



SWISS EDUCATION, RESEARCH AND INNOVATION POLICY FOR 2017–2020



Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

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Front cover: In its over sixty-year existence, CERN, located on the Swiss-French border near Geneva, has been at the forefront of all the major discoveries on the composition of matter. Thanks to its unique research infrastructure, CERN deals with questions relating to the origins and nature of the building blocks of matter and of the forces that hold them together. The discovery of the Higgs boson at CERN was rewarded with the Nobel Prize in Physics in 2013.

Note:

The funds mentioned are mainly the credits requested by the Federal Council in the Federal Council Dispatch on the Funding of Education, Research and Innovation for 2017–2020. These may be subject to certain changes as a result of parliamentary deliberations on this dispatch and annual budget consultations.

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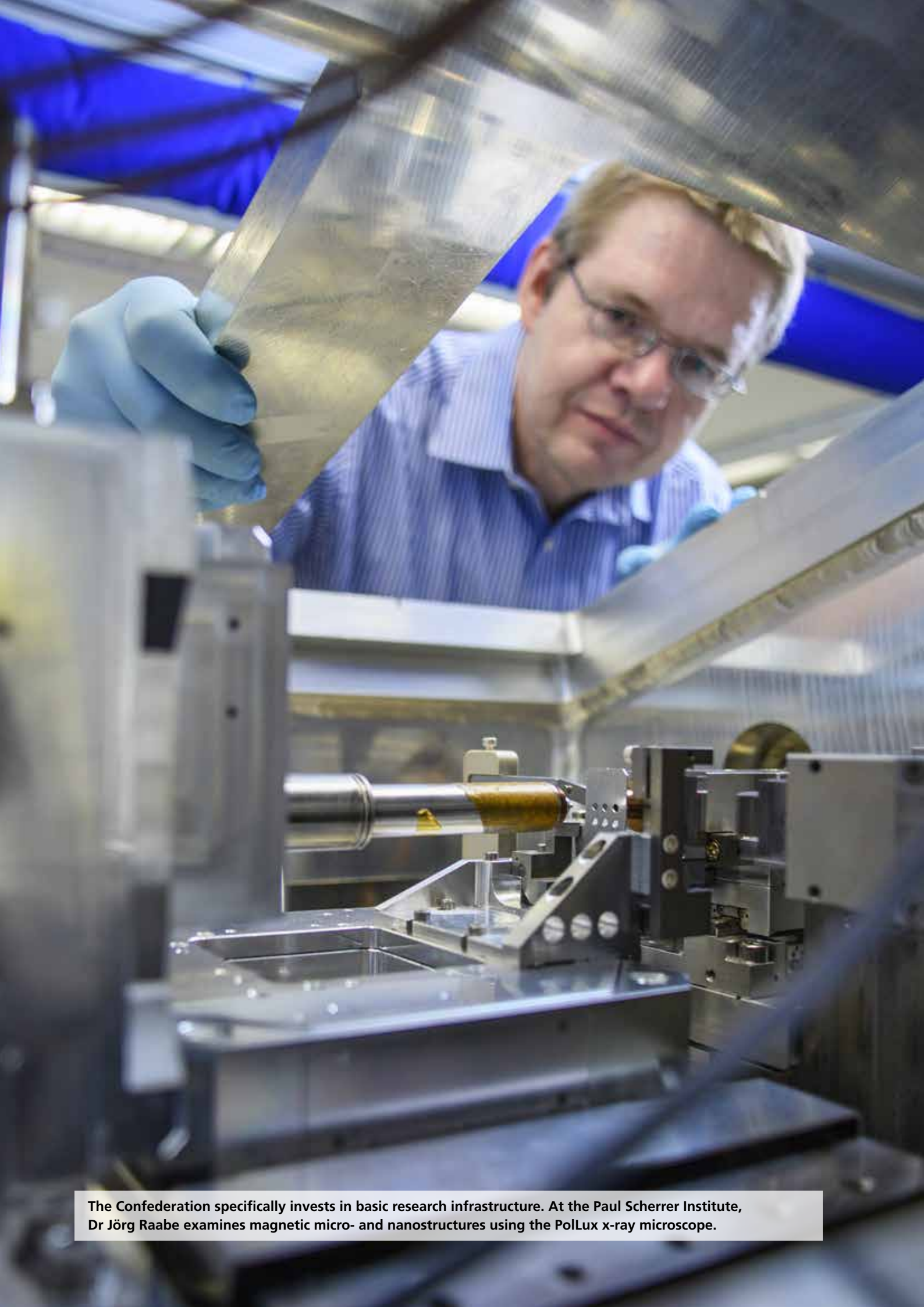
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The Confederation specifically invests in basic research infrastructure. At the Paul Scherrer Institute, Dr Jörg Raabe examines magnetic micro- and nanostructures using the PolLux x-ray microscope.

AT A GLANCE

The interplay between education, research and innovation (ERI) benefits individuals, society and the economy and is one of the main reasons for Switzerland's success as a location for research and production in a globalised world. The Swiss ERI system is recognised both in and outside of Switzerland for its high to very high quality. As a result, Switzerland gives priority to Education, Research and Innovation policy.

The commitment of individual actors is a key prerequisite for a successful national education, research and innovation system. Equally important is coherent and complimentary interaction between the various actors. Within the ERI system, the Confederation is responsible for the following tasks:

- Support for the Swiss VPET system;
- Coordination of the Swiss higher education sector through the Swiss Conference of Higher Education Institutions;
- Management and financing of the ETH Domain;
- Support for cantonal universities and universities of applied sciences;
- Promotion of research and innovation at both national and international level.

ERI policy measures are based on the same principles that have guided the Confederation for many years:

- Competition and cooperation;
- Autonomy of higher education institutions and free choice by individuals of research topics;
- Diverse and permeable education system;
- Promotion of public-private partnerships;
- International cooperation.

Federal ERI policy is based on the following pieces of legislation: the Vocational and Professional Education and Training Act (VPETA), the Federal institutes of Technology Act (FIT Act), the Higher Education Act (HEdA) and the Research and Innovation Promotion Act (RIPA).

Every four years, the Federal Council sets out its ERI policy in successive appropriation bills submitted to the Parliament for approval. Each appropriation bill for the ERI policy area is referred to as a "Federal Council Dispatch on the Promotion of Education, Research and Innovation", or "ERI Dispatch". In these appropriation bills, the Federal Council takes stock of the previous budgetary period and presents its objectives and measures for the subsequent budgetary period, together with a federal budget proposal for the ERI system. The appropriation bill also includes proposed legislative changes to optimise the legal basis

For 2017–2020 budgetary period, the Confederation will spend around CHF 28.3 billion to implement its ERI policy. From a purely financial standpoint, education, research and innovation is the Confederation's fourth largest policy area.

ERI policy for 2017–2020 is based on the motto "Switzerland will remain a leader in education, research and innovation." The guideline is: "Continuity with targeted expansion".

In the ERI Dispatch for 2017–2020 the following four priorities have been set: strengthen the professional education sector; support academic careers for the next generation of teachers and researchers; pursue special programme for human medicine; take measures to maintain the innovative capacity of the private sector.

IMPORTANCE OF EDUCATION, RESEARCH AND INNOVATION

Education is the essential basis for independent thinking and action of each individual. The type of education that one receives determines the range and scope of available choices in life. Education also enables people to play an active role in social, cultural and economic activities.

Research, the questioning of established facts and the constant pursuit of knowledge and understanding, brings fresh ideas and aspects that enrich our understanding. Increasingly, research in all scientific disciplines takes place in international networks where researchers compete and cooperate with one another and share their research findings worldwide.

Ultimately, innovation capacity equates to new prospects for individual companies and entire economies. Economic success depends on creativity and the ability to transform

new knowledge into marketable products, processes and services. Over the past few decades, Switzerland has managed to develop a globalised knowledge-based economy through innovation, with numerous companies generating high added value on world markets.

The interplay of competitive education, research and innovation (ERI) dynamics is a key to Switzerland's success as a location for research and production in a globalised world. Against this backdrop, education, research and innovation policy takes on considerable importance.

CURRENT STATUS OF SWISS EDUCATION, RESEARCH AND INNOVATION

The impact and effects of education, research and innovation policy measures on individuals, society and the economy are difficult to document because the results and impacts often tend to be felt over the long-term: with the advent of lifelong learning, academic careers have become increasingly scarce and no one is able to predict with certainty when, if ever, a given research endeavour will give rise to marketable innovations.

Nonetheless, there are several indicators closely associated with past Swiss ERI policy decisions that help shed light on the matter:

Central importance of VPET system

Two-thirds of all young people coming out of compulsory education in Switzerland enrol in upper-secondary level VET programmes. This large number bears testimony to the appeal of the Swiss VET sector over its general education sector. This popularity is largely the result of hands-on training that is closely co-related with the actual needs of the labour market. The Swiss VET sector offers training for around 230 different occupations and forms the basis for lifelong learning. It also opens a wide range of career prospects, particularly through more advanced training in Switzerland's professional education sector. The latter prepares experienced professionals for complex managerial and technical responsibilities.

High graduation rates

The higher the qualification awarded, the better the chances of finding a fulfilling job. The graduation rate at upper-secondary level (VET sector or general education sector) in Switzerland is very high compared to other countries. This state of affairs is a reflection of the quality of the Swiss education system.

Many PhDs

Switzerland has the highest proportion of PhD holders among the countries belonging to the Organisation for Economic Cooperation and Development (OECD). Among other things, this figure is the result of intensive basic research activities conducted to a large extent by young researchers at Swiss higher education institutions.

Outstanding higher education institutions

The Swiss higher education sector is extremely competitive at international level. Around 60 per cent of the students enrolled in a federal institute of technology or cantonal university in Switzerland happen to be studying at a top 200 university in the Shanghai ranking list of the world's best universities.

An efficient research system

Switzerland has outstanding research institutions and effective approaches to research (bottom-up principle as the basis for funding; free choice of research themes when applying for funding). An important indicator of research activity and output is the 'Number of research papers published per year and per million inhabitants'. Here, Switzerland holds the top position.

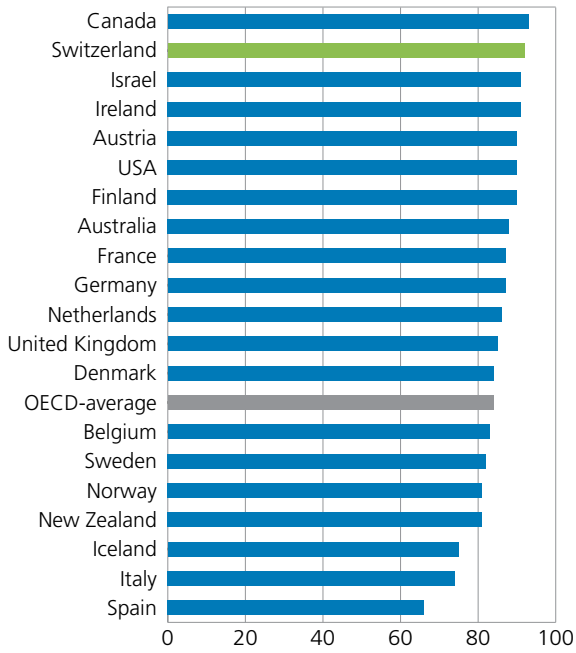
Great innovation potential

Patents are an important indicator of a country's research output. The number of patent applications allows one to assess the extent to which research findings are used for technological and economic progress. In this field as well, Switzerland is incredibly strong.

