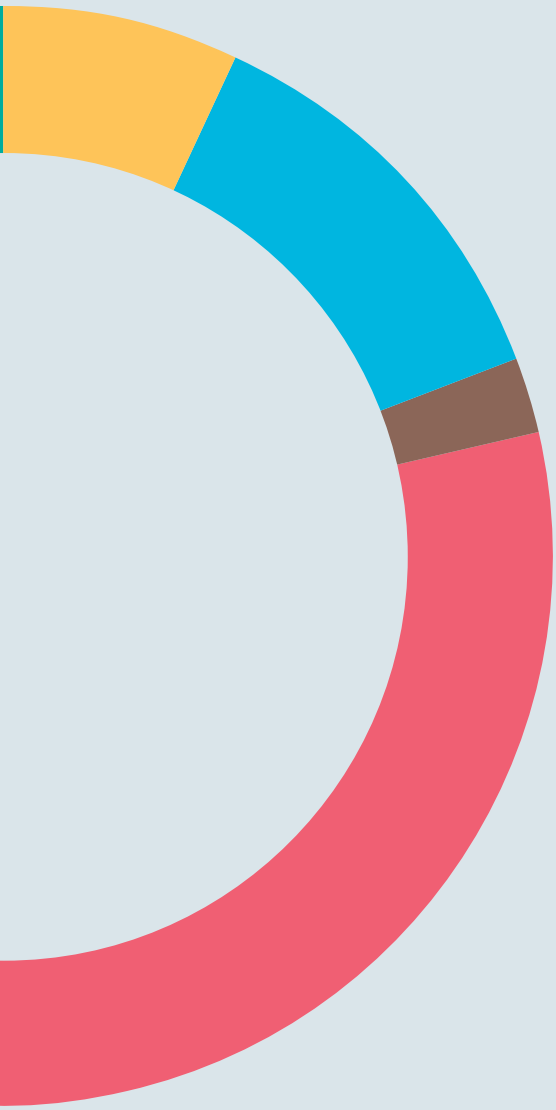

Swiss Participation in European Research Framework Programmes

Facts and figures 2018

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1 Summary

Introduction

Background to the report

This report has been prepared as part of the regular reporting on Swiss participation in the European Union (EU) framework programmes for research and innovation (framework programmes, FPs) in accordance with the mandate given by the Swiss Parliament. It provides an interim assessment of Swiss participation in FP8 (Horizon 2020, 2014–2020) since 2014 and in the associated initiatives.

For the first time, the report presents a comprehensive picture of Switzerland's participation in Horizon 2020 during its partial association from 2014 to 2016, and examines the consequences of full association from 1 January 2017. A separate report in 2019 will consider the impact of Swiss participation in the FPs.

The FPs are the EU's main instrument for implementing its common science and innovation policy. Applications for projects under the FPs are drawn up jointly by researchers from one or more countries, normally in response to specific EU calls for proposals, and are evaluated by independent experts. The EU research funds are thus awarded to scientific institutions and companies in the participating countries on a competitive basis, the key criterion being the excellence of the projects. There are no national quotas.

The FPs are financed partly by the EU member states via their regular contributions to the EU and partly by contributions by associated countries such as Switzerland in proportion to their gross domestic product (GDP). Participants from non-associated countries (third countries) may also take part in projects, but under normal circumstances must meet their project costs themselves.

Since their inception, the FPs have seen their budgets steadily increase. The various thematic priorities and instruments have been continuously adapted to Europe's social and political needs.

Switzerland's participation in the FPs

Participation in the EU's research framework programmes is one of the priorities of Swiss science and innovation policy. Switzerland's participation in the FPs takes a variety of forms:

1987–2003, FP1–FP6	Third country
2004–2013, FP6 and FP7	Full association
2014–2016, Horizon 2020 (FP8)	Partial association
2017–2020, Horizon 2020 (FP8)	Full association

Horizon 2020 (8th EU research framework programme)[1]

Like the seventh EU Framework Programme for Research and Innovation (2007–2013), Horizon 2020 runs for a seven-year period, from 2014 to 2020. The programme has essentially adopted the thematic priorities of its predecessor, but is organised slightly differently, around three main pillars. The Horizon 2020 budget amounts to EUR 82.3 billion, which includes funding for Euratom and ITER (all together forming, for Switzerland, the "Horizon 2020 package"). The budget for FP8 has been increased by more than 50% compared to FP7.

