 2000 (EC, 2000). In article 179 of the TFEU, the EC was given the mandate to establish the ERA. It is both a political objective and a policy framework aiming at bundling and enhancing synergies between the 27 member states' R&I systems. Close cooperation with associated countries of the FPs is a fundamental component (Council of the European Union, 2012, p. 3). The ERA is to be implemented through five key objectives (EC, 2012c, p. 3):

1. more effective national research systems;
2. optimal transnational co-operation and competition via common research agendas, grand challenges and infrastructures;
3. an open labour market for researchers by facilitating mobility, supporting training and ensuring attractive careers;
4. gender equality and gender mainstreaming in research;
5. optimal circulation and transfer of scientific knowledge to guarantee access to and uptake of knowledge by all.

INCO S&T is a "**vital, cross-cutting and integral**" part of ERA (Council of the European Union, 2008). In its conclusions from 2 December 2008 (Council of the European Union, 2008), the Council called for a "**European partnership in the field of international scientific and technological cooperation**" and invited the member states and the EC to establish SFIC. This new body was further supported at the strategic level by the EC's INCO S&T strategy (EC, 2008a, see section 2.2).

A noteworthy strategic impetus for INCO S&T was established with the Europe 2020 strategy. The Innovation Union flagship, one of its seven flagships, reaffirmed the common commitment of member states to develop more common approaches in INCO S&T and stipulates in its commitment 31 that INCO S&T is "an issue of common concern" for the EU and the member states (EC, 2010, p. 28). For these reasons, **INCO S&T has a crucial strategic role**

both within the ERA as well as the Innovation Union. The realisation of ERA is supported by strategic policy advice from the European Research Area Committee (ERAC), formerly the Scientific and Technical Research Committee (CREST) founded in 1974.

2.1.2 Second policy driver: unbalanced mobility and lacking brains

Mobility and brain circulation have gained in importance for Europe. The **shortage of research talent** is apparent in Europe. For this reason, increased activity in INCO S&T to facilitate the influx of talents has become a viable goal. A study commissioned by the EP found that the quality of the research environment and the availability of research funds are key in attracting foreign talent – the comparatively low wage level compared to the USA is problematic, but of secondary importance (EP, 2012). The study further draws attention to the lack of career paths for young researchers and the absence of a tenure track that are often identified as the main barriers in the EU countries to attracting top international scientific talent. In 2013, the EC plans to facilitate the entry of third country nationals through a **single visa directive** that combines all five relevant existing directives affecting the immigration of third country students, researchers and qualified workers to the EU. In some cases, the research system is difficult to access from the outside with specific certification and language skills required as a starting point.

2.1.3 Third policy driver: global societal challenges

The EU has reacted strongly to **political debates about the urgency of 'global societal challenges'** such as global warming and climate change, energy, health or poverty. There is a broad consensus among Swiss and European research policy stakeholders that these global challenges can only be answered by global cooperation in research and innovation.

2.1.4 Fourth policy driver: emerging economies

The **rapid economic development of emerging economies**, namely the BRICS countries, has resulted in governments capable to fund their own research performing institutions, but also potential eye-to-eye partners and competitors for the EU.

2.1.5 Fifth policy driver: new innovation consensus

As described in chapter 1, the **new innovation consensus** gains in importance as more and more countries increase their investments in research and innovation and therefore have acknowledged the importance of these fields. This interest of governments is strongly motivated by competitiveness and growth. While the share of global investment in research and innovation is going up, the EU's relative share is diminishing. This development needs to be seen in the larger framework of some European economies rapidly developing their knowledge sectors. These 'frontier countries' such as the Scandinavian countries, the United Kingdom, Germany, the Netherlands and Switzerland are leading the way for other 'catching up' countries, which have a higher GDP per capita growth rate than the R&D frontier countries (Veuglers & Mrak, 2009, p. 14). The EC's Innovation Scoreboard's 'performance groups' reflect this typology as well (EC, 2012d, p. 7) and pushes this goal through the Europe 2020 strategy and its Innovation Union flagship (EC, 2010).

2.1.6 European political competition

European policy has seen a **fierce battle over the scarce financial resources** that are at the EU's hands. The Common Agricultural Policy (CAP) and the European Cohesion Funds have received strong support in the negotiations on the next Multi-annual Financial Framework (MFF) from 2014 to 2020, whereas there is a tendency to cut down e-infrastructure, research, innovation and education compared to the budget proposed by the EC.

There is a general trend at European level towards **variable geometry**, the differentiated engagement of member states in European policy in different areas, contrary to a uniform and comprehensive European integration (EC, 2013; Leach, 2000). As science and INCO S&T policies remain fragmented in Europe, also due to the shared and not exclusive competences of the EU in the field of research and innovation, the degree of implication in European policy coordination remains at the liberty of member states. Research policy remains outside the 'hard core' of European policy (Habermas & Derrida, 2005) and is still strongly shaped by national particularisms. As the fields of neighbourhood policy (Tassirani, 2006) and defence (Van Eekelen & Kurpas, 2008) illustrate, the involvement in these more crucial and basic tasks are only hesitantly ceded to decision-makers at European level. In INCO S&T, there is a tendency for smaller member states to engage more actively in European-level programmes and initiatives, whereas larger member states often have large programmes of their own (ERAWATCH NETWORK ASBL, 2013, p. 15).

2.1.7 Strategic alignments

The last strategic founding document for INCO S&T of the EU is the 2008 communication of the EC that calls for a '**Strategic European framework for international science and technology cooperation**' (EC, 2008a). The underlying idea of the communication was to bundle all third-country **cooperation** where this would create more added value than bilateral cooperation. The increased collaboration should not only help to achieve critical mass in R&I collaboration and funding, but it should also enable Europe to tackle global challenges related to climate change, food and water supply or energy. It was in reaction to this communication that the Competitiveness Council, reuniting the EU member states' research ministers, called for the creation of SFIC.

The Council called for further alignment of the ERAC with the implementation of the Innovation Union in its conclusions of 31 May 2011. Simultaneously, a process to develop an **ERA Framework** was started, in which both ERAC and SFIC took part. This policy framework further steps up the EC's efforts to make R&I in Europe more efficient, high-impact and responsible towards society, and aims at better-coordinated Europeanisation and internationalisation processes. This goal should be achieved using policy development, implementation and monitoring, but possibly also a legislative component in the future. The possible legislative establishment of the ERA would have consequences that are yet open, especially for non-member states like Switzerland.

2.2 EC stepping up its INCO S&T strategy

The EC's principle of focusing and opening international participation in the FPs is not new. The 2008 strategy for INCO S&T linked these ideas to FP7, but did not have a big impact on *de facto* INCO S&T both in its drafting and its implementation. On 14 September 2012, the EC has then published a communication entitled '**Enhancing and focusing EU international cooperation in research and innovation: A strategic approach**' (EC, 2012a). The com-

munication builds on the experiences of the first communication and aims to be seen as a strategic orientation for the organisations, policies and instruments mentioned above.

As figure 2.1 demonstrates, in the past, the EU identified different areas of influence on priority setting towards the INCO S&T. The complex picture reposes on many different factors without a set hierarchy. The new strategy’s policy framework, exemplified figure 2.2, takes a **more dynamic approach to connecting different measures and instruments**. The EU’s INCO S&T priorities are linked clearly to EU policies and objectives. New policy tools at the hand of the EC such as bottom-up stakeholders’ consultations and buy-in, as done with ERA, as well as intelligence based on indicators and information are fundamental conditions for this new policy and strategy framework (EC, 2012e, p. 34).

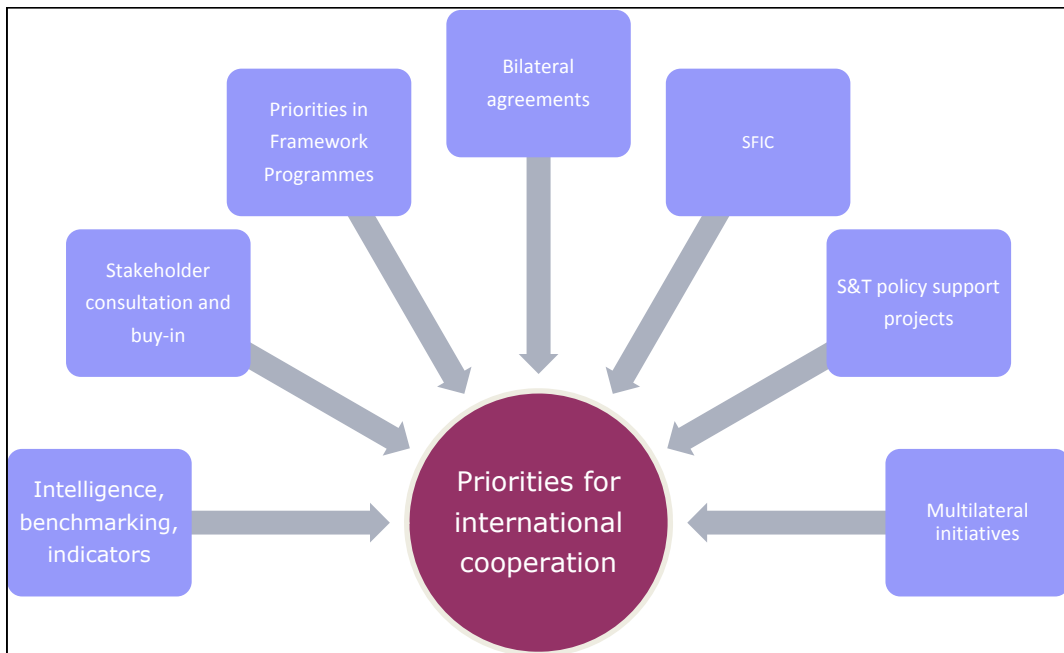


Figure 2.1: Measures and instruments for priority setting in international cooperation (EC, 2012e, p. 33)

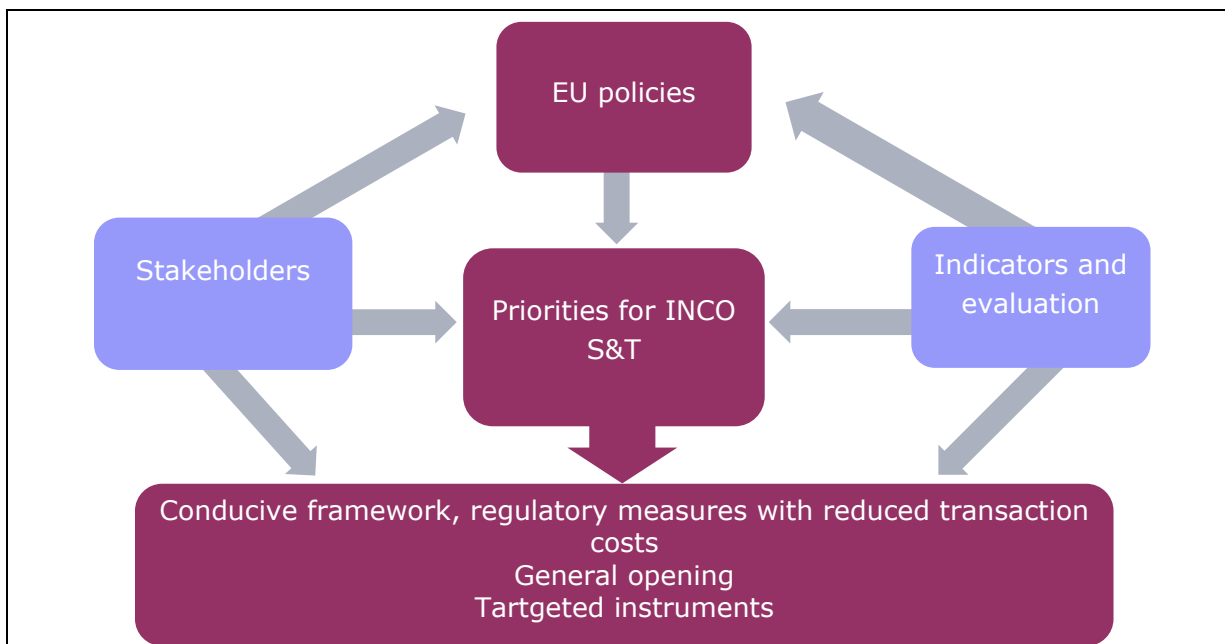


Figure 2.2: Dynamic policy framework for INCO S&T (EC, 2012e, p. 33)

2.2.1 Strategic orientation

While ensuring a considerable degree of continuity with the previous communication, the new strategy introduces a reorientation away from **cooperation** with third countries that is less strong in impact and more short-term and spontaneous. Rather, the new strategy is based on the idea of **collaboration** with countries so as to realise pervasive, more long-term relationships that are built upon shared goals and mutual benefits.

This new strategic orientation also aims to reach **critical mass** of the EU member states and EU-level R&I activities with third countries by coordinating national and European INCO S&T policies and through cooperation with third countries' relevant stakeholders, such as researchers, institutions and their national R&I structures.

An alternative strategy would have been to work towards **geographical and thematic foci** already within the communication rather than at work programme level. This would have been intrinsically more political and would have caused considerable difficulty to negotiate not only within the EC, but also with member states. The EC's strategic choice is therefore also motivated by the avoidance of complex coordination mechanisms already in strategy-setting, namely feasibility and practicality issues.

In the cooperation with third countries, the EC will also increasingly rely on other regional networks and organisations such as Association of Southeast Asian Nations (ASEAN), the African Union (AU) or the Union of South American Nations (UNASUR). Agreements and cooperation with these bodies are better manageable, have more impact and aim at showcasing the EU's will for increased bi-regional cooperation.

INCO S&T **policy cooperation** will be broadened through the inclusion of third countries' positions in the formulation process of the work programmes and the comitology of Horizon 2020. Additionally, international organisations and bodies such as the **Global Research Council (GRC)** will see agenda-setting efforts to safeguard European interests and to establish common principles for the conduct of international research, such as research integrity or open access to scientific data and publications.

2.2.2 Implementation of the strategy

The implementation of the new strategy aims firstly at ensuring that the EC subscribes to international cooperation as a **founding principle in its RTD activities**. More concretely, Horizon 2020 will be the main instrument for realising the EC's INCO S&T strategy. In principle, it will be open to participants from all over the world. However, **third country funding in Horizon 2020 will be limited** via the upper limits of Gross National Incomes (GNI) *per capita* already in place and now also via the total GDP, thereby excluding well-performing and competitive economies from direct European funding. Through this GDP upper limit of \$1 trillion, China, India, Russia, Brazil and Mexico will be excluded from automatic funding under Horizon 2020. This will affect especially Russia and India, which strongly benefitted from funding through FP7. However, the final decision of exclusion from funding will be in the multi-annual work programmes and could also include Indonesia.

The general opening of Horizon 2020 has somewhat uncertain consequences. Due to the fundamental change in funding policy for high-income countries, it is **difficult to predict whether third countries will continue to participate** in FP-funded research activities at the same intensity. However, exceptional funding for third countries will continue to be possible. According to the EC, it is decided upon within an S&T agreement, other agreements or at

committee level. The need of political accountability of distributing EU funds to third countries will increase in importance.