Robust economy

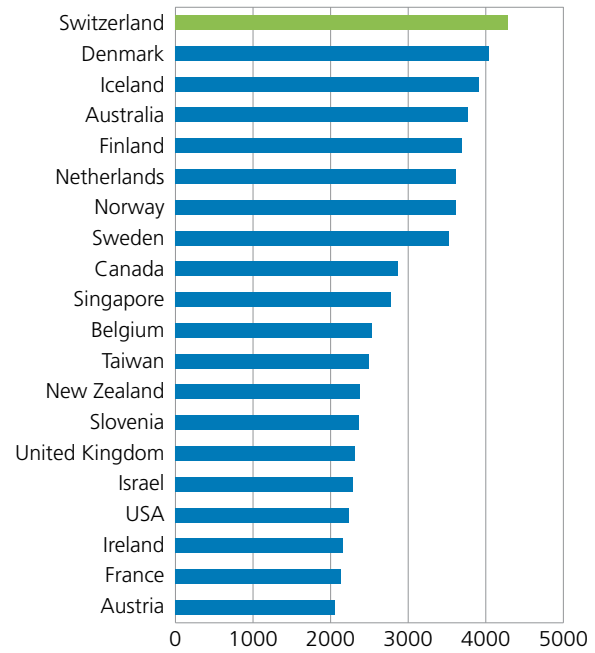
Switzerland's unemployment rate stands at 4.5% (OECD average: 7.3%; EU average: 10%) and the country's economic growth has remained solid despite difficult conditions worldwide. One of the reasons for this is the incredibly strong innovative output of its economy. In fact, Switzerland has ranked at the top of innovation ranking lists for years now..

Graduation rates at upper-secondary level, 2010
Proportion of individuals aged 25-65 holder



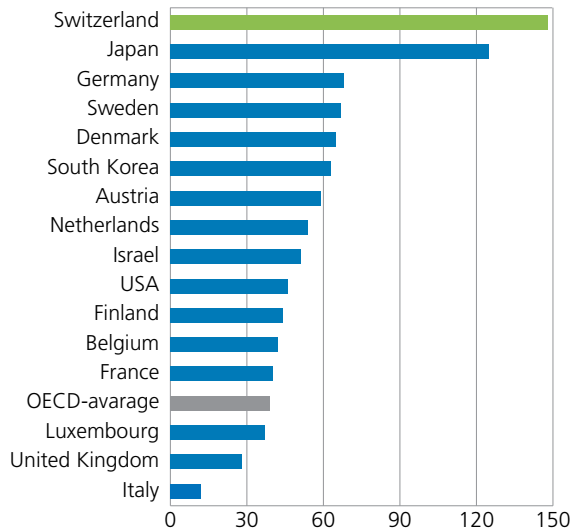
Source: Bibliometric analysis of scientific research in Switzerland 1981–2013, SERI 2016

Number of research papers published per year and per million inhabitants, 2011–2015



Source: Bibliometric analysis of scientific research in Switzerland 2006–2015, SERI 2017

Triadic patent applications per million inhabitants, 2013



Source: Factbook 2015–2016: Economic, Environmental and Social Statistics, OECD 2016

EDUCATION, RESEARCH AND INNOVATION AS A PRIORITY POLICY AREA

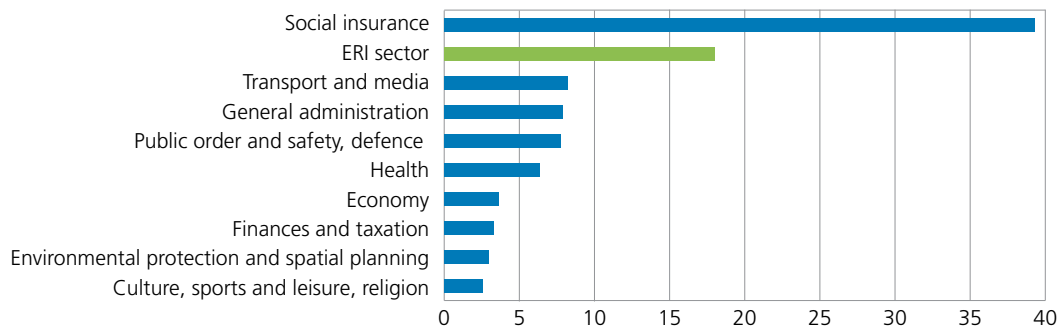
The previously mentioned education, research and innovation indicators are the result of long-term support policies. On one hand, this requires the best possible conditions for individual and institutional actors within the ERI system. Adequate funding is another important prerequisite.

Combined, the Confederation and the cantons allocate 18% of their total expenditure to the ERI system. 'ERI' is therefore the second most heavily funded policy area between 'Social insurance' (38%) and – by a large margin – "Transport" (7%).

Switzerland is among the top countries worldwide in terms of education expenditure per capita. Expressed as a ratio of per capita GDP, Switzerland's research expenditure very clearly surpasses the average level of expenditure of OECD countries. The private sector is mostly to thank for this high level of spending, as companies devote considerable resources to R&D activities in Switzerland.

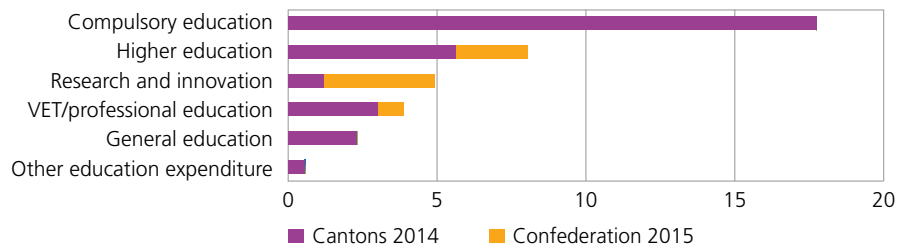
Here we should point out that under the Federal Constitution, it is the cantons that bear most of the responsibility for ERI funding. Paying out around CHF 37.5 billion, they cover roughly four-fifths of total ERI funding (2013). A considerable portion of this cantonal funding is used to pay for pre-school and compulsory education.

Proportion of public funding by policy areas, 2013



Source: Finanzierung von Bildung, Forschung und Innovation durch Bund und Kantone, SERI and Swiss Conference of Cantonal Ministers of Education EDK 2016

Federal and cantonal funding of the ERI system, 2013 in CHF billion



Source: Finanzierung von Bildung, Forschung und Innovation durch Bund und Kantone, SERI and Swiss Conference of Cantonal Ministers of Education EDK 2016

ROLE OF THE SWISS CONFEDERATION IN FEDERALIST ERI SECTOR

The commitment of individual actors is a key prerequisite for a successful national education, research and innovation system. Equally important is coherent and complimentary interaction between the various actors. This is particularly important in federalist Switzerland, where all 26 cantons play a central role in the area of education. It is also important because the Confederation and the cantons both share responsibility for education under the Federal Constitution, each in their respective areas of authority.

Federal legislation applies at various levels within ERI system (e.g. VPET system) and serves as the basis for cantonal implementing acts and provisions. The most important legal basis for federal ERI policies can be found in the Federal Vocational and Professional Education and Training Act (VPETA), the Federal Institutes of Technology Act (FIT Act), the Higher Education Act (HEdA) and the Research and Innovation Promotion Act (RIPA).

The Confederation currently provides CHF 7.7 billion each year for the policy area “Education, research and innovation”, in keeping with its regulatory powers and activities assigned to it under federal legislation. From a purely financial standpoint, education, research and innovation is the Confederation’s fourth largest policy area.

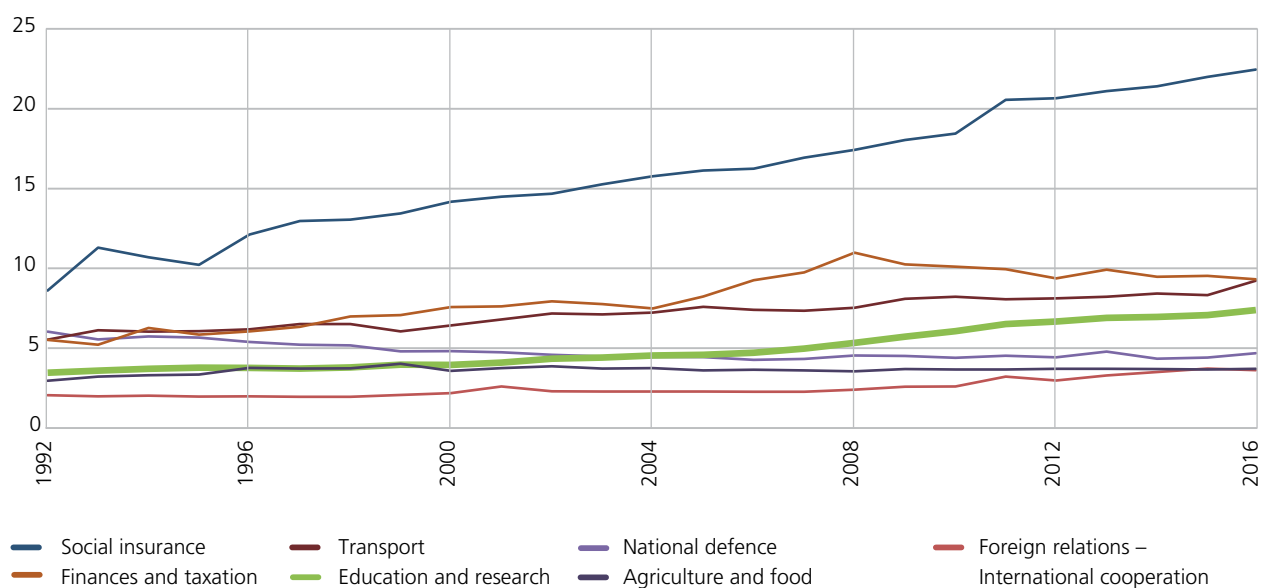
Regulatory powers of the Confederation and the cantons within the ERI system

	Confederation	Confederation and the cantons	Cantons
Compulsory education			§
General education (upper-secondary level)	§		§
Vocational education and training (upper-secondary level)	§		§
Professional education (tertiary level, non-university)	§		§
ETH Domain	§		
Cantonal universities and universities of applied sciences		§	§
Continuing education and training	§	§	
Support for research and innovation	§		§
International cooperation	§		

paragraph symbols in bold font: power to enact legislation;
 paragraph symbols in light grey font: power to enact implementing legislation and provisions

Source: ERI Dispatch 2017–2020, Federal Council 2016

Federal expenditure by policy area in 1992–2016 in CHF billion



Source: Federal Finance Administration 2017

FEDERAL ERI POLICY FOR 2017–2020

For the past 20 years, the Federal Council has expressed its ERI policy in successive appropriation bills submitted at four-year intervals to Parliament for approval. Each appropriation bill for the ERI policy area is referred to as a “Federal Council Dispatch on the Promotion of Education, Research and Innovation” (following cited: ERI Dispatch). In these appropriation bills, the Federal Council lays out its strategic vision for the ERI policy area at national, European and, where applicable, international level.

