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Switzerland's International Strategy for education, research and innovation

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Overview

In the present report, the Federal Council presents its international strategy for education, research and innovation (ERI) for the coming years. This strategy is based on the intention to further develop an internationally competitive education, research and innovation system in Switzerland and to reinforce it over time by setting priorities and clear objectives. The strategy pursues the following vision:

"Switzerland has established itself as an appealing and preferred location for education, research and innovation. It uses its excellence in these areas to become actively involved in international education, research and innovation activities. This should enable Switzerland to remain one of the world's most innovative countries."

The report uses a series of indicators to describe the influence of internationalisation on education, research and innovation in Switzerland. Basing itself on national and international studies, the report describes the consequences of internationalisation for Switzerland as an ERI location. Based on these observations, an assessment will be made of current international cooperation instruments used within the ERI system to encourage excellence. The analysis will focus on Swiss relations with the European Union and other international organisations as well as on bilateral relations in and outside of the EU. A review of the main stakeholders within the Swiss foreign network and participating federal agencies will shed light on who is responsible for implementing the various instruments.

The analysis revealed the following:

First of all, the current situation requires renewed commitment to already established measures. Given the global networking of higher education and research areas, continuation of Swiss participation in major programmes, networks and infrastructure communities will be essential in maintaining Switzerland's strengths as a location for higher education, research and innovation.

Secondly, given the various demographic challenges worldwide, Switzerland needs to establish strategic alliances in the area of human capital and mobility in order to maintain or improve our country's competitive position. Despite the extremely low burden on federal finances in relation to its overall impact, the Swiss VET/PET sector still receives only moderate recognition and social prestige within the national and international context. Based on Art. 61a, para. 3 of the Federal Constitution, system comparability and international recognition of education qualifications and education exports are crucial conditions that need to be met if Switzerland is to maintain the strengths of this important sector of the education system. At the same time, these conditions help to prevent an excessive shift away from professional training towards higher education.

Based on analysis of the current situation, three priorities with corresponding objectives will be established for future international ERI cooperation. The first priority is to *strengthen and expand international networks*. The second priority is to *encourage the exporting of education and the importing of talent to reinforce Switzerland's position as a major location*. The third priority is to *encourage international recognition*. In addition, specific criteria will be established to determine which priority countries should be selected in order to reach objectives.

Various means of implementing the present strategy will be presented in Federal Council Dispatches relating to ERI. In order to ensure information exchange and optimal use of synergies within the ERI system, a proposal will be made to create an interdepartmental working group.

Scope

The present report is intended to establish an international strategy for education, research and innovation (ERI) and set corresponding priorities and objectives for the coming years.

After some preliminary work in which representatives of the FDFA (DPA, SDC) and the FDEA (SECO) also took part, this document was drafted by the federal offices directly responsible for education, research and innovation within the FDFA and the FDEA. This drafting work was handled under the terms of a Federal Council Decree issued on 21 January 2009, which stated that an interdepartmental working group should establish an international ERI strategy and present this strategy to the Federal Council.

The present document is based on relevant ERI Dispatches and constitutes the Confederation's first long-term international ERI strategy¹.

¹ In the past, aspects of Switzerland's international science strategy were included in the FDFA's foreign policy reports. In addition, two specific reports were drafted: the first report was produced in 1997 by an interdepartmental working group established by the Federal Council; the second report was produced in 2001 by a joint working group (Federal Administration, cantonal universities, FITs, CUS, SNSF) established by the head of the State Secretariat for Education and Research, which at the time was known as the Swiss Science Agency (SSA). Since they provided an overview of the various activities as well as strategic considerations, these two reports were used to prepare ERI Dispatches.

Starting point: international context

Today, Switzerland is one of the world's most competitive countries². The performance and adaptability of its knowledge economy determine to a large extent how well and how quickly Switzerland adapts to global challenges and economic developments. The global processes of change offer the opportunity to verify whether current international ERI policy instruments are adequate in the face of new challenges. By adopting a suitable federal policy strategy for education, research and innovation, Switzerland should be able to position itself within the international context so to ensure that Swiss society and businesses will be able to derive long-term benefits.

2.1 Influence of internationalisation on Swiss ERI policy

The Swiss economy became international a long time ago: while Swiss companies have more than tripled the number of employees abroad since 1985, the number of jobs in Switzerland has only increased by about 30%. Switzerland devotes a total of 2.8% of its GDP to research and development (R&D). The private sector accounts for two-thirds of R&D expenditure in Switzerland³. Over half of this spending occurs abroad⁴.

Foreign researchers, teachers and students all find the Swiss higher education and labour markets highly appealing. This has an impact on higher education institutions and research institutes that have traditionally maintained strong international activities. The proportion of foreign nationals among the teaching and research staff at Swiss higher education institutions has once again sharply increased in recent years: at traditional universities (cantonal universities and FITs), the proportion has reached nearly 50% in the past seven years; at universities of applied sciences, the figure has risen to about 20%⁵. An objective to pursue greater mobility within the European education and higher education area was set for the first time with introduction of the Bologna Reform. By 2020, at least 20% of all graduates within the European Higher Education Area must have studied or trained for a certain period of time outside of their home country⁶. This objective has not yet been reached for all degree programmes at traditional universities in Switzerland⁷: in the graduating class of 2006, just under 15% of the students at a Swiss university had spent a semester abroad as an exchange student.⁸ With the Flagship initiative "Youth on the Move", the EU turns its attention to mobility of university students and trainees⁹. Due to the lack of representative data on the mobility of young people enrolled in VET programmes, no conclusive statements can yet be made.

2.1.1 Foreign demand for Swiss excellence in ERI

According to the latest international comparisons, Switzerland shines in all areas of education, research and innovation: competitive and innovative capacity, research excellence, the quality of Swiss higher education institutions¹⁰ and VET/PET¹¹. International comparisons show that citation ratios for publications produced by Swiss researchers are among the highest in the world¹². Over half of all university students in Switzerland attend a global top-200 university. In contrast, the proportion is only around 20% in United States of

² Global Competitiveness Report 2008-2011, WEF, European Innovation Scoreboard 2009, European Commission, 2010

³ European Innovation Scoreboard 2009, European Commission, 2010

⁴ Swiss private sector expenditure for R&D and HR in 2008, FSO, 2010

⁵ Swiss Education Report 2010, SKBF, 2010, p. 176

⁶ Bologna Process 2020 – the European Higher Education Area in the new decade, Leuven Communiqué, 2009

⁷ Swiss Education Report 2010, SKBF, 2010, p.193

⁸ Source FSO: Mobility of university students (graduating class of 2006)

⁹ Europe 2020: a European strategy for smart, sustainable and inclusive growth, European Commission, 2010

¹⁰ Swiss Education Report 2010, SKBF, 2010, p. 195-196

¹¹ Learning for Jobs, Review on Vocational Education and Training in Switzerland, OECD, 2009

¹² OECD Factbook, 2009

America.¹³ Youth unemployment in Switzerland is relatively low compared to the OECD average¹⁴. In Switzerland, holders of a PET qualification have better employment prospects than holders of a degree issued by a traditional university or university of applied sciences¹⁵. It is nevertheless worth mentioning that 90% of all university graduates in Switzerland obtain permanent employment within 12 months of graduation. In Europe, Switzerland is the country with the lowest gap between level of education and level of employment¹⁶.

These outstanding figures are drawing greater international attention. As a result, several countries are now seeking to establish cooperation ties with Switzerland. In many cases, Swiss partners propose entering into a binding bilateral agreement.

2.1.2 Influence of education systems from English-speaking countries

The internationalisation of education is becoming an increasingly important topic of discussion. This can be seen not only in the statements made earlier but also in numerous international comparisons of education systems¹⁷. General and higher education typically weigh heavily in these comparisons, which tend to be critical of the Swiss education system. Examples include OECD recommendations that Switzerland increase the proportion of holders of higher education qualifications¹⁸ or the latest EU Strategy 2020 objective of increasing the proportion of holders of higher education qualifications within the population to 40%¹⁹. Even with revision of ISCED, the Swiss education system seems to compare less favourably to English-speaking education systems. Specifically, non-academic tertiary-level qualifications are not adequately positioned in ISCED. Recent studies seek to identify quality indicators for various education systems in different countries. In individual cases, it was recognised that no reliable statements regarding education qualifications or institutions could be made in the absence of information on education level or the quality of the institution.²⁰

General and higher education play a predominant role in education systems from English-speaking countries. In these countries, the highest level of education is a higher education qualification, regardless of whether the competences acquired match the needs of the labour market²¹. The Swiss education system, in contrast, draws a distinction between academic and vocational/professional pathways; Switzerland has a long tradition of VET/PET and Swiss universities are among the best in the world. The Swiss education system is permeable (no dead-end qualifications) and qualified workers may undergo training at all levels within the education system. Two-thirds of all young people coming out of compulsory education choose to enrol in an upper-secondary level VET programme. The highest vocational/professional qualification obtained over the course of one's career is often a tertiary-level PET qualification, which is obtained by passing an examination in a given branch of activity²².

The Bologna Reform brought fundamental changes to the education system. Although it led to greater international transparency of higher education qualifications,²³ the same level of transparency and recognition has not yet been achieved for vocational/professional qualifications. Calls for reform have been made in response to claims that holders of a higher

¹³ Swiss Education Report 2010, SKBF, 2010, p.195. The German version of the text was corrected afterwards: see <http://www.skbf-csre.ch/fileadmin/files/pdf/bildungsmonitoring/Korrigendum.dt.pdf> p. 196.