The EC aims to harmonise its own cooperation, but also to some extent that of national governments through **multi-annual roadmaps** for scientific cooperation with EC's key partners (countries and regions). These roadmaps will however remain a process whose initiative and control will lie with the EC and thus the **ownership of the multi-annual roadmaps will lie with the EC**. Through the focus of EC efforts and the less interactive consultation of member states' priorities, the EC aims to achieve a more strategic output. Thanks to an institutionalised process, however, member states can link into the EC process with their programmes. The multi-annual roadmaps will also align with the two-year work programmes of Horizon 2020 and will be fairly detailed regarding the intended topics and partners. The state of play of the EC's INCO S&T will be assessed through **monitoring reports**, of which the first one will be published in 2014, including the first series of multi-annual roadmaps. In any case, the effective impact of the roadmap formulation process is difficult to predict, as it depends on member states' commitment towards the process. An analysis of complementarities of third countries' science systems with Europe can be found in the staff working document accompanying the communication (EC, 2012f).

The multi-annual roadmaps will also seek to include bodies such as SFIC and the **European Strategy Forum on Research Infrastructures** (ESFRI). The EC considers research infrastructures to be central to resolving global societal challenges, whereas member states have shown more reluctance to allow for transnational access to research infrastructure, especially in INCO S&T, where they ask for more reciprocity from third countries.

SFIC is foreseen to contribute to the implementation process of the communication by exploring the **alignment of EC and member states' strategic priorities**. In the view of the EC, SFIC should take more of a passive role once the multi-annual roadmaps have been published. The role of SFIC therefore is suggested to be to participate in the elaboration of principles and activities as well as information and experience gathering and sharing on activities of the different countries. **The EC also presumably does not wish to further develop the forum, whereas the Council, having established the body (Council of the European Union, 2008), wishes to further enhance SFIC**. Member states can however be expected to seek active involvement in the definition of the multi-annual roadmaps. SFIC's core tasks according to the EC include:

- contribution to the definition of the **multi-annual roadmaps of Horizon 2020**, depending on the comitology and governance structure, thereby also taking into account priorities from associated countries;
- the development of **common guidelines for S&T agreements**;
- the promotion of **common principles** (such as peer review of proposals, the gender dimension in research and open access to scientific information) and intensified coordination with departments, ministries, agencies and stakeholders to create a level playing field;
- contribution to **common approaches in international organisations** and European intergovernmental initiatives such as the new European Research and Innovation Observatory (RIO), but also the numerous existing initiatives;
- further development of SFIC's **Pilot Initiatives** with third countries and development of the SFIC Strategic Research and Innovation Agenda (SRIA) which link to the multi-annual roadmaps. The SRIA are, however, broader in their strategic scope as they also take up interests formulated by member states only.

It is important to note that SFIC positions do not necessarily reflect member states positions. Nevertheless, SFIC representatives regularly underline the **importance of SFIC in order to unite the forces of member states and EC efforts in INCO S&T**. They believe that the India Pilot Initiative has shown the relevance of SFIC and further Pilots with China, Brazil and the USA could serve to seek to solidify the linking function of SFIC. As observers, associated countries of the FPs are in a position to participate in the maturation of the body. From a member state perspective, the alignment with SFIC Pilot Initiatives is an intermediary step towards pan-European INCO S&T. SFIC representatives at the same time make references to the principle of variable geometry to recall the voluntary nature of member state participation in SFIC activities.

The EC's INCO S&T strategy aims at building further **collaborations with other pan-European programmes** such as the European Cooperation in Science and Technology Framework (COST), Joint Programming Initiatives (JPIs) and EUREKA. The new Financial Regulation (FR) of the EU enables the EC to mandate an international organisation or even a third country with the **delegated management** of a programme, its evaluation or full implementation.

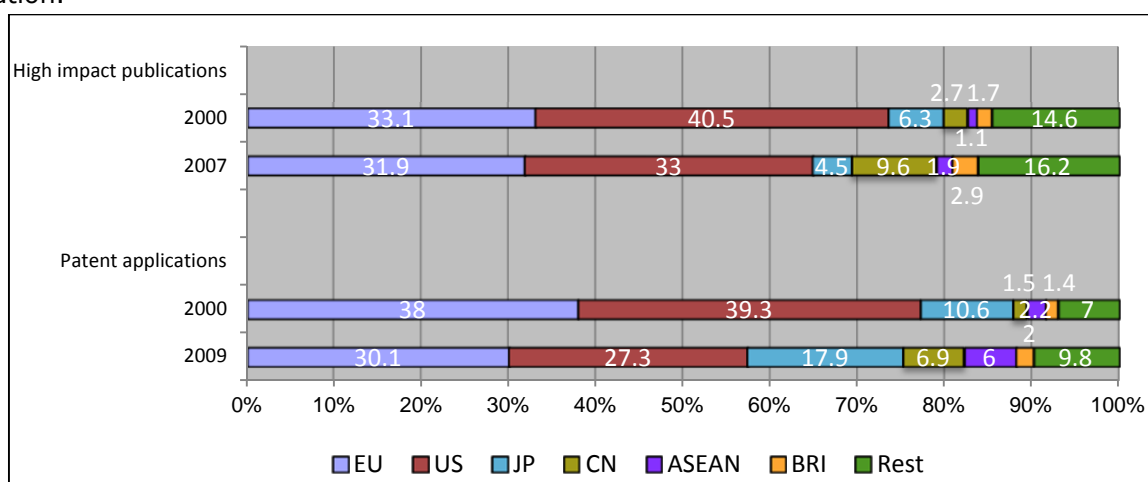


Figure 2.3: World share of high-impact publications and patent applications, 2000 and 2007/2009 (EC, 2012f, p. 3)

European research does currently not have the highest scientific impact in terms of publications in the fields wherein it is most specialised. The document therefore identifies **opportunities for complementarities** with other countries and regions. According to the communication, the European countries excel most in energy and environmental sciences, but lag behind in the fast-growing sectors of health, nanosciences, ICT and biotechnology. Figure 2.3 demonstrates how relatively, not only the EU's share of high impact publications is decreasing, but also, the more dramatic development is the decrease in patent applications, whereas the US are touched even more significantly by this development

The communication also notes that member states' **bilateral S&T agreements' goals are much more coherent than their different strategic approaches themselves**, the former mostly being inspired by excellence, access to new markets and resources and the tackling of global challenges. The member states' goal-setting therefore is in line with the proposed thematic priorities of Horizon 2020 and could be viewed as empirical argument in favour of a harmonisation of national and EU-wide INCO S&T priorities through multi-annual roadmaps.

2.2.3 Reactions of Council and Parliament

The Commissioner for Research and Innovation Geoghegan-Quinn presented the EC's Communication to the EP on 9 October 2012. The Members of the Committee on Industry, Technology, Research and Energy (ITRE) generally welcomed the new strategy, but sought clarifications regarding the interlink to related policy fields and, most importantly, the implementation of Horizon 2020. Specifically, Members of the European Parliament (MEP) took interest in the **funding mechanisms** and the development of the **multi-annual roadmaps**. They were however concerned that the development would be running on a too tight schedule to be implementable by the beginning of 2014. In addition, MEP called for more **concrete tools** to support the EU's R&I activities just as much as that of developing countries, for example through low-tech R&I activities. Finally, many MEP pointed out the difficult balance between vital funding for **close-to-market research, Intellectual Property Rights (IPR)** and the concern about European competitiveness within INCO S&T.

The Competitiveness Council discussed the communication on 11 December 2012. There was a broad sense of agreement among member states on the stronger focus and the more strategic approach of the EU's INCO S&T. However, the support for alignment of national INCO S&T activities was directly related to the size of member states: smaller member states appreciated the opportunity to **achieve critical mass in cooperating with big emerging science nations** such as India or China, whereas large member states with a strong knowledge economy, such as Germany or the UK, insisted on **variable geometry regarding the involvement of member states** in the EU's INCO S&T activities. This differentiated national commitment can be expected to strongly condition the successful implementation of the new strategy. Furthermore, member states expressed broad support for SFIC. The **Council conclusions on the communication can be expected in May 2013** and until then, the role of member states in the implementation of the strategy will be discussed intensely behind the scenes. Among others, SFIC will provide a short input to the Council conclusions.

2.3 S&T agreements: facilitating frameworks for intensified cooperation

S&T agreements are concluded between the European Community and third countries. Under the new strategy and within Horizon 2020, they will continue to provide a **facilitating framework** in which cooperation within and outside of Horizon 2020 can take place. Their establishment is not always linear and negotiations with third countries can result in modified priorities. The EC plans to be more restrictive in concluding new S&T agreements in the future. At the same time, existing partnerships with key countries could be further developed, such as with Russia, where the 'Strategic Partnership' could become increasingly important especially in the light of the discontinued funding introduced by the new limit on GDP (see below).

Future INCO S&T agreements of the EU will be oriented in scope based on **three criteria**, namely the **aptitude to engage in science diplomacy**, the **country's research and innovation capacity** and the **belonging to one of three country groupings**. The criteria are described in the next three sections.

2.3.1 Science diplomacy

Firstly, the practice of science diplomacy by integrating **science and technology into foreign and other sectorial policies**, both in the closer geographical vicinity, where collaboration through the Instrument for Pre-Accession Assistance (IPA) or the European Neighbourhood and Partnership Instrument (ENPI) might be available, but also in far-off regions and

countries. Science diplomacy is of use in classic diplomatic negotiation as a “less political” dossier, but is also a typical form of public diplomacy, i.e. a government’s “process of communicating with foreign publics” (Tuch, 1990, p. 3).

The EEAS closely cooperates with the Directorate-General for Research and Innovation (DG RTD) of the EC and regards INCO S&T as ‘non-political diplomacy’. In this sense, **the impetus for new agreements can come from either EEAS or DG RTD, but EEAS usually takes a more passive role** and ensures consistency in both EU-internal and external policy. The function of EEAS is also to ensure that external policy goals such as the Millennium Development Goals (MDG), the Rio+20 goals, trade and IPR are fully ensured in the work of the different DGs. The EEAS also has the main responsibility for the strategy and programming of Heading IV (‘Global Europe’) of the MFF.

On a content level, the EEAS has strongly **content-oriented and applied research interests**. The **EEAS’ strategic interests in INCO S&T** are summarised below (EEAS, 2012):

- EU security strategies (energy, raw materials, natural resources, critical infrastructures);
- protection of global public goods and coping with global threats and challenges (cyber-crime, organised crime, drugs, illegal migrations, political instability and war);
- applied research supporting the EEAS’s external policies and priorities (EU relations with strategic partners, EU support to the Arab Spring);
- contribution to the policy fields sustainable development, global security, poverty alleviation strategies and global stability;
- support to ‘EU in the world’ strategy;
- common or shared moral and ethical standards;
- address global societal challenges;
- involvement of member states, the EP and the European civil society in global dialogues with emerging economies, advanced countries and multilateral organisations.

The close coordination between DG RTD and EEAS has been put in place especially within the **Strategic International Research and Innovation Cooperation (SIRIC) inter-service group** with all thematic DGs - i.e. DG RTD, Directorate-General for Communications Networks, Content and Technology (DG CONNECT), DG Enterprise and the Joint Research Centre (JRC) - that engage in research or policy evidence. All work programmes, projects and the new multi-annual roadmaps are discussed in SIRIC, which enables EEAS to put forward strategic input *ex ante* rather than in the normal inter-service consultation. The European institutions therefore have a close input from a foreign policy perspective into the INCO S&T activities, which can be expected to increase with the implementation of the new communication. Through SIRIC, EEAS has also contributed to the drafting of the INCO S&T communication (EC, 2012a).

2.3.2 Research and innovation capacity

Secondly, S&T agreements will need to be backed by a partner country’s proven **research and innovation capacity**. The EC has shifted its preferred capacities from the ICT sector as prioritised in 2008 to a more open approach towards research priorities that fall within Horizon 2020’s strategy, i.e. the societal challenges.

The evaluation of partner countries’ research and innovation capacity will rely on both quantitative and qualitative assessments, notably with data collected by a new **Research and Innovation Observatory**. The observatory body **ERAWATCH** currently guarantees these tasks. More generally, there is a strong lack of indicators for European and national INCO S&T activities.

2.3.3 Different country groupings

Thirdly, INCO S&T will see further differentiation of partner countries and differentiated strategic objectives. The EC distinguishes three categories that are not actually clear-cut, but countries may fall in two country categories:

- **immediate neighbouring countries;**
- **industrialised and emerging countries;**
- **developing economies.**

The first group of immediate neighbouring countries includes European Free Trade Association (EFTA) countries, EU enlargement countries and countries covered by the European Neighbourhood Policy (ENP) all at the same time. EFTA countries therefore will fall in this first strategic group although all of them are currently associated to FP7 and although they are considered strategically important partners in the establishment of ERA. The communication does make vague provision for actions of the integration of EFTA countries into the ERA. The EC has confirmed that **associated countries will not be the object of multi-annual roadmaps, but will be included in the consultation of the roadmaps.**

The EU engages with third countries through international agreements of two kinds. The immediate neighbouring countries are, with very few exceptions, associated to the FPs and therefore enjoy, thanks to their financial contribution to the programme's budget, full access to all programmes of the FPs. The association to the FPs symbolises a strong strategic importance to the FP or a general political will for participation in European programmes. The following countries are currently associated to FP7 (EC, 2012h):

- **candidate and potential EU membership countries:** Albania, Bosnia & Herzegovina, Croatia, Former Yugoslav Republic of Macedonia, Montenegro and Serbia;
- **European Economic Area (EEA) countries:** Iceland, Liechtenstein and Norway;
- **third countries:** Faroe Islands, Israel, Turkey, Moldova and Switzerland.

The third countries that signed an S&T agreement provide for a focus on certain shared **thematic priorities and a framework for conducting joint operations in research and innovation.** In the implementation of the S&T agreements, the identification of thematic priorities is first left to DG RTD in order to guarantee the priority of science, but the EEAS's strategic interests are also taken into account. The following twenty countries have signed an S&T agreement with the EU:

- **BRICS:** Brazil, Russia, India, China and South Africa;
- **other industrialised and emerging countries:** Argentina, Australia, Canada, Chile, Japan, South Korea, Mexico, New Zealand, Ukraine and the USA;
- **developing economies:** Egypt, Jordan, Morocco, Tunisia and Algeria.

In cooperation with the **countries in North Africa**, the EEAS' thematic priorities are manifold: security, deforestation, water, transport, food security, jobs, the agro-industry, innovative textile industries, but also political and scientific dialogues around the Arab Spring. More generally, the EEAS has a focus on certain new developments in external policies such as the EU's new Nordic, Caspian and Arctic policies, but also fields such as raw materials, raw materials and energy.