The ERI policy strategy requires planning of activities and resources in order to fulfil the tasks assigned to the Confederation, namely:

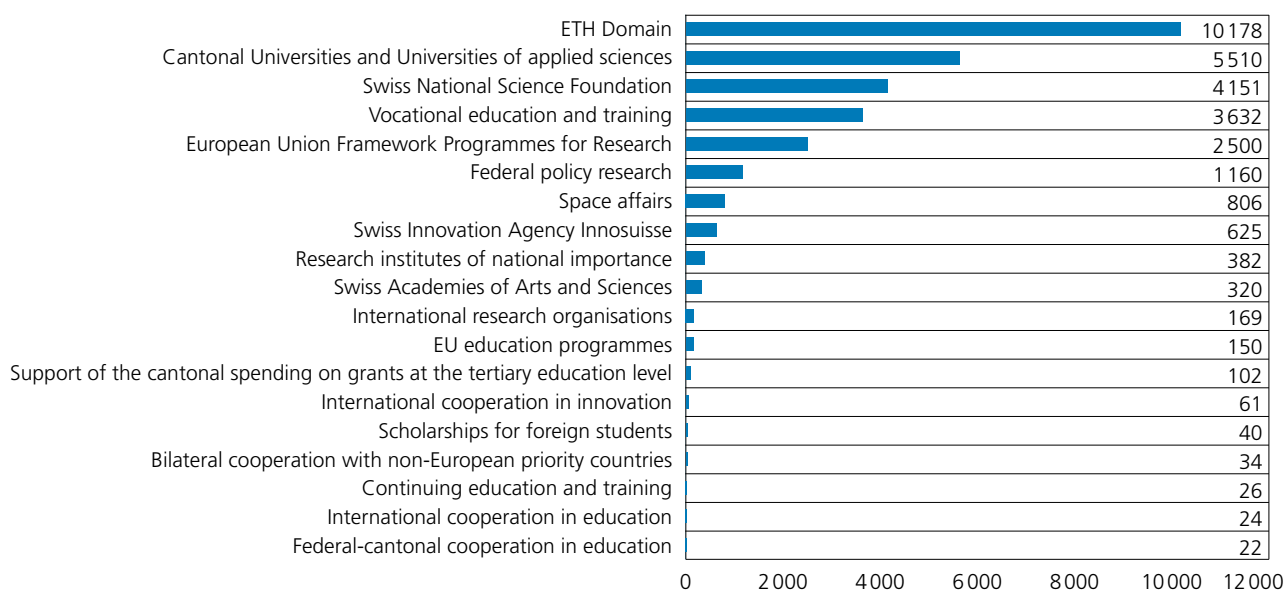
- Support for the Swiss VPET system
- Coordination of the Swiss higher education sector through the Swiss Conference of Higher Education Institutions
- Management and financing of the ETH Domain
- Support for cantonal universities and universities of applied sciences
- Promotion of research and innovation at both national and international level

For 2017–2020 budgetary period, the Confederation will spend around CHF 28.3 billion to implement its ERI policy. This constitutes an increase of just under CHF 2.6 billion compared to the previous budgetary period 2013–2016.

The allocation of the total budget to individual budget items depends on various criteria:

- The considerable funding provided to the ETH Domain is due to the fact that this domain falls under federal authority.
- The allocation of funding to individual higher education institutions in the 2017–2020 budgetary period is based on the funding provisions set forth in the Higher Education Act (HEdA), which provides for three types of federal funding contributions: operating subsidies, building subsidies and project subsidies.
- The Confederation is required to provide one-fourth of the total public funding allocated to the VPET system.
- Like other participating countries in international programmes and organisations, Switzerland’s contribution to the total budget is usually calculated as a proportion of its gross domestic product.

Federal funding of ERI system for 2017–2020 in CHF million



Source: ERI Dispatch 2017–2020, Federal Council 2016

Federal ERI funding objectives for 2017–2020

Generally speaking, the Confederation has permanent tasks in this policy area. Concrete implementation takes place during four-year planning periods, which include specific objectives and corresponding measures to be taken. ERI policy for 2017–2020 is based on the motto “Switzerland will remain a leader in education, research and innovation.” Among other things, this requires pursuit of the following objectives, aimed at improving the system:

- Maintaining favourable general conditions enabling service providers to develop the VPET system further so that it is can be readily adapted to future needs.
- Further development of international cooperation activities in topics, fields and regions that are strategically important for Switzerland.
- Reinforcing and expanding public-private partnerships.

Continuity and targeted priorities for 2017–2020

Thanks to past expenditure and current policy measures, the performance capacity of the ERI system is currently high overall. In this context, the guideline for the budgetary period 2017–2020 is “Continuity with targeted expansion”. Here, “continuity” means that future ERI policy measures will also be based on the same principles that have guided the Confederation for many years already:

Cooperative federalism

The Confederation will carry out the tasks assigned to it in a complementary fashion to those of the cantons and will remain consistently focussed on the big picture.

Autonomy

The Confederation will ensure that higher education institutions, researchers and research funding institutions enjoy a high level of autonomy with each taking individual responsibility for achieving success together. The policy measure here is to ensure the competitive use of federal funding and – where possible – the delegation of funding activities at an institutional level (ETH Board or ETH Domain, Swiss National Science Foundation, Swiss Academies of Arts and Sciences, etc.)

A diverse and permeable education system

The Confederation will strive to maintain a high-quality education system that offers general education and vocational education and training at upper-secondary level and professional education and higher education at tertiary level. The various education and training pathways must be of equal value, offer similar career prospects and enable seamless transitions from one pathway to another as well as the opportunity to pursue a combination of different forms of education and training.

International ties

The Confederation will seek to achieve ideal conditions enabling Swiss education and research actors to pursue co-operation at international level. The decisive factor is that Switzerland must be able to continue to actively and openly engage in the exchange of knowledge and people across national borders, as has always been the case previously.

In terms of ‘targeted future development’ of the system, the following four priorities have been set for 2017–2020:

Strengthen the professional education sector

Thanks to tertiary-level professional education, Switzerland has a successful model enabling professionals to pursue advanced levels of training outside of the Swiss higher education sector. The purpose of professional education is to impart competences that enable qualification holders to take on challenging managerial and technical tasks in their field. The adoption of new rules and the introduction of subsidies for preparatory courses for federal professional examinations are aimed at further strengthening the Swiss professional education sector. A total of CHF 365 million (2017–2020) has been set aside for direct federal subsidies to be paid to individuals who complete eligible preparatory courses for these examinations.

Support academic careers for the next generation of teachers and researchers

Highly qualified academic staff are essential in preserving Switzerland’s international competitiveness as a location for higher education and research. For this reason, the Confederation will provide funding to cantonal universities to adjust their tenure tracks for young people wishing to pursue academic careers. The Confederation has allocated CHF 34 million over the 2017–2020 budgetary period in support of two projects in support of academic careers for the next generation of teachers and researchers. In addition, specific measures will be taken to help young researchers (e.g. research professors) under the career support programme of the Swiss National Science Foundation.

Pursue special programme for human medicine

The medical schools at the universities of Basel, Fribourg, Geneva, Lausanne and Zurich, respectively have recently expanded their student enrolment capacities in human medicine. Nevertheless, the demand for doctors can only be covered through recruitment of individuals who obtained their training in human medicine from outside of Switzerland. In order to reduce this reliance on foreign workers while at the same time cover Switzerland’s health needs, the Confederation intends to spend CHF 100 million over the 2017–2020 budgetary period. The special programme to increase the number of holders of qualifications in human medicine is intended to accelerate expansion of capacity at cantonal universities and reach the level of 1,350 qualifications per year by 2025. This about 50% higher than current levels. In

order to reach this objective, the universities of St. Gallen, Lucerne and Lugano as well as both federal institutes of technology (ETHZ and EPFL) will launch degree programmes in human medicine.

Take measures to maintain the innovative capacity of the private sector

Within the context of increasing digitalisation, maintaining the innovation capacity of the Swiss private sector with respect to that of other countries is a major challenge. The Confederation intends to do its part in helping the private sector by implementing long-term structural measures and continuing to allocate considerable sums to fundamental research. At the same time, the Confederation will increase the budget of Innosuisse from around CHF 600 million (2013–2016) to around CHF 800 million for the budgetary period 2017–2020. The Swiss National Science Foundation (SNSF) and Innosuisse will also be given a federal mandate for the joint 'Bridge' programme, which is aimed at accelerating the transfer of research findings and applications across the entire value chain, from fundamental research to market-oriented innovation.



At a care home for the elderly in Worb outside Bern, a trainee care specialist helps one of the residents. In Switzerland, around 230 vocational education and training programmes help people enter the labour market and provide them with a solid foundation allowing them to thrive in their chosen career.

SWISS VPET SYSTEM

Upper-secondary level vocational education and training (VET) is the most important form of post-compulsory education in Switzerland. VET programmes provide many young people with their first exposure to working life and provides the Swiss economy with the next generation of skilled workers and managers. Maintaining the VPET system is a shared undertaking of the Confederation, the cantons and professional organisations.

The cantons provide most of the public funding allocated to the VPET system. For its part, the Confederation provides one-fourth of public funding for the VPET system, in accordance with the provisions of the Vocational and Professional Education and Training Act (VPETA). Since 2008, most federal subsidies to the cantons are performance-based and paid out on a lump-sum basis.

Objectives and measures for 2017–2020

Improving efficiency and effectiveness

several measures will be implemented to achieve this objective. For example, the support programme for research in vocational education and training will be continued, with research more heavily oriented towards providing policy-makers and practitioners with actionable findings. At the same time, efforts will be made to institutionally anchor this research field in Swiss higher education institutions. The positioning of the Swiss Federal Institute for Vocational Education and Training (SFIVET) as the expert organisation in this field will also be reinforced. Other measures relate to vocational, educational and career guidance, the balancing of supply and demand on the apprenticeship market and further increases in the proportion of people obtaining upper-secondary level qualifications.

Helping to cover shortages of skilled workers

In 2011, the Skilled Workers Initiative was launched to address issues arising from demographic change. This initiative is intended to tap the potential of Switzerland’s domestic labour force more effectively. The ERI Dispatch for 2017–2020 provides for the following measures for Switzerland’s VET sector: steadily increasing training capacities in the field of health; promoting the federal vocational baccalaureate as an important instrument of permeability within the Swiss education system; and improving the conditions enabling adults to obtain vocational qualifications and change occupations.

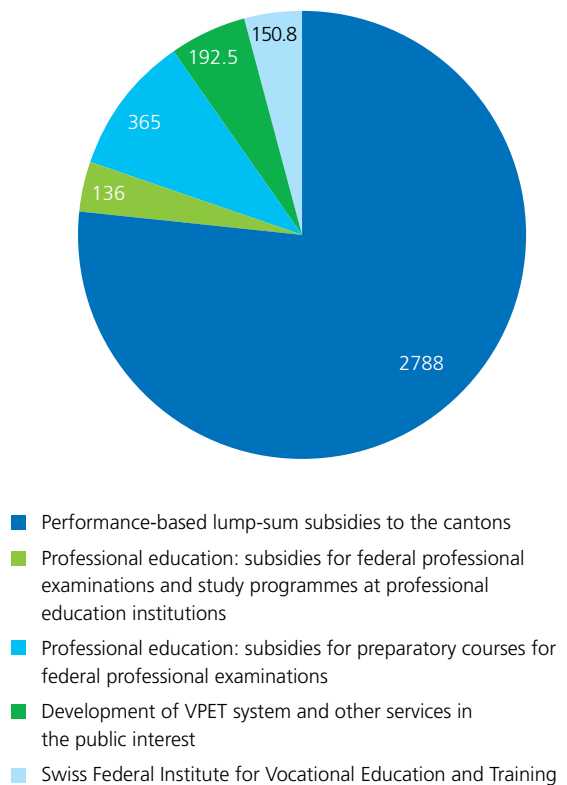
Strengthening Switzerland’s professional education sector

the national and international positioning of the professional education sector will be improved. In addition, a new system of direct personal subsidies will be introduced to enable individuals to attend preparatory courses for federal professional examinations. These subsidies will be paid by the Confederation.