¹⁴ OECD in Figures, 2009

¹⁵ Swiss Education Report 2010, SKBF, 2010, p. 251,

¹⁶ The Bologna Process in Higher Education in Europe, Eurostat, 2009

¹⁷ See OECD studies: Teaching and Learning International Survey (TALIS), Programme for International Student Assessment (PISA), Programme for the International Assessment of Adult Competencies (PIAAC), Reviews on Vocational Education and Training, etc.

¹⁸ Economic Survey of Switzerland 2009, OECD, 2009, Tertiary Education for the Knowledge Society, OECD, 2008

¹⁹ Europe 2020: a European strategy for smart, sustainable and inclusive growth, European Commission, 2010

²⁰ See for example the concept study for a "Large-Scale Assessment for Vocational Education and Training", BMBF 2009; OECD: Feasibility Study for the International Assessment of Higher Education Learning Outcomes (AHELO), Paris, 2009

²¹ The Bologna Process in Higher Education in Europe, Eurostat, 2009: e.g. Mismatch UK: 50%; CH 15%

²² Example: Advanced Federal PET Diploma in Corporate Auditing: in order to take this examination, the candidate must be a holder of a doctorate and have several years of work experience.

²³ Joint Declaration of the European Ministers of Education, Bologna, 1999. (see: www.qualifikationsrahmen.ch)

education qualification enjoy greater social prestige within the population. The desire for reform is also fuelled by concerns that there is a lack of awareness outside of Switzerland of the quality of Swiss upper-secondary level vocational education and training (VET) and tertiary-level professional education and training (PET). First of all, there has been increasing pressure in Switzerland to make non-academic, labour market-oriented VET and PET qualifications more academic even though emphasis is placed mostly on the higher education qualification itself rather than on actual academic competence *per se*. Sponsors of PET qualifications in particular complain that PET qualifications do not enjoy the same value in society as academic qualifications. This was one of the reasons why Art. 61a, para. 3 Cst. requires the Confederation and the cantons to work together to ensure that general education and VET/PET pathways receive the same level of social recognition. If no corresponding measures are taken in non-academic pathways, then international developments in education will have a negative impact on public finances. Any transfer of mostly privately funded PET programmes to higher education institutions is likely to lead to greater public expenditure for education.

2.1.3 Growing knowledge economy, greater competition from emerging countries and closer cooperation with the EU

One of the many challenges facing our economy is the rapid transition that emerging countries are making towards the knowledge economy and the corresponding competition that results from this. Several emerging countries such as China or India invest heavily in research, education and technology in order to be able to manufacture competitive export products.

The European Union is also taking action. The objective of establishing the EU as the world's most competitive, dynamic and scientific region was adopted back in Lisbon in the year 2000. The European Commission has worked to achieve this objective by creating the European Education and Research Area and by pursuing policies that favour the knowledge triangle of education, research and innovation. EU programmes for research, lifelong learning as well as competitiveness and innovation are all designed with the same objective in mind. While this objective has not yet been reached, numerous developments indicate that the EU has managed to set a convergence process in motion, which also has implications for Switzerland.

In early March 2010, the EU reiterated its strategic objective of achieving sustainable economic development and maintaining Europe's competitive position with regards to emerging countries by 2020: benefits will result from smart, sustainable and integrative growth. Like the Lisbon objectives established in the year 2000, the seven flagship initiatives of the EU's strategy for 2020 focus on education, research and innovation²⁴.

2.1.4 Global phenomena require systemic innovations and new competences for the labour market

Global challenges (e.g. global warming, depletion of resources, healthcare for an aging society, etc.), the current economic situation and technological change are accelerating the emergence of new economic branches. The services sector, which includes healthcare, information and communication technologies (ICTs) and other sub-sectors, is becoming increasingly important. Equal support should therefore be given to business and science to encourage (also international) research cooperation initiatives in the interests of optimisation: reduction of greenhouse gases requires sustainable technologies, integrated knowledge and technology transfer as well as modified or new occupational profiles. Solutions to problems require the ability to think beyond Swiss borders and greater coordination of national efforts to create synergies.

²⁴ Seven flagship initiatives: 1) Innovation Union; 2) Youth on the move; 3) A digital agenda for Europe; 4) Resource efficient Europe; 5) An industrial policy for the globalisation era; 6) An agenda for new skills and jobs; 7) European platform against poverty. Europe 2020: a European strategy for smart, sustainable and inclusive growth, Brussels, 2010, p. 5ff.

2.1.5 Different demographic developments in industrialised and emerging countries

Demographic changes pose fresh challenges for business and science in industrialised countries. In Switzerland, a new trend reversal has already taken place: the number of workers leaving the labour market is higher than the number of young qualified workers entering it²⁵. Competition for talent – whether it be for holders of academic or VET/PET qualifications – can already be felt now. In Europe, estimates indicate that there will be 1.4 million fewer students over the next ten years and that 35% of lecturers at higher education institutions will retire.²⁶ Higher education institutions and research institutes will therefore face a lack of qualified personnel. As emerging countries make the transition to mature economic countries and as the different demographic changes occur, the global competition for talent will intensify.

It is to be expected that higher education institutions will become increasingly international and workers increasingly mobile. Countries with excessive aging of the population will have to find ways to address shortages of qualified workers in business and science.

Here, human capital from countries with a high proportion of young people under the age of twenty (e.g. India, Brazil) will play an important role. In research and innovation, the importance of "brain circulation" has long been recognised and has led to a very high degree of mobility of researchers. This mobility will remain high in the future and become a characteristic feature within the scientific community. However, in the future, not only researchers but also qualified workers will become more mobile on the international labour market. It is therefore likely that more foreigner workers will enter the Swiss labour market, mainly due to the appeal of Swiss companies as employers and the lack of local workers.

2.1.6 Quality of Swiss products dependent on highly skilled workers

Switzerland owes its considerable innovative capacities to the many economic benefits it offers as well as to highly developed research and development activities. The Swiss domestic economy is nevertheless too small to fully develop highly innovative products. Swiss companies therefore often develop their products directly in foreign export markets in order to remain closer to customers and adapt products to these export markets. The high quality of products is a major competitive factor. Swiss industry is positioned on world markets because of the higher level of quality. As mentioned earlier, Swiss companies have tripled the number of workers abroad. However, the availability of highly qualified workers in all areas of activity is a crucial recruitment concern.

In emerging countries, Swiss companies have found it difficult to find qualified workers to handle production and processes. In many cases, they find themselves required by local legislation to only hire local workers (e.g. state mandated quotas on recruitment) who unfortunately do not meet the quality standards needed by Swiss companies. And in most cases it is not higher education qualifications that are needed but rather VET qualifications. Swiss companies clearly need workers who have completed apprenticeship training based on the Swiss model of dual-track VET, whether it be for their own manufacturing plants or for those of their suppliers. This bodes well for the export of Swiss VET models to other countries.

²⁵ Swiss demographic scenarios for 2005-2050, FSO, 2006

²⁶ Council of Europe, Steering Committee for Higher Education and Research (CDES), 8th Plenary Session, 2009

2.2 Current instruments used to internationalise education, research and innovation

The sections below provide an overview of the various instruments that were developed by the Confederation in the past to encourage internationalisation of education, research and innovation. The sections also highlight the efforts of Swiss federally funded ERI institutions that independently pursue international activities.

2.2.1 Switzerland is an integral part of the European Education and Research Area

Switzerland takes part in EU framework programmes for research²⁷ and education (Lifelong Learning, Youth in Action)²⁸ and is a member of the European Space Agency (ESA) and other international programmes, research organisations and infrastructures (e.g. CERN, XFEL, ESRF²⁹). The Bologna Declaration has been implemented and the foundations for integration within the Copenhagen Process are currently being laid. Switzerland is a member of the pan-European R&D initiative Eureka. Within the framework of the COST programme, Switzerland encourages European cooperation in scientific and technological research networks.

Switzerland has successfully participated in EU framework programmes which, among other things, have had a positive financial impact on Switzerland's domestic research and innovation system: since the start of the 3rd EU research framework programme (FP3), Swiss researchers have secured over CHF 2.1 billion in research funding from EU research framework programmes. Considering only the most recently completed EU research framework programme (FP6, 2003-2006), Swiss researchers managed to secure a total of CHF 794.5 million, which constitutes a positive capital inflow of CHF 19.2 million³⁰. Initial results from the current research framework programme (FP7) show an even higher positive capital inflow, particularly with regard to successful applications from Swiss higher education institutions for grants from the European Research Council (ERC)³¹. Positive effects of Swiss participation in EU research framework programmes go beyond mere finances: greater mobility of persons enrolled in tertiary-level education and training; greater mobility of research staff; presence of Swiss representatives in EU programme committees and bodies responsible for shaping the European Research Area. With EU education programmes, success of Swiss participation can be seen primarily in the steadily increasing mobility of Swiss students and lecturers, the broader selection of tertiary-level traineeships abroad³² and the involvement of Swiss education institutions in European projects to further develop European education policy.