To date (as at 6 March 2018), around 35% of the total Horizon 2020 budget has been awarded to participants in the programme. As of March 2018, there were a total of 80,514 project participations in Horizon 2020, for which EUR 32.4 billion had been committed.

1 Unless otherwise specified, in this report the term 'Horizon 2020' refers to all programme areas for which data is available in the European Commission database. It does not cover certain areas of the Euratom sub-programme for fusion research, ITER or the initiatives under Art. 185 of the Treaty on the Functioning of the European Union. However, the term 'Horizon 2020 package' does include the whole of the Euratom programme and ITER.

For political reasons relating to the acceptance of the initiative on mass immigration in early 2014 and Switzerland's non-signing of the Croatia Protocol in early 2014, from 15 September 2014 Switzerland was only partially associated to Horizon 2020. It was essentially associated to the first pillar (Excellent Science) and Euratom, and had third-country status with regard to the second and third pillars (Industrial Leadership and Societal Challenges). As a result, the State Secretariat for Education, Research and Innovation (SERI) directly financed Swiss participations in joint projects in these areas, based on a decision by the Federal Council. Because projects run for several years, SERI will continue to fund some of these projects until 2024 and possibly beyond. Following the Swiss parliament's decisions in late 2016 regarding the implementation of the mass immigration initiative, from 1 January 2017 Switzerland obtained the status of a fully associated country in Horizon 2020.

As at 6 March 2018, Switzerland had a total of 1,942 project participations (2.4% of the total number of participations under Horizon 2020 to date), for which funding amounting to CHF 1,141.1 million had been awarded (3.5% of the total funding under Horizon 2020 to date). These funds originate either from the EU (58.1%, in the areas in which Switzerland is or was associated) or from the Swiss government (41.9%, in the areas in which Switzerland had third-country status). 422 projects are coordinated or led by Switzerland (2.6% of all Horizon 2020 project coordinations). Switzerland's participation is strongest in the Marie Skłodowska-Curie Actions (MSCA, 21.8% of all Swiss participations), Information and Communication Technologies (ICT, 12.9%), and European Research Council grants (ERC, 10.8%). A similar picture can be seen in the three main programme areas in which funds have been committed to Swiss institutions: 32.6% for ERC grants, 12.3% for ICT projects and 9.1% for MSCA.

The ETH Domain (543 participations, 28%) and the cantonal universities (392 participations, 20.2%) have traditionally been very active participants in the European research framework programmes. Under Horizon 2020, SMEs have now reached a position between the ETH Domain and the cantonal universities (413 participations, 21.3%). This phenomenon is partly due to Switzerland's exclusion from the first two calls for ERC grants in 2014. Moreover, SMEs are particularly encouraged to take part in Horizon 2020. The FPs are the main source of public funds for Swiss companies engaging in research and innovation, in particular for SMEs.

The research applications in which at least one Swiss project partner is involved are generally of very high quality: the average success rate is 15.9% compared to the European average of 13.6%. The average rate in the ERC programme is even higher, with 21.9% of Swiss project applications being accepted compared to the European average of 12.7%.

From the start of Horizon 2020 up to the end of 2017, Switzerland paid CHF 724 million in compulsory contributions to the European Union (not including Euratom and ITER). According to the latest official data from the European Commission (EC, as at 6 March 2018), during the same time period Swiss research institutions received EU research funding amounting to CHF 654 million (not including Euratom and ITER). In other words, Switzerland has to date paid CHF 70 million more in compulsory contributions to the EU than it has received back in the form of research funding for project participations. This represents an absolute return rate of 0.9; however, the final return and any net inflow or outflow can only be calculated at the end of a programme generation.