Strengthen international cooperation

The Confederation will continue to give importance to creating and optimising the general conditions for international exchange and mobility programmes in the area of vocational education training. Successful Swiss participation in international skills competitions (e.g. WorldSkills competition) will continue. Various measures (e.g. exchange of experiences with foreign partners) will be taken to transfer Swiss VET expertise and intensify international cooperation in consultation with all three of the main partners within the Swiss VPET system (i.e. the Confederation, the cantons and professional organisations). Proven cross-cutting measures such as the deepening and institutionalisation of cooperation and coordination with countries with dual-track VET systems will be developed as needs arise. Swiss membership in VET-relevant international organisations (e.g. Organisation for Economic Cooperation and Development, OECD) and participation in European-level bodies will also continue. Coordination across multiple policy areas with other federal agencies involved in international cooperation in VET will also be deepened.

Federal budget for Swiss VPET system in 2017–2020: CHF 3.632 billion



Source: ERI Dispatch 2017–2020, Federal Council 2016



The Confederation encourages adults to acquire and maintain basic skills, by providing grants to continuing education organisations, for example. The “reading and writing for adults” association in Bern offers reading and writing courses at various levels, as well as courses in maths and computer applications.

CONTINUING EDUCATION AND TRAINING

The Confederation and the cantons have established the joint objective of more effectively tapping the full potential of the Swiss education system. The Continuing Education and Training Act (CETA), which came into effect in 2017, forms the starting point for this endeavour. Continuing education and training is an important pursuit for individuals, society and the economy. The increasing pace of social and economic changes requires a constant effort to adapt and expand one's competences and knowledge. Continuing education and training as a concept includes structured syllabus-based forms of learning as well as less structured learning-teaching settings.

In Switzerland, many people pursue continuing education and training. However, access to courses can sometimes be difficult for certain groups of people, e.g. adults who lack basic reading, writing and verbal skills in a national language of Switzerland as well as mathematics skills and ICT skills. The cantons that take measures to remedy this situation qualify for a federal subsidy under CETA.

Federal budget for continuing education and training in 2017–2020: CHF 26 million



Switzerland participates in the European Union's Erasmus+ exchange and mobility programmes with third country status. Annemarie Sauter, a primary school teacher from Basel, learned about new educational approaches and school systems at exchange programmes in Bobigny/Paris (FR) and Hastings (UK) and now incorporates her new experiences in her classes.

EXCHANGE AND MOBILITY

International cooperation in education is growing at a fast pace. A characteristic feature of the exchange of people and ideas at the start of the 21st century is the fact that these processes take place at different levels. People of all ages and education institutions at all levels have access to a wide range of different options for international cooperation in education. These options are constantly being expanded and developed further.

EU education programmes

The Confederation supports international mobility as part of coordinated federal and cantonal education policy. For this reason, it has carefully aligned its support policies with EU education programmes over the past twenty years. Switzerland takes part as a third country in the EU's 2014–2020 Erasmus+ programme and therefore provides funding to enable Swiss nationals to pursue education and training abroad and foreign nationals to do the same in Switzerland.

The various activities and options under the Erasmus+ programme are available to all institutions at all levels within the formal education system and non-formal learning sector. The main focus of funding is to facilitate learning mobility. Learners may spend time abroad to study, undergo training or improve their skills and teachers can teach abroad for a certain period of time. There are also exchange activities for young people. Successful formats include: stays to study at a partner institution; learning, training and working at companies; doing volunteer work; group exchanges of young people; training and teaching at partner institutions in the EU.

The aim is to encourage a large number of Swiss nationals to become more internationally mobile and to improve their skills. At the same time, the aim is to improve international net-working of the Swiss education landscape.

The Confederation and the cantons established a national agency, the Swiss Foundation for the Promotion of Exchanges and Mobility (SFAM, also called Movetia), to coordinate implementation of corresponding support measures.

Federal budget for Swiss participation in EU education programme Erasmus+ 2017–2020: CHF 150 million

International cooperation in education

Switzerland's international cooperation in education activities have long been characterised by intensive bilateral contacts. In addition, multilateral cooperation also plays a particularly important role. Examples worth mentioning include UNESCO and the education-related activities of the Council of Europe. Both organisations serve as forums for international discussions on education issues and springboards for support initiatives and projects that provide valuable stimulus for international cooperation in education. The OECD is another important player in education policymaking activities, particularly drawing attention to new issues, carrying out analysis of skills formation systems in different countries and producing comparative best practices guidelines to foster discussion of education-related topics among its members. The activities of the OECD are therefore important to Switzerland's international cooperation activities in education, research and innovation.

The Confederation gives increasing importance to international cooperation in education in general. Priority areas for support include bilateral cooperation initiatives to support young researchers, transfer knowledge and stimulate innovation capacity and creativity. Here, the Confederation provides subsidiary support to projects aimed at building and sharing expertise and maintaining scientific excellence. Various partners who have qualified for subsidies include the Association of Swiss Scientific Olympiads, the Swiss Study Foundation, the Swiss Young Researchers Association and the Berlin Institute for Advanced Study and affiliated Institutes for Advanced Study in Bucharest and Sofia.

Federal budget for international cooperation in education in 2017–2020: CHF 24 million.

Scholarships for foreign students

As part of international cooperation in education and foreign science policy, the Swiss Confederation has been awarding government excellence scholarships for foreign scholars and artists. These one-year scholarships are intended to promote international exchange and research cooperation between Switzerland and over 180 other countries. Recipients are selected by the awarding body, the Federal Commission for Scholarships for Foreign Students (FCS). Each year, around 300 scholarships are awarded on the basis of excellence criteria.

Federal budget for scholarships for foreign students in 2017–2020: CHF 40 million



The Confederation and the cantons work together to ensure that Switzerland's education system is of high quality, flexible and facilitates mobility. Common objectives, agreements, planning and development work serve to improve how the education system is managed. Part of that involves the international PISA tests carried under the framework of the Organization for Economic Cooperation and Development (OECD) designed to test young people's skills.

FEDERAL-CANTONAL COOPERATION IN EDUCATION

In federalist Switzerland, the Confederation and the cantons have different areas of authority within the Swiss education system. The decisions made at one policymaking level often have an impact on other education levels and thus on the entire education system as a whole. The Federal Constitution requires the Confederation and the cantons to coordinate their efforts and work together through joint bodies.

Monitoring education

The Confederation and the cantons have launched a joint programme to establish and develop various activities. This includes a national system to monitor education and draft a corresponding report entitled, “The Swiss Education Report”, which is published at four-year intervals. In 2018, this report will be produced for the third time since its inception. Activities also include reporting of scholastic achievement of young people as part of the EU’s “Programme for International Student Assessment” (PISA), maintenance of the Swiss education server educa.ch and measures to ensure the quality of upper-secondary level education. The Cooperation in Education Act (CEdA), which came into effect in 2017, forms the legal basis for federal subsidies to co-fund these ongoing activities.


Federal budget for federal-cantonal cooperation in education in 2017–2020: CHF 22 million

Scholarships for local students

Persons undergoing education and training in Switzerland may apply for scholarships or student loans. Each canton is responsible for deciding financial aid provisions within its territory. The Confederation provides a lump-sum financial aid subsidy to the cantons to help cover the costs of student enrolment in tertiary-level education (i.e. higher education and professional education). In an effort to harmonise financial aid criteria, many cantons have signed the Intercantonal Agreement on Financial Aid (ICA-FA).

Under the new Education Subsidies Act that came into effect in 2016, the federal financial aid subsidy will only be paid to cantons that have adopted relevant ICA-FA harmonisation provisions.

Federal budget for scholarships for local students in 2017–2020: CHF 102 million

A young woman with her hair in a bun, wearing a maroon top and white pants, is kneeling on a wooden platform. She is using a fine brush to paint a section of a large mural on a wall. The mural depicts a man in a boat, with his hands bound. The scene is set in a church, with ornate architectural details visible in the background. A metal scaffolding pole is visible to the right of the woman. In the foreground, there is a white tray with various paint colors and a small container of water.

Switzerland's higher education sector offers a comprehensive and varied range of study programmes. Caterina Riva is a student on the Master's programme in conservation and restoration at the Scuola universitaria professionale della Svizzera italiana (SUPSI), which trains students in the restoration of murals, stucco and stone surfaces. Here she is working on the 'Pesca Miracolosa' in the church of Santa Maria del Sasso in Morcote (Ticino).

HIGHER EDUCATION INSTITUTIONS

The Swiss higher education landscape offers a complete and diversified range of study options. At tier-one universities, emphasis is placed primarily on academic teaching and fundamental research. Tier-one universities include ten cantonal universities and two federal institutes of technology (ETHZ and EPFL). There are also seven public universities of applied sciences, which offer mainly practical teaching and applied research. Finally, there are fourteen universities of teacher education whose task is to train an adequate number of teachers for primary all the way to upper-secondary level.

The structure of the Swiss higher education sector is mainly determined by two bodies: the Swiss Conference of Higher Education Institutions and the Swiss Conference of Rectors of Higher Education Institutions (swissuniversities).

The Swiss Conference of Higher Education Institutions is the highest policymaking body within the Swiss higher education sector. It coordinates the activities of the Confederation and the cantons in matters pertaining to higher education. It has legislative powers and issues recommendations and opinions. The Confederation chairs this body and handles its day-to-day business.

The Swiss Conference of Rectors of Higher Education Institutions (swissuniversities) is comprised of the rectors or presidents of tier-one universities, universities of applied sciences and universities of teacher education. swissuniversities seeks to deepen and further develop cooperation between Swiss higher education institutions and achieve a common voice within the Swiss higher education sector. In addition, swissuniversities also carries out coordination tasks and represents the entire Swiss higher education sector at international level.

ETH Domain

The ETH Domain is managed by the Confederation. It is comprised of two federal institutes of technology (ETHZ and EPFL) as well as four research institutes: Paul Scherrer Institute (PSI), Swiss Federal Institute for Forest, Snow and Landscape Research (WSL), Swiss Federal Institute for Materials Testing and Research (EMPA) and the Swiss Federal Institute of Aquatic Science and Technology (Eawag). The ETH Board is the strategic management and supervisory body of the ETH Domain. Among other things, it is responsible for reaching the strategic objectives established by the Federal Council.

Objectives and measures for 2017–2020

Developing teaching activities further

Both federal institutes of technology will use new research findings to update their syllabuses and establish new study programmes.

Include promising research fields and maintain modern research infrastructures

With research in the service of society, the ETH Domain greatly helps to overcome current and future societal challenges. New and promising research fields are added on a continuous basis. The ETH Domain will continue to run and upgrade modern research infrastructures, which will be available to the entire research community. This will enable outstanding technology-based research to be conducted in the fields of natural science and engineering.

Encourage knowledge and technology transfer (KTT)

The ETH Domain will build its position as a key academic partner for Swiss and international companies as well as for the public sector. The training provided within the ETH Domain will include both KTT competences and entrepreneurial know-how.