The EEAS and DG RTD are engaging in policy dialogue with several regions of the world, namely Africa, South East Asia, Eastern Europe and Central Asia, Latin America and the Caribbean, Mediterranean countries and the Western Balkans. Whereas no specific agreements have been concluded, there are dedicated INCO-Nets, BILATs and ERA-NETs in place in some regions and there is an on-going policy dialogue with the countries or their regional association. EEAS has a strategic interest in many of these dialogues to drive other dossiers, such as free trade agreements with the *Mercado Común del Sur* (Mercosur) and ASEAN, forward.

2.3.4 Structure of EU agreements

A **typical EU S&T agreement** consists of the following parts:

- general objectives of the agreement focusing especially on mutual benefit and civil usage;
- definitions, among others distinguishing 'direct cooperative activities' between the signatory parties and 'indirect cooperative activities' between legal entities established in the signatory countries, e.g. within the FPs;
- inventory of cooperative activities;
- implementation procedures;
- tasks of the Joint Committee (JC);
- dissemination of information;
- IPR;
- coverage of incurred coordination costs through the respective party;
- assistance with entry and exit of researchers and materials;
- duration of validity of the agreement and provision for tacit renewal, mostly after five years.

2.3.5 Implementation of EU agreements

Science diplomacy is practised in the EU's delegations around the world by the nine S&T Counsellors. They are detached to the following delegations:

- USA (Washington);
- Brazil (Brasilia);
- Ethiopia and AU (Addis Ababa);
- Russia (Moscow);
- China (Beijing);
- Japan (Tokyo);
- India (Delhi).

S&T Counsellors contribute to the political reporting of the delegation, but are seconded from and report to DG RTD, whereas the EEAS is part of their selection panels. The role of S&T Counsellor in the definition of the multi-annual roadmaps for Horizon 2020 is not clear yet.

2.4 Instruments in Horizon 2020 and other instruments

The first programmes of the EC to foster international collaboration were the **INCO-Development Cooperation** calls in FP3, which were representative for early-day INCO S&T that often focused on development and international cooperation. INCO was intensified in FP5 and FP6, but was limited in its budget and rather development-oriented.

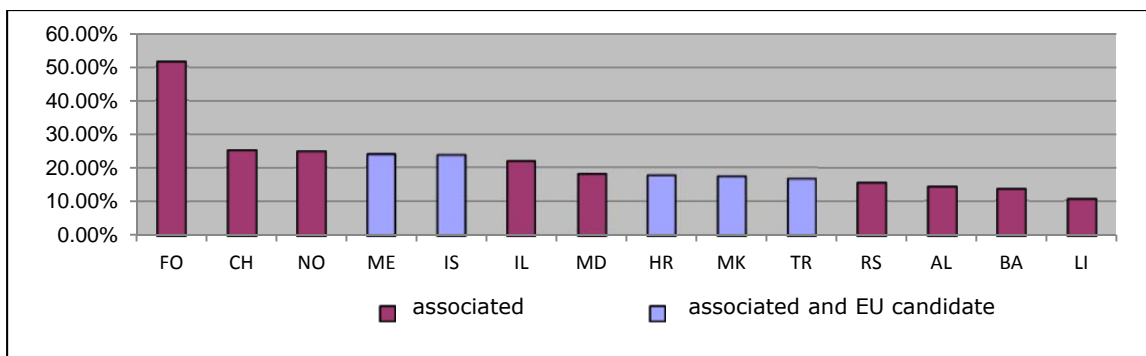


Figure 2.4: Success rates of applicants from candidate and associated countries and of requested EU financial contribution for FP7 calls concluded during the period from 2007 to 2011. Source: EC 2012g.

In the current FP7, the EC shifted towards thematic priority-setting in conjunction with a general opening of the thematic areas to all non-associated third countries. The participation of associated and third countries is considerably large and **every fifth FP7 project has an international partner** (EC, 2012g, p. 24). Especially the success rate of associated countries (see Figure 2.4) and the top third countries participants should be noted. The biggest third country participants are (in descending order): USA, Russia, China, India, Brazil, South Africa, Australia, Canada, Ukraine, and Argentina whereas the largest financial contributions went to Russia, the USA, India, China, South Africa, Brazil, Ukraine, Egypt, Argentina and Tunisia (op.cit., p. 22). It is interesting to see a clear link between the number of collaborations and the success rate, and that the EU’s general strategic partners collaborate most extensively, which also reflects the countries’ (science) economies (see Figure 2.5).

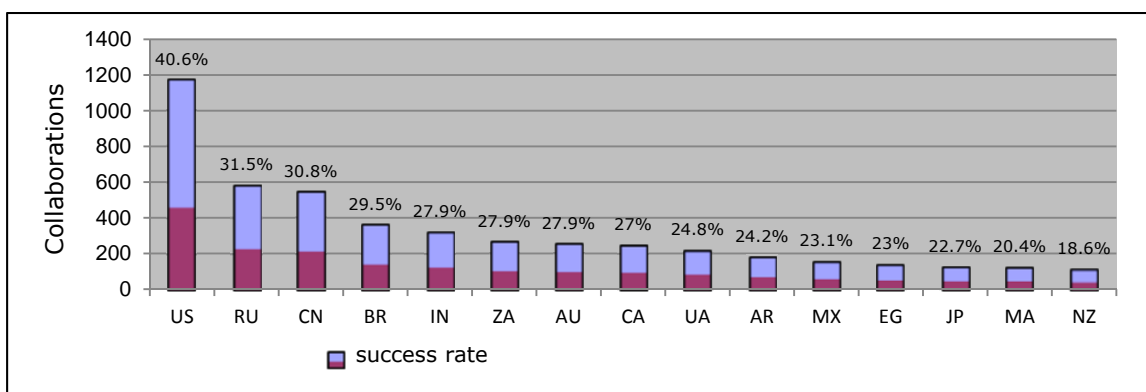


Figure 2.5: Success rates of applicants from third countries with and without S&T agreements with more than 100 collaborations between 2007 and 2011. (SER, 2012a)

Horizon 2020 will work under the principle of openness to third country participation. In exchange, the EU will seek reciprocal access to third country programmes. The collaboration with priority countries has been given an instrument for strategic cooperation through a range of **targeted actions**.

The **INCO Programme** has a coordinating role and also should foster INCO S&T in other programmes of FP7. A first focusing process was introduced through the **Specific International Cooperation Actions (SICA)**, which aim at generating, sharing and using knowledge through international research partnerships with third countries, in the areas identified through bi-regional dialogues with third countries and international organisations on the basis of mutual interest and mutual benefit.

In FP7's 'Capacities' Programme, the EC, member states and associated countries use **INCO-NETs** to strengthen bi-regional and bilateral dialogues on S&T cooperation with other world regions. They are not thematically bound, but facilitate the uptake and use of common identified research areas. INCO-NETs promote and structure the participation of third countries in the activities of FP7 and give rise to stronger bi-regional cooperation through their regional character.

International ERA-NETs are used to promote coordination and cooperation of national and regional programmes and funding between third countries and European states, whereas the EC may contribute funds to cover the networks' coordination costs. These projects also aim at increasing the understanding of European R&D procedures in third countries, identifying new opportunities for collaborative research and developing and adopting new evaluation protocols and procedures.

The **ERA-NET Plus** scheme is separate from ERA-NETs and provides a European financial contribution to those national research programmes that pool financial resources to organise and fund a joint call for transnational research projects of particular European added value. The main deliverable of an ERA-NET Plus joint call is an agreed joint selection list for funding of transnational projects, including the formal commitment of the participating programmes to finance these projects. The scheme is open to member and associated states, the funding awarded through calls also for third countries.

The **European Research Council (ERC)** awards competitive grants with a bottom-up approach and has received extensive praise by the research community. The ERC's focus on excellence help to attract world-leading scientists. If justified in the proposal, third country participation in projects is possible, but the Principal Investigator (PI) is situated in a member or associated state for at least 50% of his time. The ERC can be expected to develop its own internationalisation strategy in the future.

ERA-WIDE seeks to strengthen research excellence in the ENP countries. **BILATs** provide information for researchers in third countries on how to apply for FP funding and *vice versa*, **Access4EU** advises EU researchers on how to access funding in third countries.

The **Open Method of Coordination-NET (OMC-NET)** offers a possibility for international policy dialogue with a focus on R&D policy, especially peer review, good practice exchange and joint policy initiatives. The programmes offer a possibility to harmonise science systems, which is of interest also to foster principles such as peer review. OMC can also take place within the framework of an ERA-NET, such as with Russia (CREST OMC Working Group, 2008).

Marie Skłodowska Curie Actions (MSCA) allow for mobility of European researchers. In a bottom-up approach, the scheme provides for structured doctoral training, industry-academia exchanges and fosters inter-disciplinarity. International Outgoing Fellowships and International Incoming Fellowships offer experienced researchers to either conduct their research in a third country or to come from a third country to pursue their research activities in Europe. The COFUND action, which supports institutions' fellowship programmes with a 40% contribution, is a success in Switzerland.

Joint Technology Initiatives (JTI) are public-private partnerships of stakeholders around certain research interests. Joint Technology Platforms (JTP) are more formalised networks that launch their own calls. Organisations in countries associated to FP7 are eligible for funding. Applications from organisations based in third countries are assessed on a case-by-case basis.

A number of other European programmes and bodies is also relevant to INCO S&T. Based on the respective article of TFEU, the **Article 185 Initiatives** provide for the combination all public European sources from the EU, national and regional level into a single European programme. Member states bundle their efforts in the field of research infrastructures in ESFRI. There is an increase in **Joint Programming** of member states as well, often also with third countries.

An important tool for international cooperation and the networking of researchers is **COST**. As one of the oldest initiatives in the European research landscape, the platform gathers scientists from 36 countries, almost most of which are EU member states or associated countries to FP7, in different 'Actions'. COST is an important contribution to the bottom-up research support in Europe and sees itself an important contributor to a more connected ERA (COST, 2012). The programme is characterised by a low degree of administrative burden, but also no direct research funding, and many FP7 and nationally funded projects are based on results from COST Actions. Researchers from other countries can participate in COST actions as well. Australia, South Africa, Uruguay and Argentina, which signed a 'Reciprocal Agreement', have a particularly high participation. With the start of Horizon 2020, a **new independent legal entity** for COST will be introduced and a higher budget within Horizon 2020 will be striven for.

2.5 'Alignment' policy option

Efforts to establish the ERA have driven Europe in the field of innovation and research long before the economic crisis. The scientific and competitive advantages of European initiatives for INCO S&T in the best national interest is proven: Europe presents itself as an attractive overall science destination and lives up to its reputation of a knowledge society. Importantly, principles such as scientific excellence, peer review, societal relevance are top priorities for the EC, who also strongly focuses on improving the marketability of European research. The European level therefore presents a highly useful *locus* for INCO S&T with small-scale and regional partners around the world. Variable geometry allows for dedicated political solutions from European countries that have strong INCO S&T ambitions, as many European programmes allow or are even designed to attract foreign talents and incorporate third country science into the European research scene.

As an associated country to EU's FPs, Switzerland can benefit from the scientific collaboration and public visibility through the European programmes. Its strategy allows to associated countries to take a stake in the research activities without committing to the larger political Europe. It is therefore possible to subscribe to the reinforced strategic orientation of the EC, because INCO S&T is now at the heart of European efforts in research and innovation. National efforts, on the other hand, lack the financial resources and international momentum of European-level efforts when collaborating with emerging economies that begin to fund their own researchers more strongly. Committing to European INCO S&T would allow for a cost-effective, broad and impactful collaboration not only with third countries, but also within the ERA.

3. Selective and bottom-up: INCO S&T of Switzerland

This chapter, following the structure of the preceding chapter on European INCO S&T, introduces the **main driving factors** of the political and institutional context of Swiss INCO S&T (3.1), considers the SERI's and the SNSF's **strategies for INCO S&T** (3.2), lays out the Swiss approach to **S&T agreements** with third countries (3.3) and finally discusses Swiss **funding instruments** relevant to INCO S&T (3.4). The analysis will lead, at the end of this chapter, to a **policy option 'autonomy'**, that suggests the concentration of the Swiss INCO S&T strategy and policy on national-level efforts, due to the comparative advance of the Swiss knowledge society and the intrinsic advantage of designing INCO S&T policy at the national level.

3.1 INCO S&T in the Swiss political and institutional context

As a non-member country of the EU, Switzerland has taken an independent and well-adapted approach to INCO S&T that is very much aware of current trends, Switzerland's neighbours and its own strengths. More generally, several key institutions and their respective strategic documents mark the Swiss research and innovation field. SERI coordinates ministerial level research policy and INCO S&T activities with third countries on both strategic and partly operational levels. Moreover SNSF, the other main institutional stakeholder, plays an important role in implementing the bilateral strategy of SERI. In the following, the main drivers of the Swiss INCO S&T policy will be introduced, namely the implications of Switzerland interlinked with ERA, the importance of European research policy instruments to Switzerland, the exceptional high degree of mobility among researchers in Swiss institutions, the pronounced bottom-up scientific culture that is mirrored in Swiss research policy and, from an institutional perspective, the participation of a relatively large number of government departments and other institutions.

3.1.1 First policy driver: ERA and its own policy drivers

Due to its strong interest in research, **Switzerland shares the ambitious goals of ERA** and has a distinct interest to participate in the planned and initiated activities (SERI, 2013). Furthermore, Switzerland has been actively contributing to the Europeanisation of science in Europe for a long time already (SER, 2001, 2007). Its national research and innovation policy are generally consistent with ERA's policy objectives and its successful participation in the European instruments (see section 3.1.2) therefore makes that in research policy, Switzerland has a higher degree of *de facto* convergence with Europe than in other policy areas such as the economy, transport or the banking sector. In the middle of Europe and with its economy intertwined with the European economy, implementing the universal 'new innovation consensus' means subscribing to some of the policy drivers on the European level as well. Those applying the most to Switzerland are the **establishment of ERA** (see section 2.1.1), the **mobility of researchers** (see section 2.1.2 and 3.1.3 below), the fast rise of **emerging economies** (see section 2.1.4) and the **new innovation consensus** (see section 2.1.5). Due to its bottom-up scientific culture, tackling global societal challenges are not a priority *per se* (see section 3.1.4).

3.1.2 Second policy driver: importance of European instruments

Besides non-EU initiatives and programmes for collaboration in Europe, Switzerland's most important partners in FP7 are its immediate and close neighbours in Western Europe (see figure 3.1). This fact reflects the geographical and cultural similarities just as much as the

generally high performance of Switzerland's neighbours that corresponds to its own degree of excellence.