Switzerland plays an active role in initiatives within the European Education, Research and Innovation Area that take place outside EU framework programmes (e.g. Eureka, COST, Bologna and Copenhagen Process). This enables Switzerland to enjoy a strong position within the EU, despite its non-EU membership status, and pursue Swiss interests on an equal footing with EU member states.

²⁷ Switzerland has been involved in EU research framework programmes since 2004. This participation ensures that Swiss researchers enjoy the same rights and obligations as their colleagues from EU member states.

²⁸ Switzerland was initially a silent partner and then became an associated country from 2011 onwards.

²⁹ CERN: European Organization for Nuclear Research, Geneva; XFEL: European x-ray free electron laser research facility, Hamburg; ESRF: European Synchrotron Radiation Facility, Grenoble

³⁰ Switzerland's Participation in the 6th European Research Framework Programme, Interim Report 2009, SER, 2010, p. 13: Switzerland's contribution to FP6 (2003-2006) totalled CHF 775.3 million.

³¹ Switzerland's Participation in the 7th European Research Framework Programme, Interim Report 2007-2008, SER, 2009, p. 36

³² Indirect Swiss participation in EU education programmes, SER, 2009, p. 12-13: between 1992-2006 around 32,000 students have received mobility scholarships; 4,266 of whom in 2005/2006. Since 1997, 2,400 teachers have received mobility scholarships. Since 2006, the number of teachers benefiting from the programme has tripled.

Swiss participation in international projects to develop research infrastructures is essential in ensuring the integration and involvement of Swiss researchers. Numerous experiments have far outgrown the infrastructural capacities of individual countries. Projects to build very large-scale international research infrastructures are therefore currently being pursued. This will enable Swiss researchers to remain at the cutting edge of technology. At the same time, they will be able to measure themselves against the competition in other countries and improve as a result. These Swiss activities within an international ERI context will have a positive impact on Switzerland's position as a location for innovation and economic activities.

2.2.2 Switzerland is a member of international organisations

Switzerland is represented in the education, research and innovation bodies of several international organisations (Council of Europe, OECD, UNESCO, etc.). Switzerland's influence is contingent not only on its active presence in these bodies but also on the resources that it is able to contribute within the corresponding committees. In this sense, Switzerland is not in a strong position. As a case in point, the OECD has no Swiss employees nor does the Swiss OECD mission in Paris adequately reflect the importance of education, research and innovation. Measures need to be taken if the strengths of the Swiss ERI system are to be recognised and valued by international organisations.

2.2.3 Bilateral ERI activities conducted by the Confederation

Bilateral agreements on fundamental research, technology and higher education

In recent years, Switzerland has signed over two dozen international agreements with the European Union as well as with various countries with which it shares a strong political and scientific interest in intensifying mutual cooperation in science and technology. These are general framework agreements for the most part. Some also open the way for specific cooperation programmes and provide contracting parties with a basis for possible funding of these programmes. The agreements are nevertheless mainly intended to encourage and facilitate direct cooperation between Swiss and foreign ERI stakeholders in various ways: direct or indirect support for government agencies; support for governmental bodies; or the creation of a general framework for the protection of intellectual property rights. These are just a few concrete examples. Switzerland has also signed bilateral cooperation agreements in the area of higher education with its European neighbours (see Annex I).

Moreover, with the Federal Council Dispatch on the Promotion of Education, Research and Innovation for 2008-2011, the Federal Council and the Parliament announced their intention to develop cooperation and exchange activities with specific non-European countries (BRICS countries³³, Japan, South Korea, Chile). Bilateral cooperation agreements have already been signed with all of these countries except Russia.³⁴ The first specific programmes to support these forms of cooperation were launched in 2008. For this reason, the impact of cooperation has not yet been fully ascertained. An evaluation is planned for the end of the current ERI period.

Bilateral agreements with new EU member states under Switzerland's contribution to EU enlargement

As part of its contribution to EU enlargement, Switzerland supports education and research programmes and projects in the ten new member states that joined the EU in 2004. For the priority area "Human and Social Development", funds have been allocated to programmes and projects that relate directly to education, research and innovation in these countries. This includes scientific exchange programmes, scholarships, research partnerships, cooperation in applied research as well as technical and vocational training. The Swiss Parliament approved the framework credit for Switzerland's contribution to EU enlargement for the ten partner countries in June 2007. The objectives, scope, form and use of the corresponding funding were set forth in ten bilateral framework agreements, which were signed with each of the ten partner countries in Bern in December 2007. Implementation of these agreements began in 2008 and the commitment period will end in June 2012. Project implementation will continue

³³ BRICS: Brazil, Russia, India, China, South Africa

³⁴ Agreement pending outcome of negotiations: signature expected in 2010 or 2011.

until no later than June 2017. In December 2009, the Parliament approved an additional framework credit in support of programmes and projects in Bulgaria and Romania. Some of these programmes and projects also relate to education and research. The corresponding framework agreements with these two new partner countries should be signed in the second half of this year, opening the way for implementation. The commitment period will end in December 2014.

2.2.4 Swiss foreign network raises Switzerland's profile abroad

Swiss embassies and consulates represent Swiss interests abroad. As part of their general remit, they also support activities relating to education, research and innovation.

With the Federal Council Dispatch on the Promotion of Education, Research and Technology for 2004-2007, the Federal Council and the Parliament announced their intention to enlarge the existing foreign network for education, science and technology. For the period 2008-2011, the Federal Council and the Parliament decided to further expand this foreign network. This expansion took place with mutual consultation between the FDFA and the FDHA.

In the capitols of seventeen selected countries, Swiss embassies now include science and technology counsellors who are responsible for all matters relating to higher education, fundamental research and technology. The first swissnex consular annex was established in Boston (USA) in the year 2000. Since then, three more swissnex³⁵ consular annexes have been established in San Francisco (USA), Singapore and Shanghai (China). A fifth one is currently being established in Bangalore (India). Swissnex consular annexes provide a current picture of Switzerland and raise Switzerland's profile as an excellent location for science and technology. They establish and share contacts and work with partners that also contribute funding to swissnex activities (see Annex II). The SNSF maintains a *Swisscore* office in Brussels, which allows Swiss researchers, academics and university students to find out more about Europe. The SER, FOC and Pro Helvetia co-fund the *Istituto Svizzero di Roma*, which supports bilateral activities in Italy.

17 Swiss schools abroad provide an education based on Swiss standards³⁶ (see Annex III). These schools help to establish Switzerland's cultural presence abroad. Swiss schools are well established in their respective host countries and have a reputation for high quality teaching. The sponsoring canton of each Swiss school is responsible for ensuring the quality of education.

The Swiss Office for the Development of Foreign Trade (OSEC) has a federal mandate to encourage Swiss exports, imports and investment as well as to promote Switzerland as a location. It maintains *Swiss Business Hubs* in 21 countries that are of particular importance for Swiss exports. These hubs facilitate Swiss foreign trade (see Annex IV).

Presence Switzerland is an FDFA agency that works to enhance Switzerland's image abroad. It also implements the Federal Council's country promotion strategy which, among other things, is intended to raise Switzerland's profile in other countries.

Embassies, consulates, science and technology counsellors and swissnex consular annexes handle a broad range of different topics. As needs increase in the future, greater attention will be given to such areas as market-oriented research and development, VET/PET and universities of applied sciences.

³⁵ Since 2007, this has been the new name for "Swiss House for Scientific Exchange"

³⁶ Federal Act of 9 October 1987 on Promoting the Education of Young Swiss Abroad (SAEA, SR 418.0), 1987

2.2.5 International cooperation by federally funded ERI institutions

Switzerland also draws its strength from the proactive involvement of federally funded ERI stakeholders. Researchers in particular show a strong personal commitment, working internationally and taking every opportunity to develop international activities.

The federally funded Swiss National Science Foundation (SNSF) encourages Swiss scientific activities abroad, establishes networks and provides support to foreign researchers at Swiss institutions and international associations. As part of its performance agreement with the Confederation, the SNSF has a mandate to actively help shape Switzerland's international research policy³⁷. It maintains relations with European research funding institutions, works with transition and developing countries as well as with selected non-European countries offering particular research potential. The SNSF's international commitment brings countless benefits: its programme activities generate numerous international contacts. The SNSF also works with partner organisations to establish an institutional framework in Europe, which enables unrestricted sponsorship of researchers from participating states (agreements signed with Germany, Austria and Luxemburg).

Swiss higher education institutions, particularly FITs and cantonal universities, pursue their own international strategies, maintain international contacts, establish international cooperation and exchange programmes and actively work to draw students from all over the world. Research cooperation activities of higher education institutions are extremely diverse and range from institutionalised partnerships among similarly oriented higher education institutions (example: the IDEA League between leading European technology universities, including Switzerland's two FITs³⁸) to student and faculty exchange agreements within the framework of the EU's Erasmus Programme.

Other institutions such as SUC, CRUS, the FIT Council, EDK, KFH, EFHK, Swiss Academies, CTI, SFIVET, numerous foundations and institutes are all important ERI stakeholders. They are free to develop and implement their own internationalisation strategies, which for some institutions are even included in the performance agreement signed with the Confederation.

2.2.6 Federal agencies involved

The FDHA (SER) and the FDEA (OPET) are the main federal agencies involved in shaping ERI policy. The SER is responsible for general education, higher education and research policy as well as space affairs. OPET is responsible for upper-secondary level vocational education and training (VET), tertiary-level professional education and training (PET), universities of applied sciences (UAS) and innovation policy.