Strengthen national cooperation and coordination

In order to create research synergies, alliances will be established, reinforced and continued with selected national technology competence centres and research institutions.

Strive for international positioning and cooperation

In order for Switzerland to hold on to its leading international position and expand its international networking ties with the world's best institutions, favourable conditions need to remain in place. Among other things, this includes the possibility of recruiting talented researchers regardless of their country of origin.

Provide services to society

The mandate of the ETH Domain is to ensure the sustainable development of society, the economy and the environment. It is also responsible for other national tasks such as the Swiss Seismological Service (SED) and the Swiss Economic Institute (KOF) at the ETH Zurich, the WSL Institute for Snow and Avalanche Research or pioneering proton therapy used at the PSI to treat cancer patients.

Cantonal universities and universities of applied sciences

The Higher Education Act (HEdA) establishes uniform principles for the awarding of federal funding to cantonal universities and universities of applied sciences.

Objectives and measures for 2017–2020: cantonal universities

Offer young researchers viable career prospects

Various measures are intended to help make academic careers a more viable option for young researchers in Switzerland. These measures include mobility programmes at PhD level and the creation of new jobs for young researchers.

Expand training capacities in the field of human medicine

In recent years, Switzerland has not trained an adequate number of doctors, which has increased its reliance on foreign-trained ones. The special programme to increase the number of holders of Swiss qualifications in human medicine should lead to nearly a two-fold increase, from around 850 per year (2016) to about 1,350 (2025).

Improve the quality of teaching and mobility

With the development of digitalisation and changing living conditions of students, universities require innovative didactic methods. In addition, they seek to encourage mobility between and within higher education institutions. Specific information and advisory services will be developed for this purpose.

Improve cooperation within the Swiss higher education sector

Federal funding will be provided for specific initiatives that benefit the Swiss higher education sector as a whole. These include the following: “Scientific information: access, processing and storage”, “Strategy to reduce shortages of skilled workers in the healthcare field”, “Equal opportunities and academic career prospects”, “Development of scientific competences in vocational didactics” and the Swiss Centre for Islam and Society (University of Fribourg).

Objectives and measures for 2017–2020: universities of applied sciences

Continuously improve the quality of teaching

Various measures will be taken to continuously improve the quality of teaching. These include the creation of flexible learning environments, cooperation initiatives between higher education institutions and the private sector as well as extracurricular activities. The ongoing adaptation of syllabuses will take place in response to the needs of the labour market.

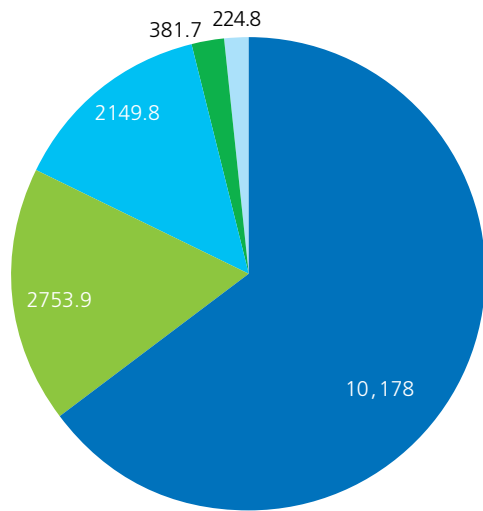
Secure long-term funding for applied research

Universities of applied sciences will pursue applied research and seek to encourage the transfer of knowledge and technology between researchers and companies. Research funding at universities of applied sciences has thus far come mostly from third party sources and have depended on the usability of research findings for third parties. This funding should be made more secure in the future.

Support young researchers at universities of applied sciences

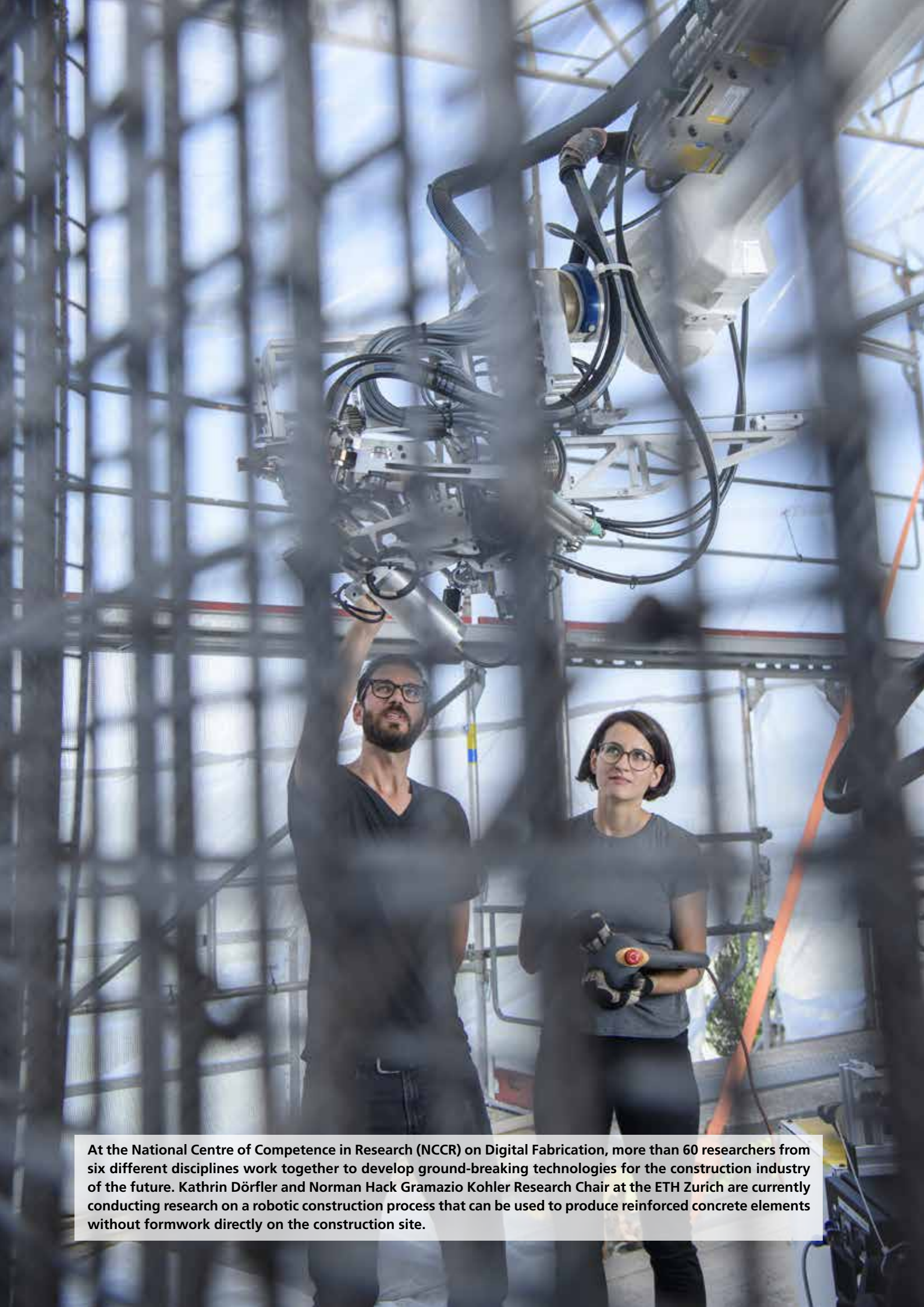
UAS-specific career pathways will be developed along with programmes designed specifically for universities of applied sciences. In this manner, the dual perspectives of professional and academic qualifications will be more adequately reflected.

**Federal budget for higher education institutions
in 2017–2020: CHF 15,688 million**



- ETH Domain
- Operating subsidies to cantonal universities
- Operating subsidies to UAS
- Building subsidies
- Project subsidies

Source: ERI Dispatch 2017–2020, Federal Council 2016



At the National Centre of Competence in Research (NCCR) on Digital Fabrication, more than 60 researchers from six different disciplines work together to develop ground-breaking technologies for the construction industry of the future. Kathrin Dörfler and Norman Hack Gramazio Kohler Research Chair at the ETH Zurich are currently conducting research on a robotic construction process that can be used to produce reinforced concrete elements without formwork directly on the construction site.

RESEARCH AND INNOVATION AT NATIONAL LEVEL

Switzerland is very competitive in the area of research and innovation. It is among the countries with the highest R&D to GDP ratios. The private sector accounts for two-thirds of total Swiss R&D expenditure. The public sector (the Confederation and cantons) awards research funding primarily on a competitive basis and at the initiative of individual researchers. Steps are also taken to ensure ideal conditions for international cooperation.

Under the Research and Innovation Promotion Act (RIPA), the Confederation is responsible for providing support for research and innovation. It does this through two research-funding institutions: the Swiss National Science Foundation (SNSF) and Innosuisse. The Confederation also provides funding for the Swiss Academies of Arts and Sciences and supports just under 30 research facilities outside of the higher education sector. Federal policy research also produces important scientific findings. This research is either conducted by the Federal Administration directly or is entrusted to higher education institutions and private companies.

Basic research

The Confederation supports free basic research, particularly through the provision of funding to the Swiss National Science Foundation (SNSF). It manages the SNSF through performance agreements and establishes a corresponding budget that the SNSF is free to use for its research funding activities

The SNSF is responsible for funding scientific research in all disciplines, supporting young researchers and conducting national research programmes (NRPs) and national centres of competence in research (NCCRs). In addition, the SNSF also plays an active role in shaping Swiss international research activities.

The SNSF was established as a private law foundation in 1952. The Foundation Council is the highest body of the SNSF and makes strategic decisions. It ensures that the Foundation stays on mission, defines the position of the SNSF on research policy issues and produces planning documents. The National Research Council is responsible for evaluating applications for research funding. It is comprised of distinguished researchers who mostly work at Swiss higher education institutions. In addition, the SNSF has established research commissions at Swiss higher education institutions.

These research commissions act as a link between the higher education institutions and the SNSF. The SNSF secretariat is called 'Administrative Office'. The role of this body is to coordinate and support the activities of the Foundation Council, the National Research Council and the Research Commissions.

National research programmes

National research programmes (NRPs) produce knowledge that can be used to understand and address current issues affecting society and the economy. NRPs are created for a period of around five years. A bottom-up process is used to select NRP research topics, whereby interested parties submit project outlines. Following a feasibility study by the SNSF, the Federal Council periodically decides which topics to pursue as NRPs and then tasks the SNSF with implementation.

National centres of competence in research

National centres of competence in research (NCCRs) focus on areas deemed strategically important for Switzerland. They are more long-term in nature and are more firmly anchored in the research landscape. NCCRs are institutionally supported research projects of national importance that pursue research in a clearly delineated thematic area. In addition to research groups in a home institution, NCCRs also maintain a network in which other teams from all over Switzerland interact with one another. The decision to launch a new NCCR is made by the Confederation, with the SNSF acting as the implementing and supervisory body.

Objectives and measures for 2017–2020

Award project funding on a competitive basis

Project funding is a key instrument of the SNSF, enabling researchers to apply for funding of any project they like, in any scientific discipline. Approved research projects are mainly intended to produce fundamental knowledge in a given field, not to develop directly applicable solutions to problems or to create marketable products. This successful funding practice will be continued in 2017–2020.

Provide greater support for young researchers

Each higher education institution has a basic mandate to provide support to young researchers and also has a vested interest in doing so. The SNSF supports these efforts both through general project funding and a specific set of measures to encourage academic careers.