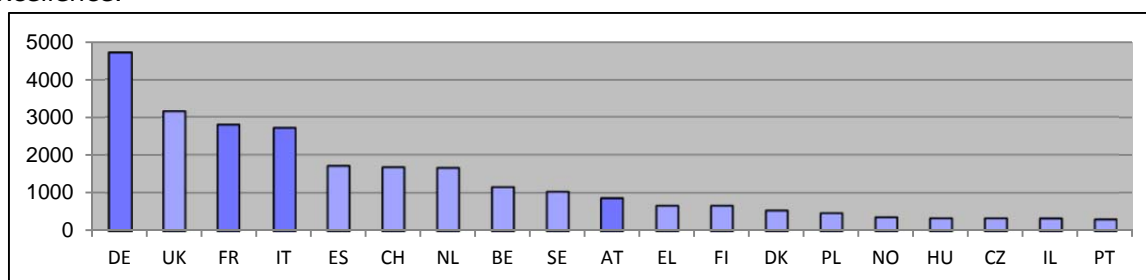


Figure 3.1: Number of collaborations of Swiss research partners with other countries within FP7 from 2007-2011. (SER, 2012b)

The European policy and programmes take an increasingly important role in Swiss research policy. Since 1987, Swiss researchers have been participating in the EU's FPs and since 2004, Switzerland has been associated to FP6 and the subsequent FP7 (SER, 2012d). Participation for Switzerland has been successful, given that from 2007 to June 2010, Switzerland received 4.3% of all approved funds while contributing 2.7% of FP7's budget (SER, 2011a, p. 5). Furthermore, Switzerland is the highest-ranking non-member state of the EU that receives FP7 funds, followed by Israel and Norway (op. cit, p. 28). However, as cooperation of the EU with third countries exists not always within the FPs, but also on the basis of other instruments of the EC, Switzerland is not always able to participate.

An important aspect of the Swiss involvement in the European research programmes, almost all of which have an INCO S&T dimension, is that despite being useful, **Switzerland does not have a direct stake in the policy formulation and the strategy** surrounding them. The European programmes therefore have to be regarded primordially as part of the Swiss wider institutional context beyond major influence possibilities. However, the association of Switzerland to FP7, and presumably also to Horizon 2020, allows Swiss government representatives and scientists to participate in the programme's **comitology**. These committees allow to defend Swiss strategic interests and to acquire information about future developments.

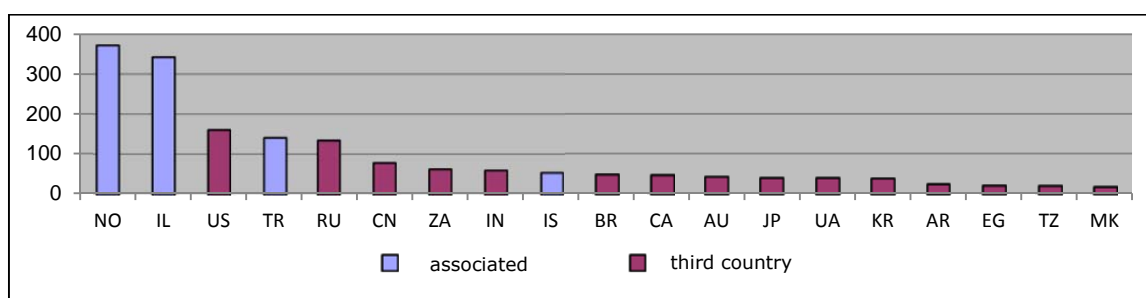


Figure 3.2: Number of collaborations of Swiss research partners with associated and third countries within FP7 from 2007-2011. (SER, 2012b)

The participation in the FPs is useful to Switzerland not only within ERA, but Swiss researchers have a positive record also in collaborating with third countries. The number of collaborations may well be lower than in comparison with immediate neighbouring countries, but INCO S&T is more resource demanding and projects are scarcer. Swiss researchers make effective use of the European programme to collaborate with countries outside the EU (see figure 3.2). There is an especially high number of participations with Norway and Israel, which represent two interesting cases of a fellow EFTA state and an ENP country.

ERA-NETs with third countries are a valuable opportunity for Switzerland to participate in European collaboration with third countries beyond the traditional funding instruments of FPs.

3.1.3 Third policy driver: highly mobile science workforce

As a small country at the heart of Europe, science has always been rather international in Switzerland and the mobility of researchers is even higher than in the EU (see section 2.1.2). Today, Swiss research performing institutions host by far the highest proportion of foreign scientists, as many as 57% come from abroad (Franzoni, Scellato, & Stephan, 2012, p. 1250). At the same time, about one-third of all native Swiss scientists chose to work abroad (op. cit., 1252), which is strong evidence of **intense brain circulation**, i.e. the coexistence of brain gain and brain drain within a country.

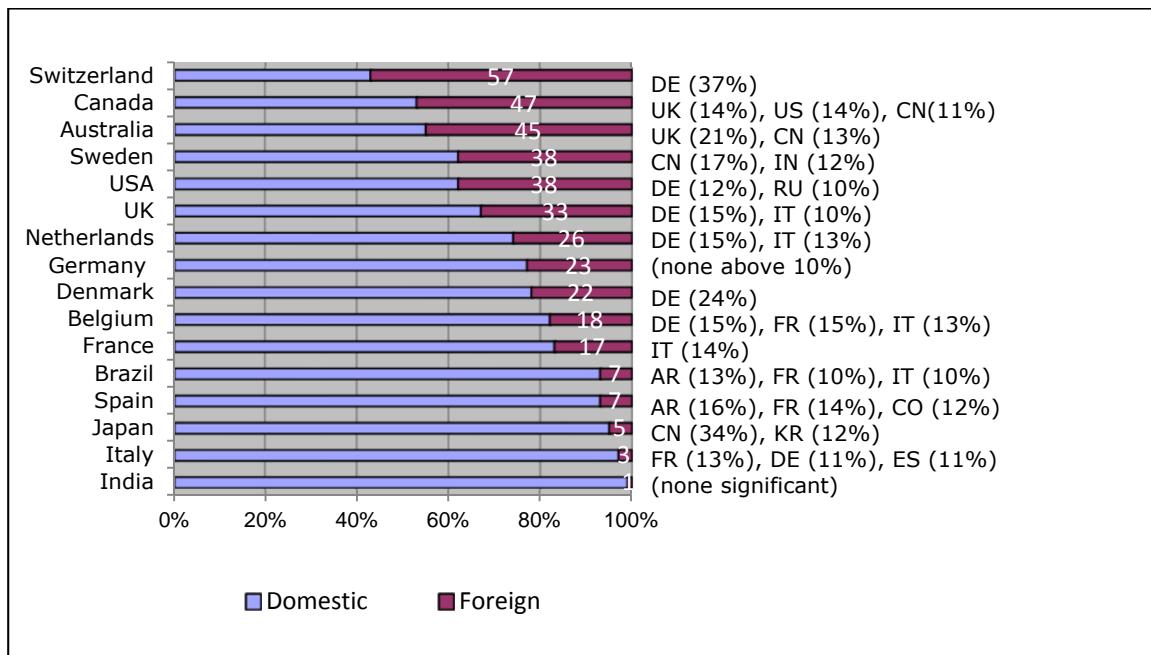


Figure 3.3: Countries with the highest proportion of foreign researchers and respective major countries of origin. (Van Noorden, 2012)

3.1.4 Fourth policy driver: bottom-up science culture

Switzerland has a pronounced bottom-up science culture (ERAWATCH, 2013), which is why few theme-setting is being done both on the side of SERI and of SNSF. Even the SNSF's largest thematic programmes, the National Research Programmes (NRP, see below) are defined through a competitive bottom-up approach (SNSF, 2013a). This particular science culture needs to be taken into account when devising a Swiss INCO S&T strategy.

3.1.5 Broad institutional stakes in research policy

A large number of institutions take a stake in Swiss research policy, which reflects the broad support for research as a driver of Swiss competitiveness:

- **SERI** devises and implements the strategies for research, education and innovation at national and towards the international level.
- The **Federal Department of Foreign Affairs (FDFA)** is responsible for formulating and coordinating Swiss foreign policy, effectively protecting Swiss interests abroad. Its Political Direction ensures, through its Sectoral Foreign Policies Division, consistency and a powerful position of Switzerland in international political *fora* touching upon research and innovation. Its **Direction for European Affairs** (DEA, previously Integration Office) coordi-

nates and harmonises different 'sectorial' policies of Switzerland with the EU. The **Swiss Agency for Development and Cooperation (SDC)** is the Confederation's development agency and a part of FDFA. Based on an overall evaluation of the research portfolio, SDC defined a new research policy in 2010.

- Several **federal departments** dealing with a specific policy field have their dedicated internationalisation activities as sectoral foreign policies, for example also by representing Switzerland in ERA-NETs or other funding schemes. Additionally, the departments also conduct their own *Ressortforschung* within the administration:
 - Federal Office of Public Health (FOPH);
 - State Secretariat for Economic Affairs (SECO);
 - Federal Office for Migration (FOM);
 - Federal Office for the Environment (FOEN);
 - Swiss Federal Office of Energy (SFOE);
 - Federal Office of Culture (FOC).
- Finally, the Swiss research institutions and foremost individual researchers themselves engage autonomously in INCO S&T by concluding agreements with other institutions and by developing their own internationalisation strategies. This subsidiary role of the state is a cornerstone of the Swiss strategy.

3.1.6 An integrated research, innovation and education strategy

The Swiss strategy addresses research, innovation and education integrally on the basis of interlinked developments that influence Switzerland's competitiveness (SER, 2010, pp. 5–12). This strategy is at the forefront of the implementation of the 'new innovation consensus' and is further strengthened by the 2013 merger of SER and OPET into SERI. Switzerland therefore aims at considering the knowledge society in a more holistic approach.

3.1.7 Joining forces in development and research policy

Switzerland regards INCO S&T as an important tool for development cooperation with third countries. SDC is part of FDFA and has launched the **Swiss Programme for Research on Global Issues for Development** (r4d.ch) in collaboration with the SNSF. The r4d Program provides funding for Swiss researchers and their partners in Africa, Asia and Latin America to jointly tackle global problems in poor countries. In the next 10 year SDC will invest CHF 72 million in the r4d Program. From a developmental perspective, the SDC supports research for development, i.e. application-driven and policy-supporting research with a focus on excellent results and concentrates on agriculture, environment and water as thematic priorities. The Research Concept for 2013-2016 (SDC, 2012b) suggests making research for development more of a priority both through increased funding, new instruments and support in academic fields that benefits the developing countries most (SDC, 2012a, p. 4). Following research will be more oriented towards global issues and public goods (e.g. health, environment, water, food security). The activities of the SDC therefore are an important contributor to the Swiss INCO S&T activities.

More generally, the **Message on Switzerland's International Cooperation in 2013–2016** aims at establishing consistence between development policy and sectorial policies (SDC, 2012b, p. 28) by focusing on sustainable development in Switzerland, research of Swiss researchers on development issues in collaboration with their research partners in Africa, Asia, and Latin America, as well as knowledge and technology transfer in developing countries, while taking into account the international strategy for education, research and innovation (op. cit., p. 30). However, **research for development is not used strategically** within the international strategy of SERI, as SERI's and SDC's strategic *foci* and objectives differ.

3.2 SERI Strategy

The Swiss INCO S&T activities depend on several institutions and documents. As a founding document of all Swiss R&I activities, however, the Federal Council relies on the regular four-year **Dispatch on Education, Research and Innovation** (*BFI-Botschaft*). The publication entails policy, programme and budgetary proposals for approval by Parliament.

The Swiss International Strategy in Education, Research and Innovation (SER, 2010) is a document apart from the regular Dispatches on Education, Research and Innovation. Developed by an interdepartmental working group headed by SERI, it was approved by the Federal Council in June 2010.

The SNSF is the main research-funding organisation in Switzerland and focuses on the funding for basic research. **SERI mandates SNSF through a performance agreement**, but SNSF is a fully autonomous body with the legal status of a private foundation and maintains a high degree of independence especially as regards scientific evaluation and in the few thematic priorities that it decides upon (SER, 2011b). SNSF therefore also takes a vital role in implementing the SERI's priorities, and its own strategic orientation is at the same time relevant when looking at Swiss INCO S&T. In its Dispatch, SERI has defined the following **goals for SNSF in the funding period 2013-2016** (Federal Council, 2012, p. 3175):

- ensuring the **competitiveness of Swiss basic research** by assuring satisfactory funding rates;
- creation of additional incentives for acquiring SNSF funding by furthering the 'overhead' instrument that covers indirect project costs;
- promotion of the next generation of **young researchers**;
- securing Switzerland's **competitive advantages in international funding programmes**.

3.2.1 Strategic orientation

While the INCO S&T activities of the Swiss government traditionally focused on Europe and Northern America, the second-last Dispatch 2008-2011 allowed for Swiss cooperation in S&T especially with emerging countries. The **Swiss bilateral programmes with priority countries** were launched in 2008 after a pilot phase from 2004 to 2007 with China (2004-2007) and India (2005-2007), which was perceived as successful. Eight targeted countries (Brazil, Chile, China, India, Japan, Republic of Korea, Russia and South Africa) were identified in the ERI Dispatch 2008-2011 (Federal Council, 2007). The bilateral programmes are coordinated by SERI, which mandates the implementation to Swiss universities under the agreement with the Rectors' Conference of Swiss Universities (CRUS).

A number of important premises inform the strategic orientation that SERI is taking:

- The Strategy accords the **SNSF** a significant role to "actively participate in the embodiment of Swiss international research policy" (SER, 2010, p. 12, translated). Each Swiss bilateral programme offers several funding schemes to researchers. Financially, the most substantial proportion has been going to **Joint Research Projects** (JRP). In the new phase 2013-2016, solely SNSF will manage all procedures concerning the JRPs on the Swiss side, also with the goal of intensifying its own relations with funding agencies in the priority countries.
- Furthermore, the Strategy also upholds the crucial **importance of the European and EU-level research scene** to Switzerland by subordinating Swiss bilateral cooperation with European countries to the strong commitment to EU-level programmes. In this sense,

Swiss collaboration with European countries should preferably happen via European instruments.

- The lack of **influence on policy-making at European level** by Switzerland is acknowledged. Swiss interests can be disseminated and reinforced in the FPs through active bilateral participation within the European programmes.
- Beyond research funding and participation in projects, Switzerland needs to **enhance the public image** about its research and innovation capacity. Analyses for the Nation Brands Index have shown room for improvement in some of the priority countries for INCO S&T (GfK Roper Public Affairs & Media, n.d., p. 14ff.) for the broader public, while specialists of course are perfectly aware of Swiss excellence in research and innovation. **Science diplomacy** as a tool for public diplomacy is broadly recognised not only at the political level (Dessibourg, 2012; Maurer, 2010), but also at the core of the Confederation's swissnex network (Marmier & Dorsaz, 2010).
- As the Strategy covers the entire 'knowledge triangle' of education, research and innovation, efforts to raise international acknowledgement of the Swiss **dual education system** could also feed into Swiss INCO S&T activities.

The integrated international strategy for research, education and innovation identifies three priority areas at the international level (SER, 2010, p. 16):

1. strengthening and extending the international network:

- a. participation in international organisations and programmes;
- b. bilateral programmes bringing an added European or international value;
- c. actors of INCO in S&T and education have the autonomy to define their internationalisation strategies.

2. exporting education and importing talent:

- a. promotion of Switzerland as a first-class research, innovation and education location;
- b. improvement of Swiss research infrastructures;
- c. mobility within the entire knowledge triangle;
- d. export the Swiss educational system.

3. recognition for the Swiss education system:

- a. recognition of Swiss degrees abroad;
- b. active role in international definition of standards;
- c. making Swiss higher education institutions known world-wide.