Other federal agencies also play an important role within the ERI system:

FDFA: Directorate of Political Affairs, for all matters pertaining to foreign policy and Swiss policy in the UN and other international organisations; the SDC, for education and research as an instrument of development cooperation and cooperation with Eastern Europe and the Commonwealth of Independent States (CIS) as well as cooperation with new EU member states under Switzerland's contribution to EU enlargement; the DRC, for matters relating to Switzerland's foreign network; the DIL, for matters relating to privileges and immunities

FDFA/FDEA *Integration Office*, for agreements with the EU and coordination of Switzerland's policies with regards to Europe

FDHA: the *FOC*, for Swiss schools abroad; the *FOPH* for international health policy

³⁷ Federal Council Dispatch on the Promotion of Education, Research and Innovation for 2008-2011, p. 1291; 1297ff.

³⁸ www.idealeague.org

FDEA: *SECO*, for economic policy, integration of Switzerland in the OECD, economic development cooperation, Switzerland's enlargement contribution in favour of the new EU member states, issues relating to Switzerland as a location

FDJP: the *FOM*, for the issuance of entry and residence permits as well as traineeship agreements

DATEC: the *FOEN and SFOE*, for sectorial environmental and energy policies.³⁹

2.2.7 Coordination

The international activities of the Confederation in the areas of education, research and innovation are heavily influenced by the respective competences of the federal agencies involved. Coordination of the Confederation's international education, research and innovation activities enables an efficient use of synergies, particularly within the Swiss foreign network. Such coordination also simplifies linkages between the various sectorial policy areas of the Confederation.

2.3 Challenges that Switzerland faces in pursuit of its international ERI strategy

The main question is whether current and traditionally developed ERI policy instruments are enough to enable Switzerland to optimally position itself within an international context. Context analysis has provided certain indications of how Switzerland will be positioned as a location for ERI and economic activities in the coming years. Swiss ERI institutions are influenced by the international context but at the same time can exert an influence on the international context in various ways, namely by:

Pursuing international research partnerships, networks and infrastructure projects;

Developing human capital aspects, i.e. encouraging the mobility of learners, students and professionals;

Working to achieve the comparability of education systems and the mutual recognition of education qualifications;

Exporting education as part of the services sector.

Analysis reveals that some of the current instruments already allow Switzerland to secure a strong position for itself. However, activities carried out thus far – with the exception of Swiss participation in European education and research programmes (particularly EU framework programmes) and research organisations – seem to be rather fragmented and still require a more coherent framework. We shall explain this at greater length in the following sections.

2.3.1 Research and innovation partnerships

Switzerland needs to more fully exploit its advantages and excellence in education, research and innovation through international cooperation in various programmes, networks, and infrastructure communities. International cooperation should be used strategically and should bring clear added value to Swiss ERI stakeholders. Swiss participation in EU efforts to develop a European Economic and Knowledge Area is an example of this.

Swiss bilateral cooperation with individual European countries must not be neglected as Switzerland pursues its strong commitment to research at EU level. Multilateral instruments within EU research framework programmes can actually be used to further bilateral cooperation with European countries. Likewise, bilateral cooperation can be used to reinforce Switzerland's position within EU framework programmes. The same holds true for bilateral projects relating to space activities, which can have positive effects for Switzerland's position within the ESA.

³⁹ An overview of the international activities carried out by the main ERI stakeholders can be found in Annex V.

Cooperation with emerging countries whose economic prospects and great potential in terms of intellectual and human resources should be leveraged to reinforce Switzerland's position as a location for ideas and production. Various studies published by Presence Switzerland show that Switzerland has yet to fully develop activities with non-European countries (e.g. USA⁴⁰, China⁴¹, Japan, Korea⁴²), despite the fact that these countries offer considerable innovation capacities and pursue extensive ERI activities.

2.3.2 Human capital and mobility

In a competitive economy, the availability of human capital with the right competences at all education levels is a critical success factor. In Switzerland, the future availability of workers on the Swiss labour market and student enrolment at higher education institutions are influenced by such things as the aging population; a lack of interest among the Swiss youth in mathematics, science, engineering and research; the feminisation of baccalaureate schools and VET schools. On the one hand, Swiss companies, research institutes and higher education institutions should be able to recruit students worldwide. On the other, the mobility of persons who are undergoing or have already completed their training is essential for successful participation in a globalised working environment. In order to attract the best talents, Switzerland needs to maintain and further enhance its appeal as a location for business, education and research activities. At the same time, the training given to Swiss youth enrolled in VET, PET or university study programmes must prepare them for a global labour market and international research activities.

2.3.3 Comparative studies and international recognition

If Switzerland is to maintain and reinforce the ERI strengths mentioned earlier, it needs to counteract Anglo-Saxon bias within the national education system and develop corresponding action plans. In order to achieve acceptance and recognition of dual-track VET programmes, efforts need to be made to create a greater understanding of the Swiss VET/PET system in other countries and draw greater international attention to the advantages, quality and mechanisms used within our education system (e.g. the high level of permeability, the fact that there are no dead-end qualifications, etc.). In particular, very little is known abroad about the advantages of dual-track vocational education and training (VET) at upper-secondary level and subsequent professional education and training (PET) at tertiary level. This lack of familiarity hinders and limits the international mobility of Swiss learners and professionals. International comparisons of competences could be one way to help change this situation.

Bilateral education projects facilitate comparisons of competences and can encourage greater foreign acceptance of the Swiss education system as a whole and the quality it offers. Active Swiss participation in EU education programmes, in processes to further develop the European Education Area and Swiss membership in international organisations support this endeavour. Greater international commitment to education would allow Switzerland to contribute to the setting of competence standards worldwide in such areas as VET and PET.

This need relates not just to VET and PET: while Switzerland has an excellent reputation worldwide as a location for research, its higher education institutions are mainly only known in Europe. In the USA and in Asian countries, experience has shown that there is very little awareness of the outstanding quality of studies and the fact that English is a very common language of instruction in Switzerland. With the support of science and technology counsellors at diplomatic missions, Swiss universities try to convey this message through education fairs and partnerships abroad. However, compared to international competition these efforts are still at an early stage.

⁴⁰ See www.image-suisse.ch, USA, S. 41ff

⁴¹ See www.image-suisse.ch, China

⁴² See www.image-suisse.ch, Switzerland, Nation Brands Index Report 2009, p. 15ff

2.3.4 Exporting education

Unlike Switzerland, numerous countries have developed education export strategies as a means of positioning themselves worldwide and creating export opportunities for their own education institutions and service providers. The German government wrote the following back in April 2010: "The federal government increased its expenditure for education and research by 6.5% compared to the previous year. Starting from this year, the strategy to export German education options will be systematically implemented to generate worldwide interest and tap into the potential offered in particular by dual-track vocational education and training."⁴³

Apart from Swiss schools abroad, Switzerland lacks a tradition of exporting education despite high quality and the presence of numerous and well-organised economic and professional organisations. At the very least, Switzerland is on par with Germany, if not in a better position. In order to satisfy the demand for workers at Swiss companies and their production facilities in emerging economies, Switzerland needs to view the dual-track VET model as an export product. A possible business model would entail developing aspects of dual-track VET programmes in target countries in accordance with the needs of specific branches of the Swiss economy. One example of this would be the trial VET programmes being tested in India on behalf of the Swiss machine manufacturing industry. Swiss professional organisations can charge licence fees in exchange for development of competence standards (training plan) in the target country. This would ensure that costs are covered. The Confederation can work to establish optimal general conditions (providing contacts with government agencies, VET schools and institutions that train VET teachers and trainers, working to achieve mutual recognition of VET qualifications)⁴⁴. Swiss schools abroad can also serve as an important anchor point and should be involved in implementation. This will ensure that Switzerland's international reputation for quality⁴⁵ can be used to position its education exports worldwide.

2.3.5 Pioneering aspects

The following aspects are taken into consideration when establishing and implementing Switzerland's international ERI strategy:

Continuation of Swiss participation in multilateral programmes that shape the European Education, Research and Innovation Area as well as participation in the main European and international organisations involved in ERI.

Setting of priorities with regards to countries, thematic areas and instruments for bilateral cooperation: before specific bilateral activities with selected partner countries are identified and negotiated on behalf of Swiss target groups, a very broad range of needs of the most diverse Swiss interest groups must be carefully and strategically considered. This process is the only way to ensure that bilateral cooperation will be sustainable and beneficial for both Switzerland and the partner country.

Measures to implement Switzerland's international ERI strategy are taken with an understanding of the overall context: international activities are weighed against existing measures and priorities are set on the basis of existing resources, necessities and benefits.

Regular monitoring and evaluation of results must remain a fundamental aspect of international ERI cooperation.

⁴³ The German Ministry for Education and Research, for example, runs an agency (iMove) that conducts studies on the education market in various countries and the potential opportunities for German providers of vocational education and training (VET) and/or continuing education and training (CET). The same agency also conducts studies to identify the factors that have enabled English-speaking countries to successfully market their CET programmes internationally. See: <http://www.imove-germany.de>

⁴⁴ Explanations on the exporting of dual-track VET programmes can be found in Annex VI.