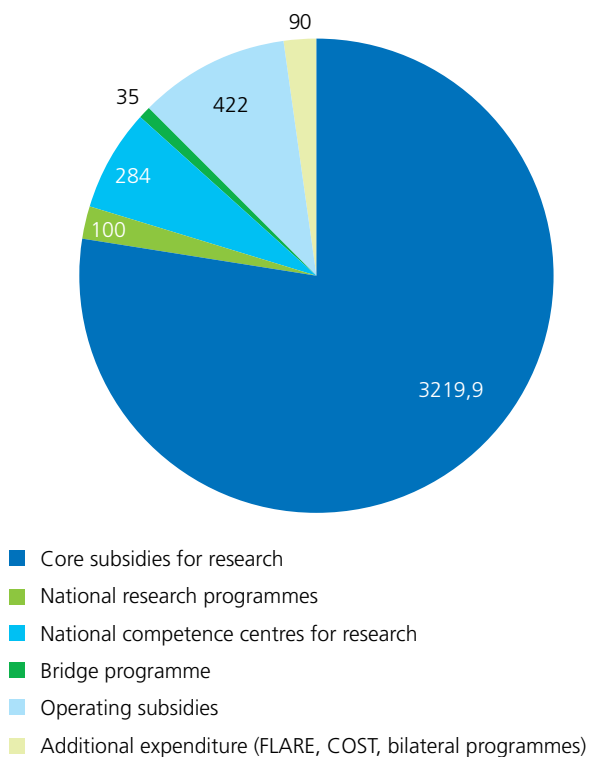
With project funding, support is provided in the form of research positions for talented PhD students or postdoctoral students. These positions are created as part of SNSF-funded research projects, through foreign scholarships, or SNSF research projects.

In the area of career support, the SNSF supports particularly promising dissertations as well as talented young scholars working either as research assistants and assistant professors.

Intensify cooperation between Innosuisse and SNSF

The Bridge Programme is a special initiative launched by Innosuisse and SNSF to reach this objective (see 'Innovation support'). In addition, when certain topics overlap, Innosuisse and SNSF may also work closely together in national research programmes (NRPs).

Federal budget for national research and innovation in 2017–2020: CHF 4,151 million



Source: ERI Dispatch 2017–2020, Federal Council 2016

Support for innovation

Innosuisse is the federal competence centre for the promotion of science-based innovation in all disciplines covered by research facilities within the Swiss higher education sector. In keeping with the objectives set forth in the Federal Constitution and established by the Federal Council, Innosuisse is free to decide how best to use its budget in support of innovation projects and other support measures. Innosuisse is comprised of representatives of the research and business community and in isolated cases, representatives of public institutions. Innosuisse is structured into several divisions, each with their own decision-making powers, and is coordinated by a secretariat. The president and head of the secretariat are appointed by the Federal Council. Under the action plan 'Swiss Coordinated Energy Research', Innosuisse also has a mandate to develop and support an inter-university network of Swiss Competence Centres for Energy Research (SCCER) and fund innovation projects in the field of energy.

Objectives and measures for 2017–2020

Continue successful support mechanisms and add specific development priorities: support for R&D

Projects will remain an important area of focus for Innosuisse innovation support. Innosuisse may also provide support to socially relevant science-based innovation in the services sector.

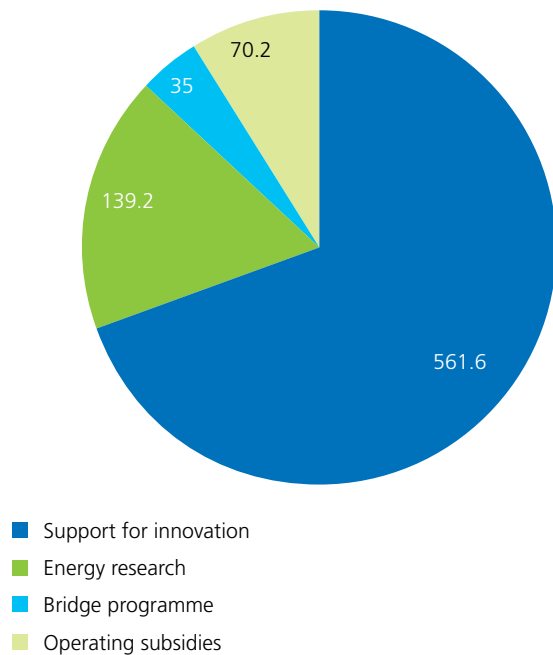
Intensify knowledge and technology transfer in innovation support activities

The Bridge programme pursued jointly by SNSF and Innosuisse is intended to enable research and innovation activities to be increasingly carried out as part of the entire value chain, from fundamental research and applied research all the way to market-based innovations. The Bridge programme focuses on two areas of support: young researchers, who wish to tap on the application potential of their research findings and pursue careers outside of the higher education sector. Here, support mainly relates to 'proof of concept studies'. Secondly, support is given to 'precompetitive projects' for individual applicants, interdisciplinary research teams and small consortia that have already carried out excellent-quality fundamental research from day one and that intend to use their research findings to develop a market-based innovation.

Continue support for energy research

Innosuisse will continue support for existing SCCER research groups for an additional four years and use project funding specifically set aside for energy research.

**Federal budget for Innosuisse in 2017–2020:
CHF 806 million**



Source: ERI Dispatch 2017–2020, Federal Council 2016

Swiss Academies of Arts and Sciences

The Swiss Academies of Arts and Sciences include six member bodies (four academies and two competence centres): the Swiss Academy of Sciences (SCNAT), Swiss Academy of Humanities and Social Sciences (SAHS), Swiss Academy of Medical Sciences (SAMS) and the Swiss Academy of Engineering Sciences (SATW), the Centre for Technology Assessment (TA-SWISS) and the Science et Cité Foundation. TA-SWISS carries out technology assessments for the purpose of ascertaining the consequences of new technologies and the Science et Cité Foundation supports dialogue between science and society.

The Swiss Academies of Arts and Sciences has a scientific network of 100,000 people. This is organised according to a “militia”-type system, which is comprised of around 160 professional societies, 100 standing committees and 30 cantonal associations.

The Swiss Academies of Arts and Sciences strive for and encourage early recognition in socially relevant areas such as education, research and innovation. They also seek to achieve greater awareness and understanding of ethically responsible approaches to gathering and using research findings. Their remit also includes the promotion of dialogue between science and society.

Objectives and measures for 2017–2020

Generate executive summaries for decision-makers

In each thematic area of research (e.g. education and the next generation of skilled workers, management of natural resources, changing health system, scientific culture), the Swiss Academies of Arts and Sciences will act as an expert body to provide executive summaries of research findings for decision-makers. At the same time, it will propose corresponding action steps.

Support for young researchers in science, technology, engineering and mathematics (STEM)

The successful work done so far by the Swiss Academy of Sciences (SCNAT) and the Swiss Academy of Engineering Sciences (SATW) in the area of support to young researchers the fields of science, technology, engineering and mathematics (STEM) will be continued. Among other things, this includes preparation of information and support for development of teaching materials. These measures are specifically intended to make children and young people more aware of these fields and encourage them to study them.

Coordinate the national support initiative “personalised medicine”

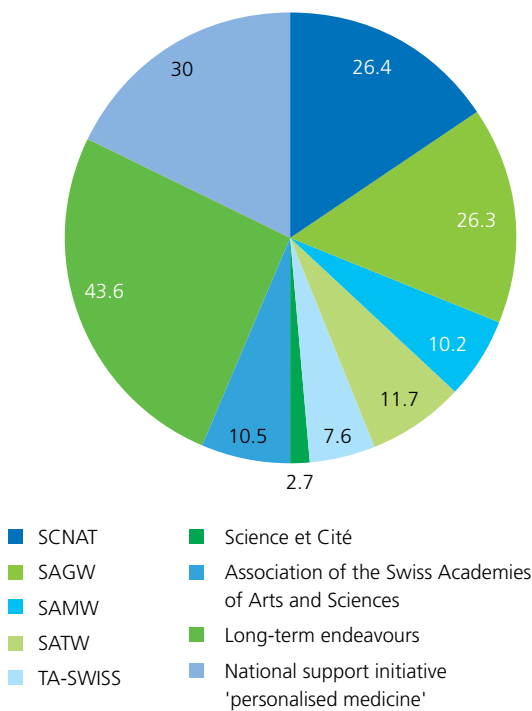
The Swiss Academy of Medical Sciences (SAMS) is responsible for overall coordination of the national support initiative “personalised medicine”. Research in the area of personalised medicine is intended to use the results of fundamental research to develop clinical applications in the form of new medicines, optimisation of existing therapies or the diagnosis and treatment of rare diseases. Harmonising the structure of health records in Switzerland, how-ever, poses a considerable challenge, particularly in the area of collecting and preparing patient data and gathering basic biological data for research.

Maintain and operate the Information and Documentation Centre of the Swiss Historical Dictionary (HLS)

The HLS is a scientific reference work presenting the history of Switzerland from prehistory to the present time in an easy to understand format. It is the only scientific dictionary in the world that is produced simultaneously in three languages (German, French, Italian) both in hardcopy (from 2002–2014 in 13 volumes) and as an online database. Under the guidance of the Swiss Academy of Humanities and Social Sciences, the HLS editing team is responsible for the following: developing and providing Information about existing and new data and data collections of relevance to Swiss history; updating and revising existing articles; carrying out research monitoring tasks and preparing new research findings.

The Swiss Academies of Arts and Sciences are also responsible for managing editions such as the “National Dictionaries”, the “Swiss Political Data Yearbook” and the “Swiss Diplomatic Documents”. In addition, they also serve as coordination secretariats for international programmes.

Federal contribution for Swiss Academies of Arts and Sciences in 2017–2020: CHF 169 million



Source: ERI Dispatch 2017–2020, Federal Council 2016

Research institutes of national importance

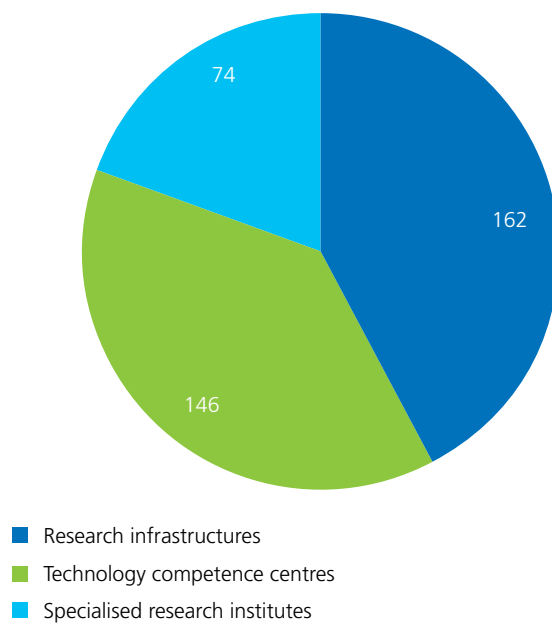
Federally funded national research facilities may be affiliated with the Swiss higher education sector or may be independent institutes. National research facilities fall into one of three categories:

- Research infrastructures render service to the research community by providing scientific information and documentation. This is achieved by gathering, collecting and analysing data and then making their work available to the research community. Examples include the Swiss Aesthetics Institute (Zurich) or the Swiss Institute of Bioinformatics (Lausanne).
- Highly specialised research institutes that hold a special niche within the Swiss research landscape. These institutes sign cooperation agreements with one or more cantonal universities or enter into strategic alliances with institutes within the ETH Domain. Examples include the IDIAP Research Institute in Martigny (specialised in artificial intelligence) and the Swiss Institute of Allergy and Asthma Research (SIAF) in Davos.
- Technology competence centres, which are intended to systematically bring researchers at higher education institutions and the private sector closer together. Technology

competence centres therefore work with institutions within the ETH Domain, cantonal universities and universities of applied sciences. At the same time, they support innovation projects with partners from the private sector. Examples include the Centre suisse d'électronique et de microtechnique (CSEM) in Neuchâtel and the Swiss Institute for Translational and Entrepreneurial Medicine (sitem-insel) in Bern.