The Swiss INCO S&T strategy sets three dynamic country groupings that are similar to the EC's three groups {Citation}. A first group with "firmly established cooperation" aims at the EU countries and countries associated to the FPs. The second group for "targeted cooperation" consists of emerging economies, namely **Brazil, China, India, Japan, Korea, Russia and South Africa**. Chile will cease to be a priority as of 2013 (Federal Council, 2012, p. 3185). Ever since, SERI is seeking to establish more ties with third countries outside Europe. Early efforts in this regard through bilateral pilot initiatives with China (2004-2007) and India (2005-2007) were perceived as successful. An evaluation of the Swiss bilateral research programmes before 2010 found that the programmes generally function well and did not recommend to modify the overall settings of the programmes, the priority countries or the organisational structure (Lepori & Dunkel, 2011). The third country grouping targets countries for "occasional cooperation". The 2010 Strategy therefore can be seen as a successful continuation of the previously taken stance on INCO S&T.

The Swiss INCO S&T strategy is **takes the general foreign policy of Switzerland into account** (FDFA, 2012; SER, 2010, p. 18). The Foreign Policy Report 2012 calls education,

research and innovation a “central factor in the implementation of foreign policy goals” (FDFA, 2013, p. 969, translated). FDFA ensures consistency of the Swiss research activities and engages in **diplomacy for science to support the bottom-up scientific culture in Switzerland**. It does so particularly in the field of multilateral cooperation, in organisations such as the European Organisation for Nuclear Research (CERN), the European Space Agency (ESA) and the UN Committee on the Peaceful Uses of Outer Space (UN COPUOS). Delegations are usually made up of SERI, FDFA and science representatives.

3.2.2 Implementation

The strategy’s implementation is overseen at the strategic level by an **Interdepartmental Working Group** (*Interdepartementale Arbeitsgruppe IDAG*) that associates the Federal Department of Economic Affairs, Education and Research (EAER) and the FDFA. There will be an **implementation report** in 2017 in the framework of the next ERI Message 2017-2020.

The selected countries for intensified cooperation will, besides the insistence on the European research funding and participation development, continue to be at the core of Swiss INCO S&T efforts.

Regarding **international activities of the SNSF**, these undertakings can be divided into several aspects. Firstly, SNSF is to continue the successful priority setting within the framework of the NRP, which aims at providing application-oriented solutions to large-scale problems, which differ from the EU’s societal and global challenges, and the National Centres of Competence in Research (NCCR) that further strengthen the Swiss research scene in its areas of expertise. Regarding the thematic NRPs, international participation through Joint Programming Initiatives at European level can be intensified, granted there is ‘added value’ for Switzerland. SERI also defines four focal points for international engagement (Federal Council, 2012, p. 3184):

- **European cooperation** regarding national research funding organisations’ efforts. This includes Science Europe, the successor of the European Heads of Research Councils (EU-ROHORCs). Furthermore, operational cooperation within **ERA-NETs** is crucial;
- collaboration with **transition and developing countries** in collaboration with FDFA;
- bilateral cooperation with **countries with high scientific potential** that is currently not used by Switzerland. The BRICS as well as Japan and other countries can fall in that category. SNSF will support this orientation with a dedicated programme;
- Swiss contribution to **international research infrastructures**.

Subscribing in part to the SERI’s strategic guidelines for SNSF, the latter has released its own **SNSF strategy for INCO S&T** in the end of 2012. The SNSF defines the following priorities for its activities (SNSF, 2012a, p. 4):

- activities need to provide added value to the Swiss research community;
- scientific excellence is at the heart of funding;
- bottom-up thematic approach;
- increasing structural simplification and multilateral approaches in coordination with other countries;
- taking into account the local work conditions in cooperating countries.

The SNSF adopted its own international cooperation strategy (SNSF, 2012a), which subscribes to SERI’s strategy, but does not focus on emerging economies only. More than using its programmes for strategic advances with targeted countries, it aims at optimising and facilitating

the conditions under which international collaboration and scientific exchange can take place (SNSF, 2012a, p. 4).

SNSF's INCO S&T activities are differentiated by groups of countries that fall into either economic or geographic criteria. Categories range from **developing, transition and emerging countries** to European and Eastern European countries with their respective strength and weaknesses. The strategy defines specific funding instruments and collaboration frameworks for the respective groups of countries.

The broad institutional stakes in research policy in Switzerland are also reflected in the different **collaborations of SNSF with other Swiss institutions** (SNSF, 2012a, p. 8, see also section 3.4): The Swiss r4d.ch programme and Scientific co-operation between Eastern Europe and Switzerland (SCOPES) are run in coordination with SDC. Thanks to its long expertise and resources in administering funding programmes, SNSF co-administers SERI's funding activities with emerging economies, such as Russia in 2012, in order to pave the way to a fast collaboration between funding agencies. SNSF takes on implementation mandates from other Confederation departments (especially SERI and SDC) to enhance institutional complementarity and to enhance the efficiency of Swiss INCO S&T. It also engages in agency-to-agency cooperation, most importantly with Germany, Austria and Luxembourg.

On the multilateral level, SNSF is active in a multitude of organisations, among them Science Europe and the GRC.

3.3 Agreements with scientific powerhouses of tomorrow

Overall, Switzerland has concluded 16 agreements with third countries that touch upon bilateral cooperation in S&T, including the EU. Not all strategic priority countries have their S&T agreement yet. Some of the agreements are from the past century, others have only been concluded recently. The agreements do not yield funding opportunities to the extent that other programmes do, especially those of the SNSF, but they offer a 'specific niche' in the palette of programmes available to researchers in Switzerland (Lepori & Dunkel, 2011, p. 17). Not all of these agreements are strongly linked to the strategy outlined in section 3.2. The following eight countries are the key priorities among emerging economies (Federal Council, 2012, p. 3185). The bilateral programmes require matching funding by governments in the third countries to fund researchers in third countries.

Country	S&T agreement	(Associated) Leading House	Swiss Budget 2008-2011
Brazil	post 2008	EPFL	CHF 4.2 million
Chile	2008	EPFL	CHF 0.35 million
China	pre 2008	ETH Zurich UZH as ALH	CHF 8.8 million
India	pre 2008	EPFL UNIL as ALH	CHF 8.8 million
Japan	shortly pre 2008	ETH Zurich	CHF 1.5 million
Russia	post 2008	University of Geneva EPFL as ALH	CHF 7.3 million
South Africa	shortly pre 2008	University of Basel Swiss TPH as ALH	CHF 6.85 million
South Korea	post 2008	ETH Zurich	CHF 1.2 million

Table 3.1: Overview of bilateral programs with emerging economies outside Europe. (Lepori & Dunkel, 2011, p. 12)

3.3.1 Structure of Swiss agreements

A **typical Swiss S&T agreement** between governments consists of the following parts:

- general objective of the agreement focusing especially on mutual benefit and civil usage;

- possible forms of collaboration, mainly expert and researcher visits, exchange of information, mobility projects, organisation of events and joint research projects;
- assured safeguarding of national legal contexts;
- specification of cooperation projects and their governance;
- tasks of the JC;
- dissemination of information;
- IPR;
- coverage of incurred coordination costs through the respective party;
- assistance with entry and exit of researchers and materials;
- duration of validity of the agreement and provision for tacit renewal, mostly after five years.

In addition, some agreements (South Africa, USA) regulate third country participation, mostly on their own cost unless otherwise specified by the signatory parties. Policy dialogue is of interest with Brazil, the private sector is explicitly mentioned in the agreements with Japan and South Korea. Agreements are the basis for cooperation, but there generally are no provisions for thematic priorities in the agreements except for Russia, as they are decided upon at JC level, if at all.

3.3.2 Implementation of agreements

The programmes that are attributed the highest budgets (China, India, Russia and South Africa) received a designated **Leading House** (LH) and an associated Leading House, which are chosen based on their past experience and established high-level contacts with the partner countries. The leading house takes care of the management of the programme, but usually not the evaluation process. Every bilateral programme has a Swiss National Steering Committee (NSC) with representatives from SERI, LH, the Associated LH, the Rectors' Conference of the Swiss Universities of Applied Sciences (KFH) and SNSF. For the other countries (Brazil, Chile, Japan, and South Korea), no NSC was set up, but a single Swiss university was respectively designated for the implementation with the status of Coordination Office. At the international level, JCs or Joint Working Groups (JWGs) composed of representatives from both countries were set up for each of the eight countries. The long-term pertinence of the Leading House model has been the object of discussion in the first evaluation of the bilateral programmes (Lepori & Dunkel, 2011, p. 50).

Within the JCs, a number of **funding instruments** may be proposed and implemented. These currently include JRPs with funding of the respective national partners, institutional partnerships, exchange grants, joint utilisation of advanced facilities or specific infrastructure or participation in joint ERA-NET calls (Lepori & Dunkel, 2011, p. 12).

3.4 Swiss instruments for INCO S&T

In the framework of the Dispatch 2013-2016, SNSF received the mandate to implement the JRP programme with Brazil, China, India, Russia and South Africa (Federal Council, 2012, p. 3233). All other programmes, as introduced in the JCs (introduced in section 3.3), will still be implemented by the respective LHs.

The following research instruments fall within the scope of this research project, but not all are strongly connected with SERI's strategy.

Mobility fellowships for doctoral, junior and experienced researchers allow the grantees, originally based in Switzerland, to stay abroad for different period of times, depending on the

chosen scheme. This instrument is an active promoter of outward brain mobility in Switzerland and hinges on the principle that fellows will return to Switzerland thereafter.

Mobility grants in projects allow doctoral students to stay abroad for up to twelve months as a supplementary grant to SNSF funded projects.

International Short Visits allow Swiss researchers to stay abroad and foreign researchers to come to Switzerland for a limited amount of time. The purpose of the tool is to consolidate or initiate international collaboration. The application must be submitted by two applicants from the two host institutions engaged in the collaboration. The duration of stay cannot exceed three months.

International Exploratory Workshops provide the opportunity to organise workshops with participation of foreign researchers.

SCOPES is run jointly with SDC to fund projects aimed at promoting fair co-operation with scientists in Eastern European countries in transition and building the scientific capacity of their institutions.

The **Swiss enlargement contribution** to Romania and Bulgaria, the two most recent member states of the EU, allows for joint projects of collaborative nature between Swiss and Romanian or Bulgarian researchers.

JRPs with priority countries allow a group of researchers from Switzerland and a group of researchers from the concerned priority country to jointly investigate a specific question. These projects typically last three years and cover research, infrastructure and personnel costs. JRPs are bilateral and each application must be composed of two PI, one from Switzerland and one from the target country.

The **r4d.ch** programme in collaboration with SDC funds projects aimed at promoting the development and spread of new knowledge and innovative solutions that contribute to sustainable global development, with the emphasis on reducing poverty and preserving public assets in developing countries. The thematic setting of proposals is decided upon in advance.

ERA-NETs, although only partly under control of the Swiss institutions, offer a highly useful possibility to engage in institutional cooperation between Switzerland and third countries. Switzerland currently participates in 29 ERA-NETs (SNSF, 2013b), of which especially **CONCERT-Japan, ERAfrica, ERA.Net RUS and Koranet** allow for geographical targeting of emerging economies along the lines of the Swiss strategy (see section 3.2.1). It is important to note that both SNSF and SERI as well as several other federal departments and private organisations act as responsible entities (SNSF, 2013b).

The Swiss Foundation for Research in Social Sciences (FORS) represents Switzerland in the **Western Balkan Countries INCO-NET** (WBC-INCO.NET). The programme aims at enhancing the inclusion of Western Balkan countries in ERA through policy dialogue, analyses and joint calls.

Germany, Austria and Switzerland enjoy a particularly close collaboration within ERA. The three main funding organisations have concluded the **D-A-CH agreement** on mutual opening and cross-border funding, which lead to the **D-A-CH Lead Agency Process** (SNSF, 2008). The trilateral agreement was later also signed with Luxembourg. It allows for researchers from signatory countries to submit a common proposal to only one of the funding agencies, whereas the other agencies will fund their national researchers of the project approved by another agency. The Lead Agency Process hinges on two principles: The **Money Follows Researchers** scheme enables researchers who move abroad to make a request for their Swiss funding to continue. The project can either continue in the country of origin while being managed from abroad or transferred to the new location. The process **Money Follows Co-operation Line** 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 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.

3.5 'Autonomy' policy option

Swiss excellence in research and innovation has few immediate dangers. It has come out largely untouched by the severe economic crisis hitting the EU, presumably also thanks to its well-performing knowledge society. The national efforts in Switzerland to foster research are well-rooted institutionally and enjoy a good standing in the Swiss Parliament. Thanks to the consistent mirroring of the principle of bottom-up scientific culture, Swiss research policy has been able to offer researchers from around the world what they want: extensive support for excellent ideas. Towards other countries, Switzerland has put this principle into action through a community-based approach to setting collaborations with third countries that were identified on the basis of objective criteria.

As European policy becomes increasingly thematically bound and market-oriented and as national budgets in Europe decrease, the principle of bottom-up scientific cooperation could be seen as not adequately present in European programmes. The excellence of the Swiss system therefore allows for Swiss INCO S&T to become more autonomous, more decisive and oriented towards the new hot-spots of global science. Implementing a truly Swiss INCO S&T policy from Switzerland for Switzerland has the intrinsic advantage of full decisional power over the policy. These Swiss INCO S&T principles (bottom-up, autonomy, excellence) have proven its success through the last decade and are among the causes of the excellent standing of the Swiss research system. The strong cultural differences between elements of the European INCO S&T strategy and the Swiss research system would result in a dilution of the Swiss research efforts in thematic areas of little relevance for the national research community.

4. Comparing Europe and Switzerland

The previous chapters have demonstrated two different paths for Swiss INCO S&T, which are to align or to seek autonomy of the Swiss INCO S&T strategy with regard to European INCO S&T. Both paths for Swiss INCO S&T are *per se* viable directions due to the arguments brought forward above. This fourth chapter will, however, on the basis of the comparison of the two strategies, demonstrate that it could be beneficial to **embed Swiss INCO S&T within European INCO S&T, while maintaining Swiss values**. By doing so, this chapter concretely addresses the research question of this report, which is to **identify opportunities at the European level for Swiss INCO S&T**.

Section 4.1 will compare the **policy contexts** of European and Swiss INCO S&T, whereas section 4.2 takes a closer look at the two **strategies** for INCO S&T. The **S&T agreements** that the two sides take are scrutinised in section 4.3 and a **tentative comparison of instruments** is provided in section 4.4.

These comparisons find interesting differences between the two **policy contexts, strategies, INCO S&T agreements and funding instruments**, but more importantly, the analysis shows a **remarkable degree of similitude and compatibility** of European and Swiss INCO S&T. This leads to a third policy option 'Seize, shape, contribute' (section 4.5). The important **synergies** between the two strategies are at the heart of this policy option, as the comparison of European and Swiss INCO S&T reveals a **shared broad affirmation of the new innovation consensus**.