⁴⁵ B. Ruetsch Keller, *Made-in-Image und Markterfolg von Schweizer Unternehmen*, Schweizer Arbeitgeber Nr. 7, March 2002, p. 284-287

Priorities, objectives and priority countries in Switzerland's international ERI strategy

3.1 Vision

Switzerland has established itself worldwide as an appealing and preferred location for education, research and innovation. It leverages its excellence in these areas to become actively involved in international education, research and innovation activities. This should enable Switzerland to remain one of the world's most innovative countries.

Switzerland's international strategy for education, research and innovation is based on this vision.

3.2 Priorities and objectives

The Confederation has established three priorities for international ERI cooperation and corresponding objectives.

Priority 1: *Reinforce and expand international networking activities*

ERI stakeholders will work to strengthen their position within the European and international Education, Research and Innovation Area. Their network of contacts should be expanded.

Objective 1a: Take part in multilateral programmes and international organisations:

Swiss ERI stakeholders are able to take part in and contribute to multilateral initiatives, organisations and programmes that seek to address global challenges. Emphasis is placed on well-established participation in European programmes. Switzerland is one of the most successful countries in terms of its participation in EU framework programmes and the Lifelong Learning Programme. It is a desired cooperation partner in these programmes. The mobility of Swiss learners, students and researchers is encouraged through these programmes.

Swiss ERI stakeholders enjoy full access to leading research infrastructures – particularly in Europe. Swiss co-funding of research infrastructures abroad serves to complement research infrastructures in Switzerland.

Objective 1b: Pursue bilateral programmes:

Bilateral cooperation with European countries is mainly based on existing efficient instruments and is firmly established.

Cooperation with industrialised countries and emerging countries brings added value to Switzerland as an ERI location. Bilateral cooperation programmes with selected countries outside of Europe are based on the principle of mutual benefit.

Objective 1c: Encourage ERI stakeholders to take initiative:

National ERI stakeholders are aware of global challenges. Acting in a subsidiary capacity, the Confederation creates suitable conditions to help federally funded institutions in Switzerland to implement their own internationalisation strategy.

Priority 2: *Work to export education and import talent to make Switzerland an even more appealing location*

Switzerland should remain one of the most preferred partners worldwide for cooperation in the areas of education, research and innovation. First of all, there is a demand for Swiss excellence in other countries. Secondly, Switzerland draws the most talented minds.

Objective 2a: Reinforce Switzerland's position as a location for world-renowned research and innovation:

Swiss education and research institutes are among the best in the world. There is a strong demand for their competences among both national and international ERI stakeholders. Among other things, Swiss ERI stakeholders raise Switzerland's profile and help to make our country appealing to foreign companies.

The Swiss research market is competitive. Swiss higher education institutions and research institutes recruit the best students and researchers from around the world and draw the best-qualified talents.

Scholarships and grants facilitate the mobility of apprentices, students and researchers between Switzerland and specific countries.

Objective 2b: Provide top researchers with the very best research equipment:

A targeted research funding policy has enabled Switzerland to establish outstanding research infrastructures, which contribute to Switzerland's appeal as a location for research and help to draw the very best researchers.

Objective 2c: Encourage Swiss mobility:

Swiss researchers, students and learners are mobile; they are in demand on the international labour and research market. Experience abroad is part of formal education: Swiss students have the opportunity to attend the best higher education institutions outside of Switzerland. When necessary, Swiss learners may also spend time abroad over the course of their VET programmes. At the same time, foreign learners also have the opportunity to spend time in Switzerland during their training. Agreements on traineeships and mobility are intended to encourage these activities.

Objective 2d: Raise awareness of Swiss excellence in education:

The excellence of the Swiss education system is being leveraged to position Swiss education exports worldwide. There are many private providers of upper-secondary level vocational education and training (VET) and tertiary level professional education and training (PET) in Switzerland. These providers will be supplied with information, support and contacts with local authorities and education institutions in other countries to facilitate market penetration and help satisfy a demand in other countries for Swiss competence in education.

Priority 3: *Achieve international recognition*

The quality of the Swiss education system should be recognised worldwide.

Objective 3a: Secure recognition of education pathways:

General education and VET/PET pathways should receive equal social recognition at both the national and international level (Cst. 61a, para. 3). Swiss education qualifications should be recognised all over the world.

Objective 3b: Promote the Swiss dual-track VET model:

Switzerland plays a leading role in establishing competence standards in the area of VET. Swiss companies abroad work with professional organisations to transpose aspects of Swiss dual-track VET programmes in target markets; through their efforts, the dual-track VET model will become firmly established in other countries, which should lead to greater use of this model and recognition of the quality of Swiss education.

Objective 3c: Maintain the strong reputation of Swiss higher education institutions:

Swiss higher education institutions are known worldwide for outstanding quality of research and teaching. They freely decide what international activities to pursue and help Switzerland to consolidate its international reputation as an ERI location.

3.3 Priority countries: criteria and selection

The geographical focus of sectorial policies in the area of education, research and innovation are aligned with the Confederation's existing foreign policy strategy. Consequently, no new priorities will be set for country selection. Nevertheless, some countries will receive greater attention than others in the area of international ERI cooperation. Given the rapid pace of international developments, a certain margin of manoeuvre must be maintained when weighing cooperation opportunities.

3.3.1 Principles

Switzerland pursues a foreign policy that is based on the principle of universality.⁴⁶ Nevertheless, certain countries or regions are given greater importance depending on the extent to which cooperation can further Swiss interests (e.g. free trade agreements, dual taxation agreements). Generally speaking, the EU is considered to be Switzerland's most important partner. Within the EU, Switzerland gives greater importance to its neighbouring countries and therefore intensively pursues bilateral relations. In 2005, the Federal Council also decided to develop and expand privileged relations with priority countries outside the EU. The following priority countries were listed in the Foreign Policy Report for 2009: the USA, China, India, Japan, South Africa, Brazil, Russia and Turkey⁴⁷.

Other sectorial policies such as foreign economic policy or development policy broaden this framework. Generally speaking, the following observations can be made:

The priority countries for general foreign policy also receive considerable attention in the area of ERI. Countries whose ERI systems are of particular interest to Switzerland are likely to also be considered as priority countries for general foreign policy.

Countries with which Switzerland maintains intensive foreign economic policy relations are potential partners for intensive contact in the area of ERI policy. ERI and foreign economic policy are mutually supportive since both policies encourage extensive and facilitated mobility of persons and/or efficient protection of intellectual property rights as general conditions.

As a rule, countries with less developed ERI systems are not selected for priority measures relating to international ERI policy. Justifiable exceptions may be made on occasion.

3.3.2 Current priority countries and regions for federal ERI activities

For international ERI cooperation, the *primary* focus is placed on the European Union. Between 2004-2011, Switzerland was an associated country in EU research framework programmes. Other associated countries include Turkey, Israel and EFTA member states and EU candidate countries. In 2011, Switzerland became a full-fledged participant in the EU's Lifelong Learning Programme. As part of its European Neighbourhood Policy, the EU also plans to pursue ERI programmes with neighbouring and other partner countries as well as with most countries in the Mediterranean Basin⁴⁸. This will enable these countries (as was the case with the Bologna Process) to become a part of the "Europe of Knowledge".

⁴⁶ Sectorial policies include the following: energy supply, protection of natural resources, ERI policy and culture. Distinctions are further drawn between foreign, security, peace and development policies as well as between Switzerland's multilateral relations with the UN, Bretton Woods Institutions (IMF, World Bank), WTO, IAEA and regional organisations (Council of Europe, OSCE, EU) and Switzerland's host state policy.

⁴⁷ Foreign Policy Report 2009, summary, p. 3

⁴⁸ The European Neighbourhood Policy (ENP) is a foreign relations instrument of the European Union, which seeks to maintain relations with countries situated directly to the south and east of the EU: Algeria, Armenia, Azerbaijan, Belarus, Egypt, Georgia, Israel, Jordan, Lebanon, Libya, Moldova, Morocco, occupied Palestinian territories, Syria, Tunisia and Ukraine. Although Russia is also a direct neighbour of the EU, the EU's relations

The Federal Council Dispatch on the Promotion of Education, Research and Innovation for 2008-2011 called for efforts to be made to establish cooperation and exchanges with countries that offered significant scientific and technological development potential. With international ERI cooperation, these same countries are once again the focus of Swiss attention, namely: China, India, Japan, Russia, South Africa, South Korea, Brazil and Chile. Swiss science and technology counsellors and *swissnex consular annexes* also pursue cooperation with other scientifically strong regions and countries (particularly North America and Singapore), where there are already active, direct and well-structured interinstitutional exchanges. In addition, Switzerland supports two high-quality research institutes, one in the Côte d'Ivoire and the other in Tanzania to gather data on such things as regional illnesses and other relevant research fields (e.g. veterinary medicine and agronomy).

3.3.3 priority countries and regions

Based on the vision, the three priorities and the corresponding objectives, **three guiding principles for ERI cooperation** with priority countries have been established:

Guiding principle 1: Access to leading, globally active research and innovation partners and research infrastructures allows Switzerland to strengthen its position as a location for research and innovation. Priority will be given to partnerships that: enable synergies to be established with other sectorial policies; help to identify solutions to global problems (e.g. in the area of energy, climate, health, qualified workers); and at the same time bring qualitative added value to the Swiss ERI landscape.