Supported institutions help to create added value from scientific research and serve as a complement to the fundamental research activities carried out by higher education institutions. Requests for funding are subject to a review by the Swiss Science and Innovation Council (SSIC). Based on the SSIC recommendation and the budget appropriation bill approved by Parliament, the Federal Department of Economic Affairs, Education and Research decides how much federal funding is to be allocated, how long and under what conditions.

Federal budget for research institutes of national importance in 2017–2020: CHF 382 million



Source: ERI Dispatch 2017–2020, Federal Council 2016

Federal policy research

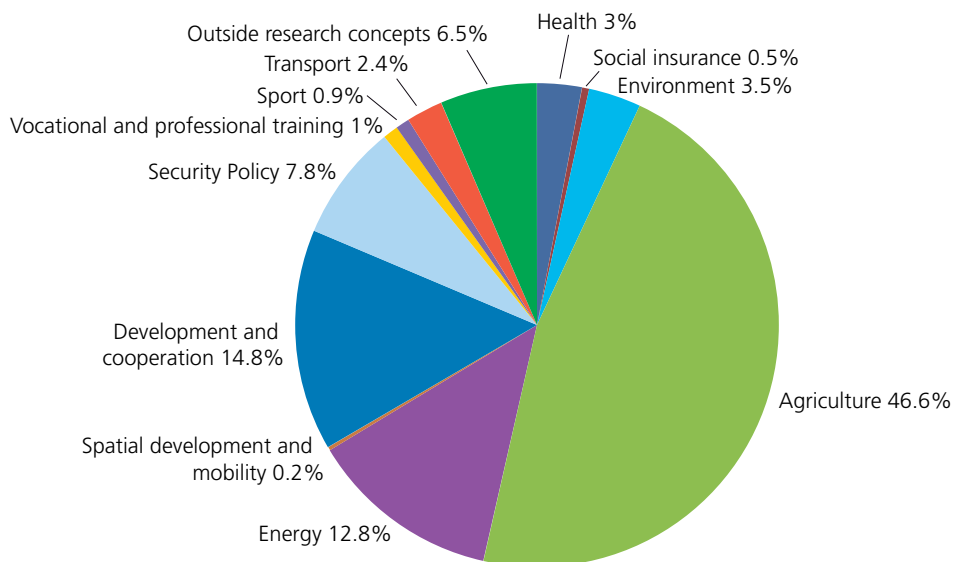
Federal policy research is scientific research carried out or commissioned by the federal administration for the purpose of gathering the data and information that it needs to carry out its tasks. Federal policy research addresses societal issues (e.g. research on the sustainable use and protection of natural resources in agriculture; research to develop innovative technologies in the energy sector; or research into the causes of disabling mental illness). Federal policy research tends to be targeted, practical and generally interdisciplinary in nature. It is intended to enable concrete solutions to be found quickly in complex circumstances.

Federal policy research is based on four-year research concepts, which are broken down into eleven policy areas for optimal coordination: Health, Social insurance, Environment, Agriculture, Energy, Sustainable spatial planning and mobility, Development and cooperation, Security and peace policy, VPET system, Sports and fitness, Sustainable transport.

At the international level, federal agencies carry out their federal policy research activities in international bodies and research programmes. In addition, funding is provided to international organisations and development programmes.

Federal budget for federal policy research in 2017–2020: CHF 1.160 billion

Federal policy research: proportion of funding by policy areas 2016



Source: www.ressortforschung.admin.ch



CERN, located on the Swiss-French border near Geneva, employs around 2,500 people, most of them engineers, who together with around 10,000 guest researchers from all over the world advance scientific knowledge in the field of nuclear and particle physics.

RESEARCH AND INNOVATION AT INTERNATIONAL LEVEL

The efforts of the Confederation to involve the Swiss research community in international cooperation endeavours began with the creation of the European Organization for Nuclear Research (CERN) in Geneva back in 1953. Over time, these efforts have become more important and consequently intensified. The networking of national research and innovation support activities at both the European and international level as well as the international opening and alignment of national programmes make these support activities all the more efficient. In addition, research questions beyond the research capacities of any single country can be more effectively addressed in this manner.

In the area of innovation support, the Confederation helps various Swiss actors such as universities of applied sciences and small- and medium-sized enterprises to take part in EU innovation-support programmes. This enables Swiss actors to pursue applied research endeavours with foreign partners aimed at developing innovative and competitive products and services.

Switzerland is also a member of various international research organisations and international research and innovation programmes, including EU framework research programmes. At the same time, the Confederation pursues bilateral research cooperation between Swiss actors and partners in selected priority countries.

Participation in international research organisations

International research organisations build and operate extremely powerful and, in some cases, unique research infrastructures. They are drivers of major scientific and technological progress. For this reason, the Swiss Confederation has signed international agreements on Swiss participation in international research organisations, which makes it easier for the Swiss research community to take part in international cooperation endeavours. Switzerland is currently a member of the following international research organisations:

- *European Organization for Nuclear Research (CERN)*
CERN brings European countries together for the purpose of conducting research in high-energy and particle physics. It maintains top-notch particle accelerator facilities.

- *European Molecular Biology Laboratory (EMBL) in Heidelberg, Germany.*
The EMBL offers research facilities that enable European countries to conduct fundamental research in the field of molecular biology. The EMBL also contributes to the ongoing development of top-notch instruments for broad-based research in biology.
- *European Southern Observatory (ESO) in Garching, Germany.*
The ESO builds, equips and operates astronomical observatories in Chile. It also supports and coordinates European research cooperation in the field of astronomy.
- *European Synchrotron Radiation Facility (ESRF) in Grenoble, France.*
The ESRF facility provides researchers with access to synchrotron radiation, which enables structural analysis in the fields of physics molecular biology and materials science as well as diagnoses and therapy the field of medicine.
- *Max von Laue–Paul Langevin Institute (ILL) in Grenoble, France.*
The ILL maintains a neutron source for research in the field of materials science, solid-state physics, chemistry, crystallography and molecular biology.
- *European x-ray free electron laser (European XFEL) in Hamburg, Germany.*
The European XFEL accelerates electrons to high energies to generate intense x-ray flashes that are bright enough to enable mapping of the atomic details of viruses or deciphering of the molecular composition of cells.
- *International Thermonuclear Experimental Reactor (ITER) in Cadarache, France.*
ITER is a project to build the world's largest experimental nuclear fusion reactor. Slated for completion in 2025, ITER is intended as the last major research step to demonstrate the feasibility of fusion nuclear power.
- *European Spallation Source (ESS) in Lund, Sweden.*
The ESS is a research facility currently under construction. Once completed, it will be the world's most powerful pulsed neutron source. It will enable scientists to see and understand basic atomic structures and forces at length and time scales unachievable at other spallation sources.

These are just a handful of examples of Swiss participation in international research organisations in the budgetary period 2017–2020, based on international agreements currently in force. In addition, over the period 2017–2020, Switzerland will consider taking part in four newly created international research organisations, including the Cherenkov Telescope Array (CTA), a worldwide project launched in 2010 to build a new generation ground-based gamma-ray instrument for astronomy research.

Federal budget for Swiss participation in international research organisations in 2017–2020: around CHF 320 million

Participation in international research and innovation programmes

Swiss membership in transnational and pan-European cooperation programmes also allows the Confederation to create optimal conditions for Swiss research and innovation actors.

The large-scale, multi-year research framework programmes (FRP) of the European Union

The large-scale, multi-year framework research programmes (FRP) are intended to support mostly cross-border research and innovation projects in areas of relevance to the whole of Europe that also help to strengthen European competitiveness. The eighth generation FP is called Horizon 2020. Covering the period from 2014 to 2020, Horizon 2020 has a (large) budget of around EUR 80 billion. Horizon 2020 combines all previous EU programmes and research and innovation initiatives under a single roof. FPs are funded partly by EU member states as well as by associated countries that enjoy all of the same participatory rights and obligations as EU member states. Switzerland was an associated country from 2004 to 2013. For the current FP8 (Horizon 2020, 2014–2020), Switzerland has been a full member since 2017.

Analysis of Switzerland's performance under FP7 (2007–2013) shows that researchers in Switzerland were very successful in competing for EU research grants: EU grants amounting to CHF 2.5 billion were awarded for just under 4,300 projects in which Swiss researchers took part. In this period, Switzerland was therefore the fourth most successful country in terms of secured funding for submitted project proposals. In that same period, Switzerland's contribution to the FP7 budget stood at around CHF 2.3 billion.

Federal budget for Swiss participation in Horizon 2020 in 2017–2020: nearly CHF 2.5 billion

European Cooperation in Science and Technology (COST)

European Cooperation in Science and Technology (COST) is an EU-funded programme that enables researchers to set up interdisciplinary research networks in Europe and beyond. Founded in 1971, COST is located in Brussels. COST activities take place in the form of "Actions" (i.e. networks where research activities pursued by at least five different COST countries may be coordinated).

COST Actions are initiated by means of a bottom-up process, which enables the free choice of research topics in all branches of science. The Swiss National Science Foundation (SNSF) is responsible for all COST-related financial, research and administrative matters.

Federal budget for COST in 2017–2020: CHF 24 million

International cooperation in innovation programmes

Switzerland takes part in international programmes that foster innovation cooperation such as EUREKA, Eurostars or Active and Assisted Living (AAL). In addition, innovation actors from Switzerland are also involved in ERA-NETs (coordination of national and regional research programmes) and have – thanks to full-fledged Swiss participation in Horizon 2020 – access to other market-oriented programmes such as the Electronic Components and Systems for European Leadership (ECSEL) initiative.

EUREKA and Eurostars are initiatives aimed at helping small- and medium-sized enterprises to carry out cross-border R&D projects and become a part of international value chains. Both initiatives are complementary to national innovation support and EU research framework programmes.

Under the European AAL programme, research facilities, companies and end user organisations develop technological solutions to help older people to determine their own lives, remain active and live self-sufficiently.

In the ECSEL technology initiative, national research funding institutions support EU projects in the field of nanoelectronics, system integration and smart systems.

Federal budget for international cooperation in innovation programmes in 2017–2020: CHF 61 million

Bilateral cooperation with priority countries outside of Europe

The programmes jointly launched by Switzerland and the corresponding governments of partner countries are intended to solidify bilateral cooperation and establish a sustainable research tradition. Since 2008, the Swiss Confederation has sought to establish cooperative ties with non-European countries that offer considerable scientific and technological development potential.

So far, Switzerland has signed bilateral cooperation agreements with seven non-European countries: Brazil, China, India, Russia, South Africa, Japan and South Korea. Cooperation initiatives are based on the principles of mutual interest in research fields and topics, scientific excellence and matching funds. Bilateral cooperation programmes will be continued in 2017–2020 under the same principles.