4.1 Comparative analysis of policy contexts

4.1.1 Institutional set-up

The politico-legal nature of the EU and Switzerland is distinguished through a different level of governance. This is best exemplified through some of the policy drivers and the institutional set-up that make the EU a unique decisional body (see sections 2.1.6 and 2.1.7). In the EU, interests are generally more diversified and thus more divergent, and decision-making is less centralised than in Switzerland (see for example Bache, 2008; Kauppi, 2005; Schendelen, 2002). **OMC** or an **ambitious mechanism of variable geometry for INCO S&T** that would allow for voluntary national intensification of INCO S&T harmonisation and Europeanisation has not been introduced. European policy in this regard is therefore bound to remain focused at the European level only. As a consequence, the European process of policy-making is entirely different to the Swiss one, because of institutional differences. Nevertheless, as this chapter will show, the underlying ambition that is addressed by the two strategies is not a fundamentally different one. While the institutional set-up leading to a research and INCO S&T strategy differs between the EU and Switzerland, the EU's strategic output is not formally precluded from being complementary to the Swiss one.

4.1.2 Switzerland as a part of Europe

There is an exceptional amount of mutual understanding and agreement on the European and Swiss sides about the importance of an ambitious research policy and the innovation consensus. In both policy contexts, the **diversity and size of Europe** is a first-order factor of difference in many ways: INCO S&T is often called the '**external dimension of ERA**' and the member states take strong interest in the EU's INCO S&T activities. Also as an associated country, Swiss institutions participate in European research programmes and are perceived as a part of the Europe of knowledge landscape. Europe is a priority for Switzerland through the

FPs, to whose policy-making it cannot contribute actively, but the success of the FPs is exemplary of this importance. Therefore, **European INCO S&T is of considerable significance to the Swiss INCO S&T strategy and Switzerland is intrinsically part of the European research policy landscape.**

As a small nation in a Europe that is undergoing political integration, Switzerland can be seen as a globalised country for that very reason too. The Europeanisation of research policy should also be seen in a tendency to global governance. It has become a main driver of both EU and Swiss policy. For the latter and in light of the importance of Europe, the Swiss strategy also needs to be seen as set in an effort to localise and specialise the Swiss activities in INCO S&T. As James Rosenau wrote, **globalisation is always also responded to by processes of localisation** (Rosenau, 1997), which highlights both the globalisation of the European strategy, but even the Swiss strategy as an effort to link into global developments, but also the stronger INCO S&T in Europe overall. The localisation of the Swiss strategy therefore further means the fine-tuning to European developments as well. Globalisation in the context of INCO S&T does not only mean that science becomes more international in general, but it also means that Switzerland, as an actor of limited size in the globalised science scene, is right to concentrate on its strengths and seize its opportunities.

4.1.3 A glance at other European states

European INCO S&T is first and foremost in the hands of the EC, which designs policies and designs instruments to implement them, but it is also, as pointed out in section 4.1.1, an interesting interplay of member states and EC. As larger member states often have their **own powerful internationalisation strategies** for their knowledge societies, and as Switzerland enjoys a **particularly close relationship with some of these member states**, the INCO S&T activities of our neighbouring countries are of interest in the policy context.

While a comparative analysis of other national policies for bilateral INCO S&T does not lie within the scope of this report, Lepori and Dunkel found a relatively **highly similar approach to INCO S&T of other member states and Switzerland**, as many share a focus on emerging countries and the BRICS in specific (2011, p. 21). As a general rule, research funding *per se* receives smaller shares of the overall expenditure than coordination and exchange activities. Switzerland's immediate neighbours tend to have **fewer S&T agreements, but equally focus on emerging countries**. Furthermore, **the main cooperation partners of Switzerland's European neighbours are only India and China**, whereas Russia, Korea, Japan and South Africa have agreements with a handful of European countries only. The European INCO S&T activities are however aimed more specifically aimed at the complete group of emerging economies (section 2.3).

The **importance of Europe for INCO S&T of European countries varies**: large member states like Germany, France, Italy and the United Kingdom have stand-alone extra-European strategies for cooperation with third countries, whereas countries of medium size with strong knowledge societies view EU and third country INCO S&T equally important (Denmark, Finland, the Netherlands) and some do not focus on broad extra-European cooperation (Austria, Spain - except South America-, Portugal, Slovenia and Sweden), but only engage in INCO S&T through the European programmes (ERAWATCH NETWORK ASBL, 2013, p. 15). This ERAWATCH report also provides further interesting data on member state INCO S&T activities.

The similar but generally less accentuated INCO S&T activities of other European countries and especially our immediate neighbours can be explained through their EU membership, which allows the active participation in the shaping of European INCO S&T. Therefore, it can be assumed that the European level replaced some of the INCO S&T programmes at national level, but **the strategic approach of these European countries and Switzerland is highly similar and compatible.**

4.1.4 Science and diplomacy

Switzerland has a strongly expressed bottom-up scientific culture (see section 3.1.4). A very direct and pragmatic use of institutionalised **science for diplomacy**, as the EEAS practices, is therefore not foreseen, as Switzerland maintains only loose ties between scientific collaborations and diplomacy already by its institutional set-up. The FDFA ensures consistency of INCO S&T policy with the general foreign policy, but will not engage itself in theme-setting. As an intrinsic part of the new innovation consensus, science diplomacy is handled differently at the European and Swiss levels, but in both cases, science has become a significant register of diplomacy for the EU and Switzerland. Both parties share the view that science is essential in opening doors for diplomacy, and therefore, **science diplomacy can be expected to continue to play an important role both for Europe and Switzerland** (see Royal Society, 2010, for a succinct discussion).

4.1.5 Research and development policies

Emerging economies are distinguished by a comparatively rapid GDP growth, but this **growth is often not inclusive of all citizens and economic sectors**. Often, these inequalities are visible in a rural-urban cleavage. Therefore, the higher economic inequality of emerging economies creates a paradox for industrialised countries, as the activities with the third country evolve from a development approach to other policy fields such as research. Striking the right balance regarding this paradox is difficult due to the volatile nature of the divergence.

The EU's first steps in INCO S&T were undertaken in a developmental perspective (see section 2.4) and as emerging economies have become more viable partners in doing excellent science, they have become **more equal partners**. This change falls well in line with the EC proposing for the first time a joint strategic approach for research and innovation that will be implemented through Horizon 2020. As a logical consequence, **non-reciprocal R&I support to third countries above the GDP threshold can only diminish**. The EU still has development programmes with some of its priority countries and mentions them explicitly in the S&T agreements (see section 4.3.3) to guarantee their viability, the **EU therefore openly addresses the dilemma of emerging economies** and ensures a comprehensive approach to both development and research cooperation with emerging countries.

Switzerland, on the other hand, has always approached INCO S&T as a **research-oriented strategy** and has only recently started to integrate research and development policy through the **r4d.ch** programme. Swiss development policy focuses more on societal challenges identified by SDC such as the MDG and not developing research capacity itself. Research is also not used in a strategic way in development policy, but as one of many factors that SDC is taking into consideration.

The European and Swiss approach to development in the context of research therefore differs, while Switzerland insists mostly on **excellent science**, the EU also fosters the **development of emerging economies in addition to collaborating scientifically** with these countries.

4.1.6 A shared belief in the new innovation consensus

Despite some differences pointed out above, it is important to note that Switzerland's and Europe's policy contexts both hinge on the general broad support of the new innovation consensus. Switzerland is a highly competitive country and the EU has set itself ambitious goals in the area of competitiveness through the Europe 2020 strategy. In line with Rosenau's realisation of globalisation and simultaneous localisation, the two strategies follow a compatible political framework, wherein networked knowledge societies are the key goal for a prosperous future.

4.2 Comparative analysis of Swiss and EU strategies

The comparison of the strategies of the EU and Switzerland is bound to certain structural limits to consider because the EU is a unique supranational entity that has shared competencies in the field of research and innovation and it can only mobilise resources at European level (see 4.1). However, a strategy as defined in section 1.2 as "coordinated policy action by public bodies that seeks to influence the intensity, content and direction of collaboration of research across borders" can be compared regardless of institutional differences. This section will compare the two frameworks of coordinated policy action with regard to their drivers and goals.

4.2.1 Addressing similar problems

The analysis of both strategies points out to two similar, but slightly different problems that are addressed. The EU deals with a shortage of research funds and fights for its place in the world ranking of competitiveness in light of new emerging economies. It lacks high-skilled researchers and sees bright talents emigrate. The economic crisis has resulted in significant cuts in education and research spending in half of the member states. The new European strategy therefore needs to tackle a **shortage in diverse resources necessary for excellent research** and the knowledge societies that evolve from it. On a different level, Europe also needs to address its internal political structure of **variable geometry**, as the strong knowledge societies have powerful INCO S&T strategies and programmes of their own. Effectively, member state-level bilateral activities should subscribe more to a pan-European strategy in order to create 'critical mass'. Finally, the EU's INCO S&T strategy also addresses the fact that **the BRICS have become more mature economies** that are increasingly able and willing to fund their own research.

Switzerland addresses a slightly different problem with its INCO S&T strategy. With an excellent science system and an high degree of competitiveness, the challenge for Swiss INCO S&T is to **externalise the highest of ambitions** it has in research in order to continue to attract the best talents, correspond to its small size and, in absolute terms in comparison to the potent emerging economies, the small overall budget it can allocate to research.

These two underlying issues again are **motivated by an interest to increase the competitiveness of the European and Swiss knowledge economy**. The two strategies address this goal in a slightly different manner, but *in fine* work towards the same goal. There is a general understanding and agreement about the **values and aims** just as much as about the factual **knowledge** in INCO S&T between Switzerland and the EU.

With the TFEU and the Europe 2020 strategy, heads of states have left no doubts about the added value of research and innovation at the European level. Also Switzerland can build on a strong, already internationally mobile and diverse science community, all of which is sup-

ported through a political agenda that has fully adhered to the innovation consensus. The Swiss small size and accompanying limited resources is not *per se* a problem, but implies a specific course of action that looks to the most promising partners in the best ways. This issue is furthermore not unique to Switzerland and research policy, but can be resolved through smart localisation strategies of political actors (Walser, 2013).

While there are some differences about the scope of the issues being addressed and especially the level of political consensus about the values and aims of research policy, the **factual evidence** in favour of research as a driver of competitiveness and the importance of INCO S&T to contribute to this goal is traditionally high in Switzerland and are on the rise at the European level. **The underlying problems that the respective strategies address therefore have become more close and compatible.**

4.2.2 Narrow and broad strategic orientations

The comparison of the Swiss and European strategies is best done in a framework reposing on the policy drivers that make up the **implicit and explicit preconditions and logic causes** for the argument that is made by any INCO S&T strategy. Strategies can be differentiated by the broadness of input they take into account, and the resulting broadness of policy output and the impact that is being aimed at. It is useful to distinguish a **narrow** and **broad strategic orientation** of INCO S&T strategies that are distinguished by their strategic scope being open to other policy considerations than research (for a more precise definition, please refer to EC & Technopolis, 2009, pp. 13–14).

Switzerland pursues a 'narrow strategic orientation' in which INCO S&T is linked to drivers that are intrinsic to the science dynamics of the policy that develops the strategy. The goals of narrow strategies typically seek to **enhance the national science scene**:

- contribution to the quality of science (through cross-fertilisation, competition, combining complementary knowledge, access to world class researchers, facilities and groups);
- solving specific scientific problems that need the input from, and the teaming-up of, various international research teams;
- increase of the scope of research (combining complementary knowledge, pooling funding and human resources, sharing risks, increasing computational power);
- improve access to scarce human resources for research;
- increase (international) productivity and visibility of research;
- contribute to building institutional capacity in research organisations.

These criteria match the Swiss science scene and the Swiss INCO S&T strategy (see also section 3.1 for the Swiss policy drivers). With these rather consistent goals, there is less potential for conflict in the drafting and implementation of the Swiss INCO S&T strategy. Furthermore, there is no 'science for diplomacy' orientation. On the other hand, the different types of research, development policy and the different Swiss institutions require a certain degree of coordination.

The EU gave itself a 'broad strategic orientation' wherein other non-science policy objectives interact with the intrinsic science oriented objectives and INCO S&T becomes a means to reach the overarching policy ends along with the core scientific goals. EC and Technopolis found that in addition to the drivers forming the narrow strategic orientation four additional drivers from other policy areas to make up the broad strategic orientation for the European INCO S&T:

- improving competitiveness;
- supporting less developed countries by developing STI capabilities;

- tackling global societal challenges;
- creating good and stable diplomatic relationships (and indirectly ensuring international security).

The link to the policy fields and constraints on the EU when designing policy pointed out in section 2.1 are evident. The EU openly posits competitiveness as a main driver of its research policy, the decision to discontinue funding to third countries above a certain economic threshold is a measure to **concentrate funding efforts to competitiveness to Europe**. Development plays an important role in the EU's general relation with emerging economies and is also present in INCO S&T instruments. The EEAS has a clear intention to use science for diplomacy and science in diplomacy. In this sense, science diplomacy is more 'political' at European level, whereas it is only diplomacy for science or 'public diplomacy' in Switzerland.

However, while the EU allows for other policy areas to influence its research activities, it would be **precipitate to conclude the incompatibility of a 'narrow' and 'broad' strategic orientation**. There continues to be a strong strategic core that is in line with the Swiss 'narrow strategic orientation' and it is important to negate any conceptual or normative contradictions between the two strategies. **The broad strategic framework of the EU clearly builds on the principles of a narrow strategic framework also endorsed by Switzerland and therefore, the two strategies share their core goals, but are different in scope**. As a first consequence, it cannot be said which strategy is 'better', but the 'best' strategy is one that works in favour of the scientific and/or political goals that are set by governments. As a second consequence, **the Swiss strategy is compatible to interlink with the European strategy** albeit the broader strategic orientation of the latter.

4.2.3 A more dynamic policy framework for the EU

Switzerland identifies its priorities in international cooperation on the basis of analyses of different policy areas and considerations that all have a stake in the Swiss strategy. This was equally true for INCO S&T activities of the EU prior to the new strategy, which were mainly DG RTD-driven and therefore followed many aspects of the narrow strategic orientation (see section 4.2.2). As discussed in section 2.2, the EU has now adopted a **more dynamic approach to connecting different measures and instruments**. The architecture of this new dynamic policy framework goes further than the fundamental principle of the Swiss strategy, which is to preserve the integrity of its 'narrow strategic orientation'. However, the link-in of Switzerland into European activities is still very much possible, as the 'narrow strategic orientation' is still an intrinsic part of the dynamic policy framework. **Collaboration through the European programmes is therefore not precluded** at all due to this new strategic framework. More precisely, the driving forces of excellent research and the intrinsic advantage of INCO S&T are at the core of both strategies.

4.3 Comparison of EU and Swiss S&T agreements

The EU and Switzerland have concluded numerous S&T agreements, not all of which fall under the current strategic priorities (see annex IV for a comprehensive list of EU and Swiss S&T agreements). In this section, only the agreements between Switzerland or the EU with Brazil, China, India, Japan, Russia, South Africa, South Korea and the USA will be looked at into more detail, to some extent also regarding their implementation.