Guiding principle 2: Encourage national ERI stakeholders to actively work to establish international networks by removing barriers to mobility: through scholarships, exchange programmes, traineeship agreements, foreign network.

Guiding principle 3: Maintain and build from the strengths of the Swiss education system (recognition of qualifications, creating greater permeability between general education and vocational and professional pathways, exporting education and enabling comparison between qualifications).

Countries involved in cooperation initiatives in the areas of education, research and innovation can be placed into one of three categories:

A) Firmly established cooperation: Cooperation in the areas of education, research and innovation is firmly anchored; there are already established and efficient forms of cooperation; there is mutual interest in cooperation; and the benefits for Switzerland justify continuation of this cooperation. Renewal or expansion of existing agreements considers all three of the above-mentioned guiding principles.

Target countries: European countries and partner states within the EU

This large group of countries can be further broken down into smaller categories:

High intensity: neighbouring countries and Alpine countries

Normal intensity: EU member states and associated states in framework programmes⁴⁹

with this country have developed within the framework of a strategic partnership. Cooperation in education and research is considered a priority action point in the ENP (Strengthening the European Neighbourhood Policy, COM(2007) 726, Brussels, 4 December 2006, p. 8). In the implementation strategy (A Strong European Neighbourhood Policy, COM(2007) 774 final; Brussels 5 December 2007, p. 11) integration in programmes is mentioned as an important measure. This integration has already begun in some cases.

⁴⁹ In addition to Switzerland, current associated countries include Norway, Iceland, Liechtenstein, Israel, Turkey, Croatia, former Yugoslav Republic of Macedonia, Serbia, Montenegro, Albania and Bosnia and Herzegovina.

Lower intensity: other European countries and countries that lie along the border with Europe (Balkans, countries in the Black Sea, Caucasus, Mediterranean regions), which are becoming increasingly integrated in the "Europe of Knowledge" through the European Neighbourhood Policy.

B) Targeted cooperation: Switzerland already works with other countries in individual policy sectors. Switzerland pursues these cooperation initiatives in the area of education, research and innovation to further its education, research and economic interests. It also strives to sign ERI agreements in order to tap into the considerable potential of these countries in a way that creates a win-win situation. Agreements are based on the three guiding principles mentioned above.

Agreements have already been reached with the following countries or are currently pending:

USA, Japan, South Korea

BRICS countries

Possible future agreements:

New agreements may be signed in particular with OECD countries that do not already fall into the above-mentioned groups, with member countries of the Gulf Cooperation Council or ASEAN⁵⁰. Such agreements will be checked to verify compliance with the above-mentioned guiding principles. If deemed compliant, these agreements will then be submitted to the Federal Council for approval.

C) Occasional cooperation: institutionalised forms of cooperation do not exist or exist on a case-per-case basis. Following general Swiss ERI policy principles, greater cooperation with such countries should nevertheless be pursued in the area of education, research and innovation. In the absence of other incentives, Swiss ERI stakeholders depend on federal funding to establish initial contacts to discuss new cooperation opportunities. New agreements should be based on at least one of the three above-mentioned guiding principles.

⁵⁰ ASEAN: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam
Gulf Cooperation Council: Bahrain, Kuwait, Qatar, Oman, Saudi Arabia, United Arab Emirates

Measures, funding and coordination

In order to reach the objectives set forth in the present international ERI strategy, the required measures, incl. allocation of sufficient funding, will be set forth at four-year intervals in Federal Council Dispatches on the Promotion of Education, Research and Innovation as well as in other ERI dispatches.

In order to ensure the exchange of information and optimal use of synergies within the ERI system, an interdepartmental working group comprised of representatives from the FDHA, the FDEA and the FDFA should be created. This working group may also serve as a platform for discussion on whether performance agreements or agreements on objectives should be reached between the three Federal Departments involved. The working group would be chaired by the FDHA (SER) and may invite other Federal Departments to attend annual meetings if necessary. Every four years, the working group would inform the Federal Council of the various bilateral activities conducted in relation to the ERI Dispatch⁵¹. Each Federal Department would be responsible for drafting the portion of the report that relates to its own area of responsibility.

⁵¹ The first reporting will be included in the Federal Council Dispatch on the Promotion of Education, Research and Innovation for 2017-2020

List of abbreviations

FEDRO	Federal Roads Office (DATEC)
FOEN	Federal Office for the Environment (DATEC)
FOPH	Federal Office of Public Health (FDHA)
FOC	Federal Office of Culture (FDHA)
OFCOM	Federal Office of Communications (DATEC)
FOBL	Federal Office for Buildings and Logistics (FDF)
OPET	Federal Office for Professional Education and Technology (FDEA)
SFOE	Swiss Federal Office of Energy (DATEC)
ERI	Education, research and innovation
FOM	Federal Office for Migration (FDJP)
IBE	International Bureau of Education (UNESCO)
FOAG	Federal Office for Agriculture (FDEA)
BRICS	Brazil, Russia, India, China, South Africa
FSIO	Federal Social Insurance Office (FDHA)
Cst.	Federal Constitution of the Swiss Confederation
CERN	European Organization for Nuclear Research
CGIAR	Consultative Group on International Agricultural Research
CIESM	International Commission for the scientific exploration of the Mediterranean
COST	European Cooperation in Science and Technology
CRUS	Rector's Conference of the Swiss Universities
SDC	Swiss Agency for Development and Cooperation (FDFA)
DRC	Directorate for Corporate Resources (FDFA)
DIL	Directorate for International Law (FDFA)
FDFA	Federal Department of Foreign Affairs
FDHA	Federal Department of Home Affairs
EDK	Swiss Conference of Cantonal Ministers of Education
EDPC	Education Policy Committee (OECD)
FDF	Federal Department of Finance
EFHK	Federal Commission for Universities of Applied Sciences
EFTA	European Free Trade Association
SFIVET	Swiss Federal Institute for Vocational Education and Training
CFAS	Federal Commission for Space Affairs
FDJP	Federal Department of Justice and Police
EMBC	European Molecular Biology Conference
EMBL	European Molecular Biology Laboratory
ESA	European Space Agency
ESKAS	Federal Commission for Scholarships for Foreign Students
ESO	European Southern Observatory
ESRF	European Synchrotron Radiation Facility
FIT	Federal Institute of Technology
EU	European Union
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
EURATOM	European Atomic Energy Community
EUTELSAT	European Telecommunications Satellite Organization
FDEA	Federal Department of Economic Affairs
UAS	Universities of applied sciences
R&D	Research and development
GEO	Group on Earth Observations
GEOSS	Global Earth Observation System of Systems
GMES	Global Monitoring for Environment and Security
HFSP	Human Frontier Science Program (International programme to encourage fundamental research in life sciences)
IAEA	International Atomic Energy Agency
IAS	Institute of Advanced Study
IB	FDFA/FDEA Integration Office
IKAR	Interdepartmental Coordination Committee for Space Affairs

ILL	Institut Laue-Langevin, Grenoble
ISR	Istituto Svizzero di Roma
ITSO	International Telecommunications Satellite Organization
IMF	International Monetary Fund
KFH	Rectors' Conference of the Swiss Universities of Applied Sciences
CTI	Commission for Technology and Innovation
MeteoSwiss	Federal Office of Meteorology and Climatology (FDHA)
MoU	Memorandum of Understanding
OECD	Organisation for Economic Co-operation and Development
OSCE	Organization for Security and Co-operation in Europe
DPA	Directorate of Political Affairs (FDFA)
PRS	Presence Switzerland (FDFA)
REEEP	Renewable Energy and Energy Efficiency Partnership
REPIC	Interdepartmental platform for the promotion of renewable energy and energy efficiency in international cooperation.
SER	State Secretariat for Education and Research (FDHA)
SECO	State Secretariat for Economic Affairs (FDEA)
SNSF	Swiss National Science Foundation
swissnex	Swiss consular annexes devoted to science
UNESCO	United Nations Educational, Scientific and Cultural Organization
UN	United Nations
UNOOSA	United Nations Office for Outer Space Affairs
DATEC	Federal Department of the Environment, Transport, Energy and Communications
DDPS	Federal Department of Defence Civil Protection and Sport
STC	Science and Technology Counsellors posted to Swiss diplomatic/consular missions abroad
WTO	World Trade Organization
XFEL	European x-ray free electron laser research facility

Annex

Annex I: Main intergovernmental agreements in the area of science, technology and education ("Educ" used to indicate the latter)

a) European Union, Alpine countries (countries listed)

Partner	Title	Signature date
European Union	Agreement between the Swiss Confederation and the European Atomic Energy Community (EURATOM) on Cooperation in the Area of Controlled Nuclear Fusion and Plasma Physics.	14 September 1978
	Framework Agreement between the Swiss Confederation and the European Communities on Scientific and Technological Cooperation	8 January 1986
	Agreement between the Swiss Confederation, on the one hand, and the European Community and European Atomic Energy Community, on the other, on Scientific and Technological Cooperation	25 June 2007
	Educ: Agreement between the Swiss Confederation and the European Union on the Requirements and Conditions for Participation of the Swiss Confederation in the "Youth in Action" programme as well as in the Lifelong Learning Programme (2007-2013)	15 February 2010
Multilateral (Treaty of Lisbon)	Educ: Agreement on Recognition of Higher Education Qualifications within the European Region	24 March 1998
Germany	Educ: Agreement between the Swiss Confederation and the Republic of Germany on Mutual Recognition of Craftsmanship Examinations	1 December 1937, in effect on 1 January 1938