Federal budget for bilateral cooperation with non-European priority countries in 2017–2020: CHF 34 million

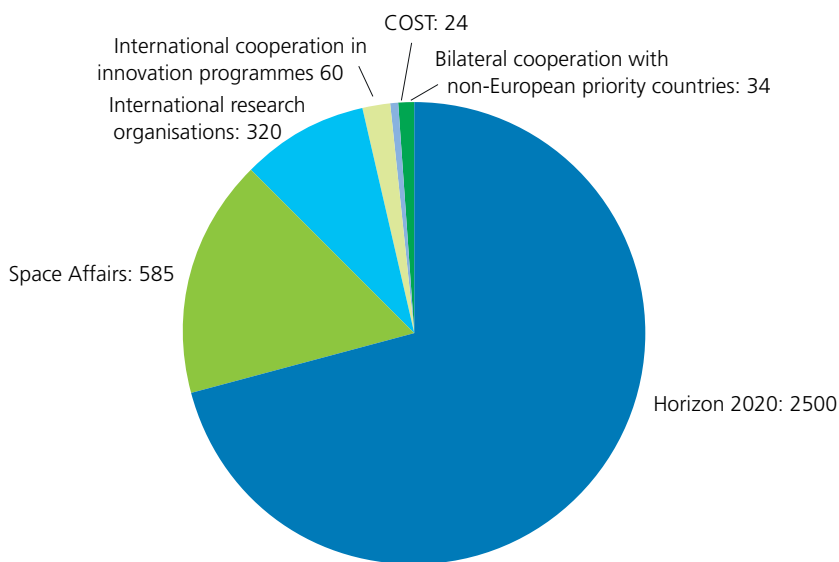
Space

Space technology helps scientists to gain a clearer understanding of the planet Earth and explore the universe. At the same time, it offers practical applications to our daily life: satellite communications, navigation systems for ground, maritime and air transport and Earth observation for weather forecasts are just a few examples. European countries pursue space technology primarily through programmes sponsored by the European Space Agency (ESA). Switzerland is a founding member of the ESA and is fully entitled to take part in all ESA programmes.

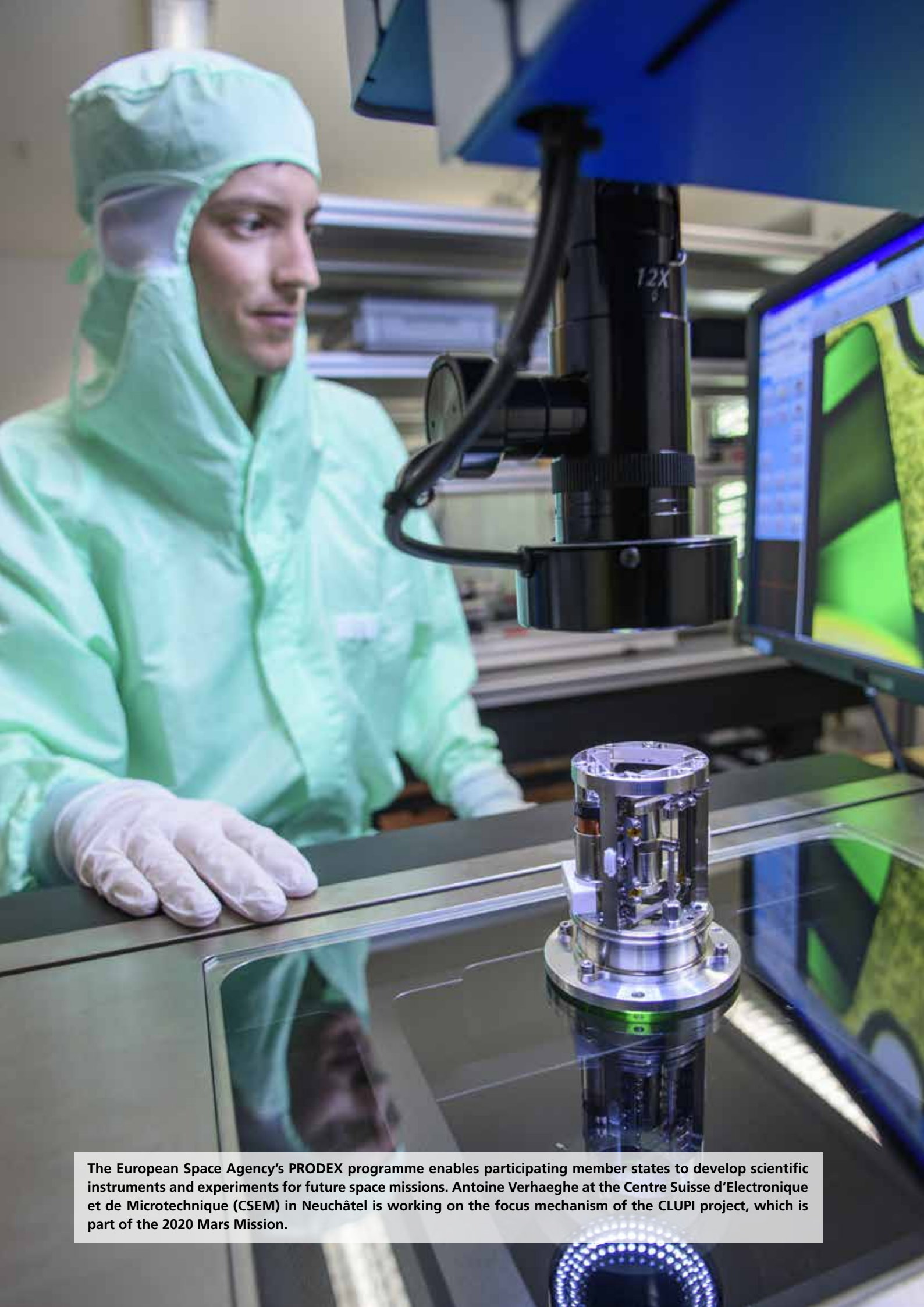
Swiss participation in the ESA provides Switzerland with a frame of reference that can be used to guide Swiss space policy in support of a full range of R&D activities in civilian aerospace. Complementary national activities also enable consolidated Swiss participation in European programmes.

Federal budget for Swiss cooperation in space in 2017–2020: CHF 585 million

Promotion of research and innovation at international level 2017–2020 in million CHF



Source: ERI Dispatch 2017–2020, Federal council 2016



The European Space Agency's PRODEX programme enables participating member states to develop scientific instruments and experiments for future space missions. Antoine Verhaeghe at the Centre Suisse d'Electronique et de Microtechnique (CSEM) in Neuchâtel is working on the focus mechanism of the CLUPI project, which is part of the 2020 Mars Mission.

LEGAL BASIS FOR FEDERAL ERI POLICY

Vocational and Professional Education and Training Act (VPETA)

The Vocational and Professional Education and Training Act (VPETA) covers: upper-secondary level vocational education and training (VET), which includes the federal vocational baccalaureate; tertiary-level professional education; job-related continuing education and training, qualification procedures, vocational and professional qualifications and their titles, training of vocational school teachers, workplace trainers, branch course instructors, examiners, teachers at professional education institutions; the responsibilities and guiding principles associated with the provision of vocational, educational and career guidance and federal subsidies to help cover the costs of the Swiss VPET system. This piece of legislation is based on the basic principle that responsibility for upper-secondary level vocational education and training (VET) and tertiary-level professional education shall be shared by the Confederation, the cantons and professional organisations. VPETA also legally anchors the federal remit to play an active role in the subsequent development of the Swiss VPET system, in ensuring equal opportunities for men and women as well as permeability between different education and training pathways. Moreover, the measures contained in VPETA must not create unfair competitive distortions affecting private providers on the education market. The measures taken by the Confederation must also be designed to provide the cantons and professional organisations with financial and other resources to encourage initiatives.

Continuing Education and Training Act (CETA)

The Continuing Education and Training Act (CETA) applies to the whole of Switzerland's non-formal continuing education and training sector (i.e. adult education for the acquisition of basic skills, job-related continuing education and training at professional education institutions and advanced studies programmes at higher education institutions). This piece of legislation is intended to strengthen the CET sector as an integral part of lifelong learning within the Swiss education system. CETA establishes the basic principles governing non-formal CET as well as the criteria that cantons must satisfy in order to qualify for federal subsidies. CETA also establishes the conditions enabling the Confederation to support research and development within the CET sector and encourage adult acquisition of basic skills. In this manner, CETA replaces already existing CET-related provisions found in federal and cantonal special-purpose legislation, thereby creating a framework and showing development prospects. The measures set forth in CETA are primarily focussed on systemic aspects. The only exceptions are specific provisions concerning adult acquisition of basic skills.

Cooperation in Education Act (CEdA)

The Confederation and the cantons share responsibility for ensuring the high quality and permeability of the Swiss education system, each within their respective areas of authority. They are required to coordinate their efforts and work together in joint bodies and other activities. The Cooperation in Education Act (CEdA) stipulates that the Confederation's coordination role shall be based on a cooperation agreement signed with the cantons. As a result, the Federal Department of Economic Affairs, Education and Research (EAER) and the Swiss Conference of Cantonal Ministers of Education formulate common objectives at four-year intervals. This helps to ensure coherent and forward-looking development of the Swiss education system.

Federal institutes of Technology Act (FIT Act)

The Federal institutes of Technology Act (FIT Act) applies to the Federal Institutes of Technology Domain (ETH Domain). The Federal Council also uses the FIT Act when establishing strategic objectives for the ETH Domain. For the budgetary period 2017–2020, the Federal Council has mainly asked the ETH Domain to preserve its leading international position in the area of research and to maintain its reputation for top-notch teaching that is both research-based and appealing to students.

Higher Education Act (HEdA)

The Higher Education Act (HEdA) is based on the following principle: The Confederation will work with the Cantons to coordinate, maintain the quality and ensure the competitiveness of the entire higher education sector in Switzerland. HEdA applies to both higher education institutions and other institutions within the higher education sector (e.g. Swiss Distance Learning University). This piece of legislation and associated agreements assign the areas of responsibility that may be transferred to joint federal-cantonal bodies. They also establish the organisational and procedural aspects of coordination within the Swiss higher education sector. Finally, HEdA implements the constitutional requirement that the Confederation apply uniform principles for the allocation of federal funding to cantonal universities and universities of applied sciences.

Art. 47 HEdA provides for three different types of federal subsidy: operating subsidies (referred to as 'basic contributions'), building subsidies (referred to as 'contributions to cover expenditure for construction and use of buildings') and project subsidies (referred to as 'project contributions'). The latter type of subsidy is used to finance cooperation and innovation projects of importance to the whole of Switzerland.

Research and Innovation Promotion Act (RIPA)

With the Research and Innovation Promotion Act (RIPA), the Confederation seeks to encourage scientific research and knowledge-based innovation. It also wishes to support efforts to assess research findings and transform them into marketable products and services. Finally, it seeks to encourage cooperation between research bodies. RIPA is intended to ensure that federal funding will have the most cost-efficient and effective impact on scientific research and knowledge-based innovation. It applies to research bodies whenever they use federal funding for research and innovation purposes. Under RIPA, the Confederation is responsible for providing the necessary financial resources to Switzerland's two federal research and innovation-funding institutions, namely: the Swiss National Science Foundation (SNSF) and Innosuisse (formerly the commission for technology and innovation), the Swiss Academies of Arts and Sciences and Research institutes of national importance.