The agreements on both sides follow a consistent structure and general logic. The content and degree of detail varies at both the European and Swiss sides, but the agreements also reflect the two different strategic orientations in addition to subscribing to the same core values and aims (see section 4.2). As the structure of European (section 2.3.4) and Swiss (section 3.3.2) S&T agreements with third country shows, there is a lot of similitude in the way the two sides conclude their agreements. The main differences between the agreements are that the EU has only recently begun to include **framework conditions** systematically in its agreements, that the EU tends to refer to **larger policy dialogue processes and political partnerships** with emerging economies in line with its 'broad strategic orientation', and that the EU often identifies **priorities in the collaboration** already in the S&T agreement and not in the JCs like Switzerland.

4.3.1 European and Swiss priorities and agreements' specificities compared

	Swiss S&T agreements		EU S&T agreements	
	Priorities (not in agreements)	Specificities	Priorities	Specificities
Brazil	neurosciences, health, energy, environment	policy dialogue	biotechnology, ICT, bio-informatics, space, micro- and nano-technologies, materials, clean technologies, natural resources, biosafety, health and medicine, aeronautics, metrology, SSH	not excluded from EU 'research for development' activities
China	life sciences, biotechnology, environment, urban development and sustainability, materials science, and medical sciences.		ICT, food quality and safety, sustainable development, transport	not excluded from EU 'research for development' activities
India	information and communication technologies, material sciences and nanotechnology, human health sciences, sustainable urban development, renewable energy, social and human sciences		ICT, mathematics, engineering including transport and energy, chemical sciences, physics and astronomy, advanced materials and nanotechnologies, health and medicine, biotechnology, agriculture, environmental sciences	reference to Partnership and Development Agreement, not excluded from EU 'research for development' activities, strongly linked to India's participation in FPs
Japan	medical research	private sector		private sector
Russia	engineering and IT, nanosystems and materials, life sciences, natural resources and energy, transportation, economic sciences, human and social sciences	some theme-setting in agreement	environment, biomedicine, agriculture, forestry, fishery, industrial production, materials, non-nuclear energy, transportation, ICT, SSH, S&T policy, training and mobility of scientists	reference to Partnership and Cooperation Agreement, third country participation, yearly JC meetings
South Africa	health and biomedicine, bio- and nanotechnology, social sciences and humanities	third country participation	Pharmaceutical research and innovation, mining and minerals, global change and earth observation, biotechnology, food safety	Linked to South Africa's participation in FP4 and successors, EU S&T Sector Budget Support for South Africa (not in agreement)

South Korea	different technological fields	private sector	non-nuclear energy, nanosciences, materials and production, ICT, researchers mobility, international cooperation	private sector
USA	none	third country participation	environment, biomedicine, health, agriculture, fisheries, engineering, non-nuclear energy, natural resources, materials, ICT, telematics, biotechnology, marine sciences, SSH, transportation, S&T policy	destination Europe (not in agreement)

Table 4.1: Comparison of Swiss and EU S&T agreements with priority countries (All EU priorities from agreements, except: EU-South Africa priorities (1/2): EC, 2007, EU-China priorities: 2008b, p. 32, EU-South Africa priorities (2/2): 2011a, EU-Korea priorities: 2011b; EU-India priorities: ERAWATCH, 2011, p. 7; Swiss priorities: Lepori & Dunkel, 2011, p. 12)

The Swiss and European agreements differ little in general, but a few interesting specifics can be identified (see table 4.1). Furthermore, the **EU is more specific** in its agreements, not least in identifying **priorities of the collaboration already in the S&T agreement** and not at JC level like Switzerland. It also integrates agreements more into the general bilateral relations and makes provisions for continued cooperation in the field of development for Brazil, China and India.

Table 4.1 shows that the **priorities** of the EU and Switzerland in the collaboration as well as the **specificities** of the agreements coincide to a large degree of detail. While the Swiss agreements are free of scientific priorities, the JCs seem to conclude on the same priorities as the EU. The FP7 statistics that are available for some of the countries indicate that the priority areas by number of Swiss collaborations fall in line with the priorities set in the agreements. For that reason, there is a **high degree of similitude in the governance and implementation of the agreements between the Swiss and European side**. The relatively high numbers of collaborations of Swiss researchers with third countries (see section 3.1.2) can be explained by this similitude, but they also would allow for further synergies.

In conclusion, there is a **high degree of congruence regarding the approach** to INCO S&T agreements on both sides. Furthermore, the EU now also wishes to improve **framework conditions** to some extent, but this is still more at the heart of Swiss agreements. **Topical setting** is done at agreement level by the EU and at JC level in Switzerland, but both approaches result in fairly identical priority areas of collaboration. The approach to INCO S&T of Europe and Switzerland therefore is relatively compatible. The specific theme-setting is not a Swiss approach, but it allows for Switzerland to identify **opportunities in the European INCO S&T activities** and from the beginning of a concluded S&T agreement.

4.4 Analysis of instruments

A comprehensive comparative comparison of European and Swiss research and innovation instruments lies outside the scope of this report. General comparison of the funding instruments shows that the European and Swiss approach to funding instruments is not diametrically opposed, and certainly the least different in directly implementing the INCO S&T agreements through joint research programmes. European instruments play an important contextual role for Swiss national research funding just as much as for INCO S&T.

4.4.1 An open Horizon 2020, but Swiss matching funding

When undertaking a general comparison of the European and Swiss instruments, it is apparent that the **general opening to participation** (section 2.4), but not automatic funding of third countries is a **major INCO S&T added value to the regular European programmes**. In exchange, **not many Swiss programmes are unconditionally open** to participation of third countries. However, **Switzerland's partners in the bilateral programmes are expected to provide matching funding**. Researchers in third countries are not supported financially by Switzerland, but they receive funding from their respective governments. This is an important difference to Horizon 2020, where some third countries continue to be supported by the EU.

The general opening of Horizon 2020 allows European and third country researchers to collaborate within this framework, and **third countries can be expected to eventually develop respective funding instruments for their researchers**. However, there is an element of uncertainty to which extent third countries and emerging economies in particular will react to their exclusion from automatic funding.

In addition to Horizon 2020, the implementation of INCO S&T can also take place within **bi-regional and multilateral frameworks**, where the EU, due to its size, has considerable *impetus* and agenda-setting power. This will be useful to foster 'soft factors' such as research principles, mobility policy dialogue or open access to research results.

4.4.2 Contribution of member states to European implementation

Member states undertake their own activities without involvement from the EU, but should, in the view of the EC, feed into the multi-annual roadmaps and coordinate their further activities.

In this sense, SFIC, as an advisory body to the Council and EC, has contributed to the European INCO S&T activities through a number of ways. Its Task Force has started activities in **Brazil**. In **China**, the EC is undertaking a High-Level Innovation Cooperation Dialogue and launched a BILAT project, but SFIC is not involved in it yet. In collaboration with the **USA**, the **Destination Europe** programme is very important and is perceived as a success by European actors. As **Russia** has made it clear that exclusion from funding would not be a problem, the Strategic Partnership between EU and Russia is of big importance. **South Africa** is a successful participant in FP7 and will serve as a partner in the tripartite Africa-South Africa-EU partnership, but will receive a more focused development programme.

4.4.3 Addressing development through research policy

As explained in section 4.1.5, both at the European and Swiss levels, development plays an important role. At the instrument level, the European instruments will still be **open to third country funding below the GDP threshold** and the EU therefore shares a vital interest in supporting less well-performing countries around the world. Switzerland shares the view that **research should contribute to development**, and its instruments, notably the **r4d.ch** scheme, focus both on **research for development**, i.e. less on the development of research capacity through collaboration in European projects like at the European level, but more on scientific cooperation among equal partners, and at the same time increasing the collaboration with weaker science economies.

Therefore, there is a **shared belief to support developing countries also through research budgets**, and there exist instruments notably for newer member states and ENP countries that are targeted similarly by the Swiss and European instruments. Overall, the European instruments, in combination with the EU's development cooperation schemes also touching upon research, show a **larger connectedness of development and research at the European level**. This falls in line with the respective strategic orientations of the two sides.

4.5 'Seize, shape, contribute' policy option

The comparison of the Swiss and European policy contexts, strategies, agreements and instruments have showed that there is a **large degree of compatibility at the 'excellent science' core of the two strategies**. Switzerland operates a 'narrow' strategy based on excellence, an ambition which the EU fully shares and that is implemented through programmes such as the ERC and competitive funding within the FPs. On top of this central ambition, the EU has widened its strategic scope to include other policy goals in INCO S&T, and it has done so also by adopting a more dynamic policy framework within which the EU's general policies are equally stringent as research priorities. While there are a few differences to be kept in mind, **the ambitions of the two strategies lead to a preferred third policy option** – one that identifies the opportunities at European level for a powerful and assertive Swiss INCO S&T while playing an active role in the European research landscape.

The previous sections 4.1-4.4 reveal some differences that nevertheless are expressed on the basis of a common ground of an **'excellent science' core** and a shared belief in the **new innovation consensus**. These differences ought to be kept in mind when engaging at the European level, as they make it **impossible for Switzerland to completely align with European INCO S&T**. At the same time, the very significant similarities create a number of opportunities to contribute to European-level INCO S&T for the benefit of Switzerland in Europe.

4.5.1 Seize

The association of Switzerland to the FPs and the participation in other European programmes has proven successful. It is now also possible for this participation to be used strategically to enhance Swiss INCO S&T. The compatibility of the two allows to **seize opportunities** wherever possible while respecting the principles behind the Swiss strategy. Doing so would mean to make optimal use of European INCO S&T, including policy dialogue, promotion of Europe as a knowledge society, collaborative (joint) programmes and other instruments such as mobility schemes. As the EU shows convergence to the Swiss insistence on positive framework conditions for researchers, Switzerland can benefit from and actively contribute to their development by aligning with this priority bilaterally, European-wide or globally.

In the light of the Swiss funding instruments and their considerable overall budget of more than CHF 700 million in 2011 (SNSF, 2012b, p. 25), the grants retained through European programmes seem small. However, as the European instruments have the **advantage of per definition being open to more than 30 countries for funding** and to all countries for participation, they allow for participation of key third countries. By intensely collaborating internationally, Switzerland therefore lives up to the general fact of small countries collaborating more on the international level (Royal Society, 2011, p. 47), and it does so by using pan-European synergies.

4.5.2 Shape

In spite of no formal decisional participation in European legislation, associated countries including Switzerland have a number of opportunities to get involved in the programme's implementation and evaluation in order to **shape conditions** where possible for Switzerland's ideal participation in the EU's INCO S&T activities. By shaping conditions, Switzerland, as an active and successful member of the European knowledge landscape, can contribute to a governance of European research policy through relevant institutions and it can position Swiss interests where most needed and where most useful.

4.5.3 Contribute

The essence of this policy option is that it responds to this report's research question ideally. At the same time, a **committed contribution of Switzerland to European INCO S&T** will in fact create leverage for the Swiss and European INCO S&T alike. By committing to European INCO S&T, Switzerland can contribute to making Europe an attractive place for science – with **Switzerland as one of the best among Europe's science nations *de facto* and by perception.**

5. Concrete opportunities to seize, shape and contribute

Making optimal use of the opportunities at European level in the sense of the 'seize, shape, contribute' policy option laid out previously is a **mere suggestion for an additional strategic consideration** for Swiss INCO S&T. This final chapter identifies a few concrete ideas on how such a policy option could be implemented by the relevant Swiss institutions. The propositions are **by no means exhaustive or conclusive**, but they aim to provide food for thought and reflexion.

The practical implication of the 'seize, shape and contribute' policy option 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**. INCO S&T cooperation in general would therefore adhere to a 'triangular' model of interactions in INCO S&T (see figure 4.1), as the collaboration with third countries not only happens bilaterally and directly, but also via Europe. The three aspects of seizing opportunities, shaping conditions and contributing all are part of collaboration within this triangular approach. By subjecting to this triangular cooperation, Switzerland would be able to shape conditions and contribute more efficiently in **supranational and international gremia**.

To address the Swiss basic problem of limited resources, but highest ambitions, the EU's sheer size and financial ability would allow Swiss researchers to run **additional bilateral cooperation activities**. Due to the broad compatibility of the European and Swiss INCO S&T strategies, **the European programmes and the third country participation therein add value to the Swiss bilateral agreements**, as the funds available in the Swiss bilateral programmes are rather small.

'Triangular cooperation' would not only extend to INCO S&T, but it spells out a development towards a society increasingly turned towards knowledge, wherein the **multilateral and bilateral undertakings of small nations like Switzerland can increasingly become closer**.

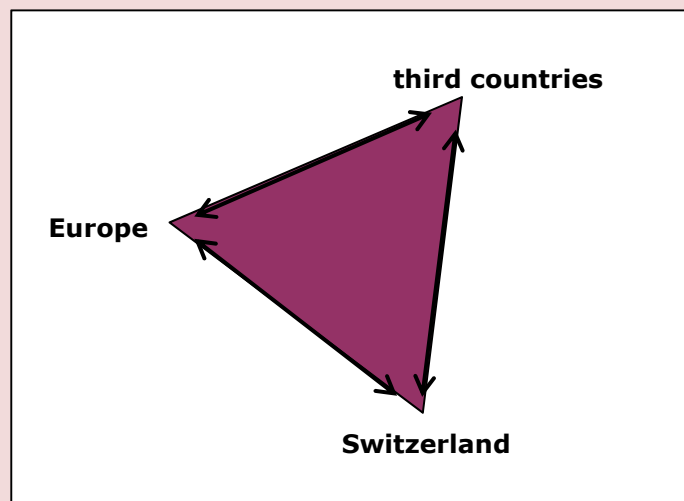


Figure 4.1: 'Triangular cooperation' approach Switzerland-EU-third countries

As the governmental actor in charge of research policy, **SERI** – in close cooperation with FDFA where appropriate – could consider adopting the European dimension as an integral sphere for implementing its INCO S&T. The following concrete actions might contribute to this orientation:

- SERI could consider to continue to actively contribute and participate in **European *gremia* such as SFIC's working groups and task forces, as well as programmatic bodies of Horizon 2020, notably the Advisory Boards**. By doing so, Switzerland would be perceived as an active and reliable partner, can take an informal role in shaping the conditions for Swiss involvement in European INCO S&T. Furthermore, Swiss best practice can create leverage effects for both Swiss and European activities.
- In the preparation of Horizon 2020, SERI could closely **monitor the exchanges with emerging economies of the EC and attentively follow the establishment of Horizon 2020's multi-annual roadmaps**, also within SFIC, for the collaboration with specific countries.
- SERI could, depending on the upcoming evaluation results of COST in Switzerland, use the pronounced correspondence of COST to the Swiss bottom-up scientific culture and seek to safeguard a **prominent yet independent role for COST within Horizon 2020** through its presence in the different bodies. This would further help promoting the Swiss research system abroad and increase the interactions between Swiss researchers and their counterparts in third countries.
- With a view on **sensitising Joint Committees in charge of Swiss bilateral S&T agreements** to the European-led research, SERI could consider diverse ways of contributing to the work of Switzerland at European level, e.g. through areas of mutual interest or policy best practice. Vice versa, the **Horizon 2020 collaborations of Swiss researchers with third countries could become a regular agenda item** of Joint Committees, thereby increasing the synergies between the two ways of cooperation.
- As soon as the detailed structure of Horizon 2020 is clarified, SERI could consider **training its S&T Counsellors and swissnex staff** around the world on how third countries researchers can engage in collaboration with Swiss researchers through Horizon 2020. By deepening their knowledge on the European research programmes, such as the ERC, Swiss S&T Counsellors thus could become contact vectors for the triangular cooperation approach for researchers and institutions in their mission country.
- As the Swiss bilateral programmes mature in the priority countries, SERI could consider **opening further swissnex offices** to promote the Swiss knowledge society in third countries.
- SERI could further look into even more raising awareness of its S&T Counsellor about the role of the EU's S&T Counsellors and **seek to systematically participate to the meetings of S&T Attachés and Counsellors at the EEAS's missions** around the world. These meetings reunite national S&T Counsellors and local government representatives to map European INCO S&T activities in the country.
- With the EU's stronger coordination of international research activities of different departments as an example, SERI could consider **increasing the exchange of information within the IDAG for research policy** while still preserving Swiss bottom-up culture within the administration. **IDAG could be enhanced to become a platform for exchange between departmental research (*Ressortforschung*), bilateral and multilateral activities of SERI**, for example sharing FP7 and Horizon 2020 statistics and insights from the Joint Committees. In a second step, relevant stakeholders, including SNSF and the LHs, could be associated to these meetings as well to **open and diversify IDAG** to all Swiss INCO S&T institutions.