	Educ: Agreement between the Swiss Federal Council and the Government of the Federal Republic of Germany on the Mutual Recognition of Higher Education Qualifications (with exchange of letters)	Signed on 20 June 1994, in effect on 1 July 1995
France	Exchange of letters between the General Directorate of Cultural, Scientific and Technical Services of the Ministry of Foreign Affairs of the Republic of France and the Federal Office for Education and Science of the Federal Department of Home Affairs of the Swiss Confederation	11 July 1984
	Educ*: Swiss-French Framework Agreements between the Conference of University Presidents (CPU), the Conference of the Directors of French Engineering Schools (CDEFI), on the one hand, and the Rectors' Conference of the Swiss Universities (CRUS), the Rectors' Conference of the Swiss Universities of Applied Sciences (KFH) and the Swiss Conference of Rectors of Universities of Teacher Education (COHEP), on the other, on Recognition of Higher Education Qualifications	Signed and in effect on 10 September 2008, effective starting from the Winter semester 2008/09)
Italy	Educ: Agreement between the Swiss Federal Council and the Government of the Italian Republic on the Mutual Recognition of Higher Education Qualifications (with annexes)	Signed on 7 December 2000, in effect through an exchange of notes on 1 August 2001
	Agreement between the Swiss Federal Council and the Government of the Italian Republic on Scientific and Technological Cooperation.	14 May 2003
Austria	Educ: Agreement between the Swiss Confederation and the Republic of Austria on the Mutual Recognition of Higher Education Qualifications (with exchange of notes)	Signed on 10 November 1993, in effect through an exchange of notes on 1 October 1994
Slovenia	Agreement between the Swiss Federal Council and the Government of the Republic of Slovenia on Scientific and Technological Cooperation	2 March 2008

*The contracting parties for the framework agreement are the university rectors' conferences in both countries.

b) BRICS countries (countries listed alphabetic order)

Partner	Title	Signature date
Brazil	Agreement between the Swiss Confederation and the Federative Republic of Brazil on Technical and Economic Cooperation	26 April 1968
	Agreement between the Swiss Federal Council and the Government of the Federative Republic of Brazil on Scientific and Technological Cooperation	Signed on 29 September 2009
China	Agreement between the Swiss Confederation and the People's Republic of China on Scientific and Technological Cooperation	24 February 1989
	Memorandum of Understanding between the Swiss Federal Department of Home Affairs and the Ministry of Science and Technology of the People's Republic of China for the strengthening of the scientific and technological cooperation between Switzerland and the People's Republic of China	21 November 2003
India	Agreement between the Swiss Confederation and the Government of India on Technical and Economic Cooperation	27 September 1966
	Agreement between the Swiss Federal Council and the Government of the Republic of India on cooperation in the fields of science and technology	10 November 2003
	Swiss-Indo Cooperation in Science & Technology Executive Programme for the period 2006-2010	16 November 2006
	Addendum to the Swiss-Indo Executive POC (2006-2010)	13 November 2007
Russia	Agreement between the Swiss Federal Council and the Government of the Russian Federation on Scientific and Technological Cooperation	<i>Negotiations still underway</i>
South Africa	Memorandum of Understanding between the State Secretariat for Education and Research of the Swiss Confederation and the Department of Science and Technology of the Republic of South Africa on Scientific and Technological Cooperation	28 June 2005
	Agreement between the Swiss Federal Council and the Government of the Republic of South Africa on Scientific and Technological Cooperation	7 December 2007

c) OECD partners (countries listed in alphabetic order)

Partner	Title	Signature date
Chile	Agreement between the Swiss Confederation and the Republic of Chile on Scientific and Technological Cooperation	5 December 1968, in effect through an exchange of notes on 2 October 1969
Japan	Agreement between the Swiss Federal Council and the Government of Japan on Cooperation in Science and Technology	10 July 2007
South Korea	Agreement between the Swiss Federal Council and the Government of the Republic of Korea on Cooperation in the Fields of Science and Technology	6 May 2008
United States	Agreement between the Swiss Federal Council and the Government of the United States of America for Scientific and Technological Cooperation	1 April 2009

d) Other agreements (countries listed in alphabetic order)

Partner	Title	Signature date
Egypt	Memorandum of Understanding (MoU) between the Ministry of Water Resources and Irrigation of the Arab Republic of Egypt and the State Secretariat for Education and Research of the Swiss Confederation	18 December 2004
Ethiopia	Agreement between the Swiss Federal Council and the Government of the Federal Democratic Republic of Ethiopia on capacity building and research partnership between Swiss and Ethiopian institutions in the fields of science and technology	27 November 2008
Burundi	Agreement between the Swiss Confederation and the Republic of Burundi on Technical and Economic Cooperation	19 November 1969
Côte d'Ivoire	Framework Agreement between the Swiss Confederation and the Republic of Côte d'Ivoire on Scientific Cooperation	10 December 1998
	Agreement between the Federal Department of Home Affairs of the Swiss Confederation and the Ministry of Higher Education and Scientific Research on Scientific and Technological Cooperation	18 July 2006
Ecuador	Agreement between the Swiss Confederation and the Republic of Ecuador on Technical and Economic Cooperation	4 July 1969
Qatar	Memorandum of Understanding between the Government of the State of Qatar and the Government of the Swiss Confederation	20 December 2004
Tanzania	Memorandum of Understanding (MoU) between the Ministry of Science, Technology and Higher Education of the United Republic of Tanzania and the Swiss Science Agency of the Federal Department of Home Affairs of the Swiss Confederation on Scientific and Technological Cooperation	30 October 2004
United Arab Emirates	Memorandum of Understanding between the Ministry of Higher Education and Scientific Research of the United Arab Emirates and the State Secretariat for Science and Research of Switzerland	1 March 2003

**Annex II: Network of science and technology counsellors (STCs) and swissnex consular annexes
(Last update: 1 May 2010)**

<input type="checkbox"/> STCs (full-time) and ESA delegates	<input type="checkbox"/> swissnex (official starting year)
Washington	Boston (2000)
European Space Agency ESA (Paris)	San Francisco (2003)
Brussels (EU multilateral)	Singapore (2004)
London	Shanghai (2008)
Moscow	<i>Bangalore (2010?)</i>
Pretoria	
Beijing	<input type="checkbox"/> Headquarters
New Delhi	Bern
Tokyo	
<input type="checkbox"/> STCs (part-time)	
Berlin	Brasilia
Madrid	Ottawa
Paris	Santiago de Chile
Vienna	Seoul

Annex III: Swiss schools abroad (last update: April 2010)

Annex IV: Countries where the Swiss Office for the Development of Foreign Trade (OSEC) has established Swiss Business Hubs

Bahrain	Austria
Brazil	Poland
Germany	Russian Federation
France	Saudi Arabia
United Kingdom	Singapore
India	Spain
Italy	South Africa
Japan	United Arab Emirates
Qatar	United States
Kuwait	People's Republic of China
Oman	

Annex V: Most important international ERI activities

A) Education

According to the Federal Constitution, the Confederation and the cantons "shall jointly, within the scope of their powers, ensure the high quality and accessibility of the Swiss Education Area" (Art. 61a para. 1).

As far as education is concerned, responsibility for pre-school all the way through tertiary level remains mainly in the hands of the twenty-six cantons. The Confederation and the cantons work together as partners at post-compulsory level (i.e. upper-secondary level baccalaureate schools and higher education sector). In the area of upper-secondary level vocational education and training (VET) and tertiary-level professional education and training (PET), the constitutional mandate is given to the Confederation.

In the area of international cooperation in education, the Confederation and the cantons closely coordinate their activities. The cantons are mainly responsible for pre-school and compulsory education as well as for cantonal universities; the SER is responsible for the two federal institutes of technology (ETH in Zurich and EPF in Lausanne); and OPET is responsible for VET, PET and UAS.

Activity	Instrument	Agencies involved and interested
International programmes		
Participation in EU education and youth programmes	EU Lifelong Learning Programme <u>and Youth in Action Programme</u>	FDHA (SER, FSO), FDEA (OPET), IB, EDK
Mobility		
Mobility of students	Federal scholarships	FDHA (SER) FDFA (DPA, SDC, foreign network)
	Bologna Process	FDHA (SER)
Recognition of qualifications	Bilateral or multilateral agreements	FDHA (SER, FOPH), FDEA (OPET), CRUS, EDK FDFA (DIL, DPA), IB, FDJP (FOM)
General cooperation in education		
International perspectives on higher education	FITs, cantonal universities	FDHA (SER), via performance agreements (FITs) and/or partial funding FDFA (SDC): specific funding
Initial education and training; continuing education and training; and extracurricular activities	Programmes sponsored by the EU, UN, UNESCO (IBE), ILO	FDHA (SER and FSO) and FDEA (OPET)
Education research	OECD	FDHA (SER), FDEA (OPET), EDK, SFIVET
Thematic cooperation in education		
Education for sustainable development	UN, UNESCO	EDK, FDHA (SER), FDFA (SDC, DPA), FDEA (OPET)
Promotion of human rights and civics in education	Council of Europe	FDHA (SER), EDK, FDFA (DPA)
Promotion of basic education in countries of the southern hemisphere and Eastern Europe	SDC programmes	FDFA (SDC)
Education on development cooperation	SDC programmes IBE/UNESCO	FDFA (SDC, DPA) FDHA (SER), EDK

Promotion of VET/PET and CET in countries of the Southern hemisphere and Eastern Europe	SDC programmes	FDFA (SDC)
Other: language learning, information and communication technologies, special needs, relations with French-speaking world	Co-funding of programmes, associations and institutions: Council of Europe, Agence universitaire de la Francophonie, etc.	FDHA (SER), EDK FDFA (DPA)
Positioning of Swiss VET/PET		
Internationalisation of VET/PET activities	Bilateral projects, project funding under Switzerland's "1 CHF billion" contribution to EU enlargement, OECD (EDPC)	FDEA (OPET, SECO), FDFA (SDC)
Promoting Switzerland as a location for education and training		
Promoting Switzerland as a location for education, international networking, synergies between science - economy - culture	Network of science and technology counsellors, swissnex consular annexes	FDHA (SER, FOC) FDFA (DPA, PRS, foreign network, DRC) FDF (FOBL)
Contribution to raising Switzerland's international profile, "good neighbourhood" policy, encouraging the mobility of students	Swiss schools abroad	FDHA (FOC) FDFA (DPA, foreign network, PRS)

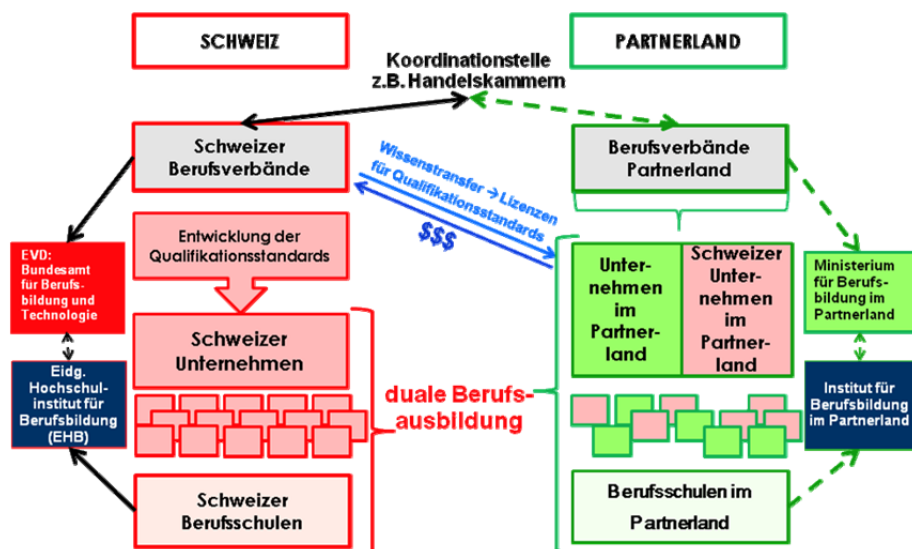
B) Research and innovation

According to the Federal Constitution, the Confederation "shall promote research and innovation" (Art. 64); It "shall manage the Federal Institutes of Technology...It shall support the cantonal universities and may make financial contributions to other higher education institutions that it recognises." (Art. 63a). The legal basis for corresponding federal activities are set forth in the Research and Innovation Promotion Act (RIPA, SR 420.1), the FIT Act (SR 414.110), the UAS Act (SR 414.71) and the Higher Education Act (pending).

Activity	Instruments/institutions/ international organisations	Agencies involved and interested
General conditions		
Official reports and representation at governmental level. Creation and preservation of good general conditions for research and innovation at both bilateral and multilateral levels	Framework agreements, MoUs, declarations of intent, joint committees, round tables, exploratory visits, information exchange, visits by foreign delegations, meetings, visits by Swiss delegations abroad, etc.	FDHA (SER) FDEA (OPET, SECO) FDFA (foreign network, DPA, SDC, DIL)
Monitoring of developments at main scientific locations worldwide, exchange of information, promotion of Switzerland as a location for research, international networking, synergies between science - economy - culture	Network of science and technology counsellors, swissnex consular annexes	FDHA (SER), in cooperation with the FDFA (foreign network, DPA, DRC) and the FDF (FOBL: buildings and logistics abroad)

International organisations and programmes		
Participation in multilateral organisations or specialised bodies	OECD, OMS, IAEA, REPIC, REEEP, UNFCCC and CBD, GEO/GEOSS, CGIAR, etc.	FDHA (SER, MeteoSwiss) and/or in some cases other agencies: FDHA (FOPH), FDEA (OPET), DATEC (SFOE, FOEN), FDFA (SDC, DPA)
Participation in multilateral research organisations and institutions	CERN, ESA, ESO, EMBL, EMBC, ESRF, CIESM, HFSP, ILL, IMS, etc.	FDHA (SER) FDFA (DPA, DIL) FDEA (OPET)
Participation in European research and innovation programmes	EU Framework Programme, Eureka, COST etc.	FDHA (SER, FOPH) FDEA (OPET, FOAG / Agroscope) DATEC (FEDRO, FOEN) DDPS, FDFA (SDC)
Research, technology and innovation in the area of space affairs	ESA, EU Framework Programmes, Eumetsat, Eutelsat, ITSO, UN OOSA etc.	FDHA (SER, MeteoSwiss), CFAS, IKAR, FDFA (DPA, DIL), DDPS, DATEC (SFOE, FOEN, OFCOM)
Bilateral cooperation		
Targeted bilateral programmes and projects, specific funding of institutions, programmes or projects abroad in relation to Switzerland as a location for science	Programmes with priority countries (BRICS, etc.) and institutions (ISR, IAS, archaeology, etc.)	FDHA (SER), in some cases in cooperation with the FDEA (OPET, CTI), SNSF, higher education institutions, FDFA (SDC, DPA, foreign network)
Joint research projects involving industry	CTI	FDEA (OPET)
Internationalisation		
Internationalisation of national and international programmes/projects	SNSF	FDHA (SER); FDEA (OPET, CTI, FDFA (SDC)
Internationalisation of higher education institutions	Cantonal universities, FITs, UAS, research institutes, SNSF, Swiss academies, KFH	Autonomy of institutions Funding: cantons, Confederation (via FDHA [SER]: partial or primary funding, performance agreements; via FDEA [OPET] for UAS), FDFA (SDC): specific funding
Promoting Switzerland as a location for research and innovation		
Promotion of Switzerland as a location for research and innovation, international networking, synergies between science - economy - culture	Network of science and technology counsellors, swissnex consular annexes	FDHA (SER, FOC) FDFA (DPA, PRS, foreign network, DRE) FDF (FOBL)
Mobility		
Mobility of researchers	ESKAS scholarships, Instruments used by the SNSF	FDHA (SER) FDFA (DPA, foreign network) SNSF
Development cooperation		
Research on development cooperation	SDC programmes SECO programmes	FDFA (SDC) FDEA (SECO)

Annex VI: Explanations of Chapter 3.2.4: Exporting education Case study of initiative to export Switzerland's dual-track model for vocational education and training (VET)



Switzerland - Partner country
Coordination office (e.g. chamber of commerce)

Swiss professional organisations - Professional organisations in the partner country
Knowledge transfer - Licences for competence standards \$\$\$

FDEA: Federal Office for Professional Education and Technology

Development of competence standards; Companies in the partner country; Swiss companies in the partner country;
Ministry for VET in partner country

Swiss Federal Institute for Vocational Education and Training (SFIVET); Swiss companies; Dual-track VET; Institute for
VET in partner country

Swiss VET schools - VET schools in the partner country

For over one hundred years, vocational education and training in Switzerland has been a successful partnership between the private sector and government authorities. As many Swiss companies expand their activities outside of Switzerland, they find that the only way to maintain high quality in the production of goods and services in other countries is to train local workers to Swiss standard using a training plan that they themselves develop. For this reason, large-sized companies have established their own training centres. However, the high costs associated with this course of action prevent many SMEs from following suit. SMEs are therefore interested in taking part in pilot projects that mirror the VET partnership established in Switzerland (see left side of chart), i.e. between the Confederation (supervision, training of VET teachers and trainers, recognition of qualifications), the cantons (VET schools) and professional organisations (development of training content). Implementation of pilot projects in the partner country requires identification of corresponding national and local authorities, education and training institutions and professional organisations in that country. At the same time, it requires partners who are willing to work together to provide apprenticeships (see right side of chart). Like in Switzerland, the corresponding professional organisation in the partner country needs to play a leading role, i.e. coordinate the activities of the various member companies, prepare training materials, develop training concepts to be used by VET teachers, trainers and examiners and organise final examinations.

Education services are exported when a Swiss professional organisation works to transfer knowledge to the partner country through the development of a training plan (competence standards) and the rendering of other services to the professional organisation in the partner country. All of this is done in exchange for license fees. Classroom instruction for the vocational theory portion of the VET programme should be provided and funded by the local authorities or by the local VET school. The task of the Confederation, for instance, would be to work with a bilateral chamber of commerce to identify potential partners in the given country, provide information about the Swiss dual-track approach to VET, establish contacts with government authorities and – if a VET programme can be successfully implemented in the partner country – establish an agreement on mutual recognition of qualifications.