- SERI could look into ways of **enhancing existing policy goals of the Federal Council** through INCO S&T by including concrete goals at national level into the work programmes of the JCs. For example the action plan 'Coordinated Energy Research Switzerland' already has international aspects (Federal Council, 2012). SERI could further contribute to other action plans of the government by **raising awareness about activities in Horizon 2020 and the Swiss bilateral S&T agreement activities** whenever the Swiss priority countries could have a distinct contribution, for example in ICT.
- Thanks to its recent merger of two departments, SERI is in an excellent position to possibly **take an active role in the shift towards INCO in innovation and Vocational Education and Training (VET)** at European level. The European agenda could benefit from Swiss inputs. Furthermore, this interest could be an opportunity for SERI to lay **the strategic foundations for an increase in international cooperation of Swiss Universities of Applied Science (UAS)** thanks to developments at European level.
- SERI contributes actively to the data collection on the European INCO S&T, but also could deliberate whether to intensify its systematic recollection of data on Swiss INCO S&T and their systematic use for Swiss bilateral activities. **Along the European tendency to collect more data, Switzerland could actively contribute to developing further INCO S&T indicators and** to increasing synergies between multilateral and bilateral forms of collaboration with third countries. While the EU is intensifying its own indicators and data collection, world-wide comparable data could prove equally important. Organisations such as UNESCO and OECD are in the advantageous position to promote the **development of new indicators** and Switzerland could support any effort in these organisations in this regard, as issues such as **mobility patterns of researchers** are of utmost importance to Switzerland and yet are understudied (Royal Society, 2011, p. 107).
- While continuing the collaboration with its current priority countries, SERI could make good **use of the intelligence and experiences created within existing EU agreements with future emerging economies**, in order to efficiently prepare eventual future Swiss agreements. These next emerging economies are likely to be the '**Next Eleven**' (O'Neill, 2005): Bangladesh, Egypt, Indonesia, Iran, South Korea, Mexico, Nigeria, Pakistan, Philippines, Turkey and Vietnam. Not all are expected to become as important global players as the BRICS, except possibly **Mexico, Indonesia, South Korea and Turkey (MIKT)**.
- The SERI INCO S&T strategy would benefit in the long term from taking the **political evolution of its current priority countries** into account. While first identified as an economic country grouping, the BRICS - particularly Brazil, India and South Africa - are now evolving, at least partially, into a political alliance. In the latter, there are regular meetings in different policy fields, also in science. In a few decades from now, there could be **South-South joint research programmes**. For example, the India-Brazil-South Africa Trilateral Dialogue Forum is a prime example of how these alliances between emerging economies could look like. SERI could view this development as a **welcomed further arena of INCO S&T collaborations**;
- With research as an integral part of diplomacy at the European level and considering the complex relations between EU and Switzerland in certain areas, SERI and FDFA could **explore possibilities to practise science diplomacy at the European level** by using the good standing Switzerland enjoys in Europe in the field of research in order to contribute to other policy fields. This exploration could focus on cross-fertilisation of distinctly close-to-science policy fields such as energy, transport, climate and result in public events that implement the insights of the two ministries.

In the Swiss context of a 'narrow' strategic orientation of research policy, it is not foreseen to make development a main driver of research policy. Nevertheless, the funded activities on research of **SDC** and also on the European level showed that development policy incorporates research. With the idea to seize opportunities at the European level, adapting the Swiss development activities could prove beneficial, given the limited resources spent on research in the context of development. The following actions by SDC could further enhance Swiss development activities in the field of research:

- SDC could use the **automatic Horizon 2020 funding of researchers in third countries below the GDP threshold** as a concrete measure to **foster research capacity** in evolving knowledge societies. Switzerland could legitimately engage in such an activity, as "the building of local research capacities in developing countries falls beyond the scope of Swiss international cooperation", but the goal should "still be pursued" (SDC, 2010).
- SDC could **actively offer Swiss best practice and research results to European efforts** that aim to tackle the grand societal challenges, thereby enhancing the synergies between the Swiss Global Programmes and the European societal challenges.
- In the light of EEAS efforts to enhance knowledge transfer in policy and programmes in developing countries, SDC could **use its expertise to support a user-oriented and self-sustained innovation community in third countries**. There have been novelty conceptual advances by OECD in how to combine research, innovation and development (Kraemer-Mbula & Wamae, 2010, p. 17ff.) that fall in line with this suggestion.

As an independent and well-connected funding organisation, **SNSF** has a longstanding record with INCO S&T within Europe. The fact that its own strategy for INCO S&T follows SNSF's mandate by the Swiss Confederation and the newly introduced implementation mandate from SERI to SNSF to manage all JRPs from the bilateral programmes (SNSF, 2011) make SNSF an important Swiss institution in strategic INCO S&T. The following concrete proposals might offer opportunities to seize, shape and contribute to the European level:

- SNSF could **support Swiss researchers in intensifying Swiss participation in ERANETS** 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.
- Switzerland contributes to the EU's new member states in the East through the Swiss contribution to EU enlargement towards the East. 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 support from Europe. This is particularly true for the 'ERA Chairs'.
- In light of a European tendency towards more **long-term institutional cooperation for capacity-building**, for example the Tempus Programme and the presumably prominent role of 'teaming and twinning' in Horizon 2020, SNSF could **closely observe this development at European level and consider adjusting its funding instruments in favour of long-term partnerships between researchers and institutions**. By implying CRUS in this process, European best practice could be translated ideally to the needs of the Swiss research institutions.
- As a well-connected and esteemed research funding council, SNSF could **confirm its active leading role in setting standards** at the European and global levels in organisations like Science Europe and the GRC.

As the host organisation of the Swiss National Contact Points (NCP) of FP7 and the future Horizon 2020, **Euresearch** has the crucial task of involving the Swiss research community into the INCO S&T. It understandably focuses on European programmes. The following lines of action could enhance Euresearch's contribution to Swiss INCO S&T:

- Euresearch could train its regional network to **inform researchers actively on how Swiss researchers may collaborate successfully with extra-European partners through Horizon 2020** with or without funding, thereby making them aware of an additional funding opportunity, given the limited budgets of the Swiss JRPs.
- Euresearch could consider reinforcing its **Swiss NCP for INCO S&T** that would deal with such synergies and the implementation of the Swiss INCO S&T strategy;
- Euresearch could look into ways of **fostering participation in European programme governance by Swiss researchers**. Euresearch could also ensure a more systematic follow-up and communication of intelligence with SERI.

Universities and UAS, the institutions and people at the benefit of the Swiss INCO S&T policy, have become increasingly internationalised themselves in the past decades. Through the bilateral activities and their involvement as LHs, they have become active stakeholders of the programme's governance. In order to use synergies at European level, the following suggestions for Swiss knowledge institutions could be considered:

- Universities and UAS could strategically **use European programmes to collaborate with countries outside the scope of bilateral agreements** of Switzerland or those that are not agreement partners yet. Bilateral activities, especially research collaborations, are possible through the Horizon 2020 at very low effort.
- As successful participants in the European FPs, universities and UAS are encouraged to **study the multi-annual roadmaps and their thematic priorities** with regard to their institutional strengths and collaborations with institutions in third countries. Hence, institutions are able to develop their own fine-tuned approach to INCO S&T.
- They could adopt the view that even when aiming at countries outside Europe through European programmes, they are **a way to reinforce collaboration with their European partners**.
- UAS are invited to closely **observe the European momentum towards applied and innovation-oriented research** within Horizon 2020 as new funding opportunities. Doing so, they could further **fine-tune their internationalisation strategies** to the instruments and opportunities for INCO S&T on the European level.

Annexes

Annex I: List of literature

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Annex II: List of interviewees

Marnix Surgeon	EC, DG RTD	Policy Officer for policy coordination, EFTA and Enlargement countries, Russia, Asia and Pacific
John Claxton	EC, DG RTD	Deputy Head of Unit policy coordination, EFTA and Enlargement countries, Russia, Asia and Pacific
Andrea Moggi	EEAS	Senior Policy Coordinator
Mauro Moruzzi	SERI	Ambassador, Head of bilateral cooperation Division
Danièle Rod	Mission of Switzerland to the EU	Science and Technology Counsellor
Claude Crottaz	FDFA	Head of Section Education, Science and Space
Eva Klaper	SERI	Head of COST
Jean-Luc Barras	SNSF	Head of International Cooperation
Elisabeth Schenker	SNSF	Scientific collaborator international cooperation
Patrick Furrer	Euresearch	Vice Director Euresearch, Head of NCP for ICT Bern
Simone Rychen	SDC	Research advisor
Daan Du Toit	South African Department of Science and Technology	Senior Science and Technology Representative in Europe at South African Mission to the European Union

Annex III: List of country abbreviations and FP7 status

	Country	FP7 status			
			JP	Japan	Third country
AL	Albania	Associated			
AR	Argentina	Third country	KR	South Korea	Third country
AT	Austria	Member			
AU	Australia	Third country	LI	Liechtenstein	Associated
BA	Bosnia Herze- govina	Associated	LT	Lithuania	Member
			LU	Luxembourg	Member
BE	Belgium	Member			
BG	Bulgaria	Member	LV	Latvia	Member
BR	Brazil	Third country	MA	Morocco	Third country
CA	Canada	Third country	MD	Moldova	Associated
CH	Switzerland	Associated	ME	Montenegro	Associated
CL	Chile	Third country	MK	Republic of Mace- donia (FYROM)	Associated
CN	China	Third country			
CO	Columbia	Third country	MT	Malta	Member
CY	Cyprus	Member	MX	Mexico	Third country
CZ	Czech Republic	Member	NL	Pays-Bas	Member
DE	Germany	Member	NO	Norway	Associated
DK	Denmark	Member	NZ	New Zealand	Third country
EE	Estonia	Member	PL	Poland	Member
EG	Egypt	Third country	PT	Portugal	Member
EL	Greece	Member	RO	Romania	Member
ES	Spain	Member	RS	Serbia	Associated
EU	European Union	Member	RU	Russia	Third country
FI	Finland	Member	SA	Saudia Arabia	Third country
FO	Färöer Islands	Associated	SE	Sweden	Member
FR	France	Member	SI	Slovenia	Member
HR	Croatia	Associat- ed/Member	SK	Slovakia	Member
HU	Hungary	Member	TN	Tunisia	Third country
IE	Ireland	Member	TR	Turkey	Associated
IL	Israel	Associated	TZ	Tanzania	Third country
IN	India	Third country	UA	Ukraine	Third country
			UK	United Kingdom	Member
IS	Iceland	Associated	US	United States of America	Third country
IT	Italy	Member	ZA	South Africa	Third country
JO	Jordan	Third country			

Annex IV: Comprehensive list of EU and Swiss S&T agreements

Country	EU agreement	EU grouping	EU renewal	EU next renewal	CH agreement	CH renewal
Albania	17.12.2007	candidate				
Bosnia & Herzegovina	24.11.2008	candidate				
Croatia	13.06.2007	candidate				
Macedonia	13.06.2007	candidate				
Montenegro	25.01.2008	candidate				
Serbia	13.06.2007	candidate				
Turkey	01.06.2007	candidate				
Iceland	16.06.2007	EEA				
Liechtenstein	16.06.2007	EEA				
Norway	16.06.2007	EEA				
Algeria	19.03.2012	Third country				
Argentina	20.09.1999	Third country	28.05.2011	28.05.2016		
Australia	23.02.1994	Third country				
Brazil	19.01.2004	Third country		07.08.2012	26.04.1968	28.09.2009
Canada	17.06.1995	Third country				
Chile	23.09.2002	Third country		10.01.2012	05.12.1968	
China	22.12.1998	Third country	09.12.2009	09.12.2014	24.02.1989	
Egypt	21.06.2005	Third country				
Faroe Islands	03.06.2010	Third country				
India	23.11.2001	Third country	17.05.2010	17.05.2015	10.11.2003	
Israel	16.07.2007	Third country				
Japan	30.11.2009	Third country		23.03.2016	10.07.2007	
Jordan	30.11.2009	Third country				
Mexico	03.02.2004	Third country	13.06.2010	13.06.2015		
Moldova	11.10.2011	Third country				
Morocco	26.06.2003	Third country				
New Zealand	16.07.2008	Third country		30.01.2014		
Russia	16.11.2000	Third country	20.02.2009	20.02.2014	16.12.2012	
South Africa	05.12.1996	Third country	01.01.2007	01.01.2014	07.12.2007	
South Korea	22.11.2006	Third country		29.03.2012	06.08.2008	
Switzerland	25.06.2007	Third country				
Tunisia	26.06.2003	Third country				
Ukraine	04.07.2002	Third country	21.12.2011	21.12.2016		
European Community	n/a	EU			08.01.1986	
United States of America	05.12.1997	Third country	14.10.2008	14.10.2013		
Italy	n/a				14.05.2003	
Germany	n/a				20.06.1994	
Austria	n/a				10.11.1993	28.10.2011
France	n/a				11.07.1984	
Slovenia	n/a				10.09.2008	
Ethiopia		Developing			02.03.2008	
Burundi		Developing			27.11.2008	
Ecuador		Developing			04.07.1969	
Ivory Coast		Developing			18.07.2006	
Qatar					20.12.2004	
Tanzania					30.10.2004	
United Arab Emirates					01.03.2003	

For the typology of EU groupings, see pg. 24. (Source: EC, 2012h; SER, 2012c)