Impact of partial association and transition to full association

The last interim evaluation of Swiss participation in the first eighteen months of Horizon 2020 (as at July 2015) showed a considerable drop in Swiss participation compared to FP7, both in terms of the number of project participations and the amount of funding awarded. The most marked difference, however, could be observed with regard to Switzerland's role as project coordinator: the share of Swiss project coordinations relative to all project coordinations dropped to a tenth of that same rate in FP7. The indicator values for Swiss participation in Horizon 2020 have since been increasing but are not yet at a comparable level to those achieved in FP7.

These developments are also linked to the uncertainties related to the admission and funding of Swiss project partners following the EU's response to the Swiss popular vote in favour of the mass immigration initiative in February 2014.

	FP7 (2007–2013) (as at Nov. 2015)	Horizon 2020 (as at July 2015)	Horizon 2020 (as at March 2018)
% Swiss participations	3,2% (4,323)	1,8% (318)	2,4% (1,942)
% all contributions	4,3% (CHF 2,496 m)	2,2% (CHF 172 m)	3,5% (CHF 1,141 m)
% Swiss coordinations	3,9% (981)	0,3% (15)	2,6% (422)

NB: Values as % of European total; values in brackets are absolute number of participations, contributions and coordinations.

As the table above shows, Swiss research and innovation actors have so far received 3.5% of all committed funds under Horizon 2020, compared to 4.3% in the previous framework programme. This lower figure also reflects Switzerland's partial association in the first couple of years of Horizon 2020. Assuming that the 3.5% funding rate will be maintained until the end of Horizon 2020, an estimated CHF 3.21 billion in EU research project funding will go to researchers in Switzerland over the entire duration of Horizon 2020 (calculated on the basis of the total Horizon 2020 package budget of around CHF 91.8 billion). If Switzerland were in a position to secure the same percentage of funding over the whole Horizon 2020 period as under it predecessor FP7, Swiss research institutions would receive around CHF 3.95 billion by the end of Horizon 2020. This is an estimated difference of CHF 734 million over the entire programme 2014–2020.

Conclusion

The available data show that Swiss participations in the FPs have declined for the first time since the launch of Horizon 2020. The clearest indicators for this are the relative reduction in Swiss participations compared to other countries, the marked reduction in Switzerland's role as project coordinator and reductions in EU funding to Swiss research institutions as a share of all funding for projects under Horizon 2020. At the same time, Swiss project applications are still very successful compared to those of other European states, demonstrating that Swiss research is among the most competitive in Europe. The relative reduction in Swiss participations in Horizon 2020 is thus not a result of a lower quality of the research applications.

Other Swiss participation

Initiatives under Articles 185 and 187 TFEU

In the field of public-to-public partnerships (P2P) in Horizon 2020, Switzerland is participating in four research and innovation programmes under Article 185 of the Treaty on the Functioning of the European Union (TFEU): 1) Active and Assisted Living 2 (AAL2); 2) Eurostars 2; 3) European & Developing Countries Clinical Trials Partnership 2 (EDCTP2) and 4) European Metrology Programme for Research and Innovation (EMPIR).

Since 2014, a total of 221 projects involving Swiss partners have been set up under these four initiatives. Funding came either from Horizon 2020 or Swiss substitute funding, or from the national budgets for ERI (education, research and innovation). Swiss project applications enjoy a high success rate (27 to 58%), with the exception of those for EDCTP. The total costs for Swiss projects in all four initiatives amounted to CHF 179 million, of which around CHF 41 million came from the EU (2017–2018) or Swiss substitute funding (2014–2016), CHF 50 million from ERI budgets, and CHF 88 million was contributed by the participating project partners themselves.

The Joint Technology Initiatives (JTIs) are undertaken jointly by the EU and European industry under Article 187 TFEU. Seven initiatives are running under Horizon 2020: 1) Clean Sky (CS) in the field of aviation; 2) Innovative Medicines Initiative (IMI) in the field of drug research; 3) Fuel Cells and Hydrogen (FCH); 4) Electronic Components and Systems for European Leadership (ECSEL) in the field of micro- and nanoelectronics and electronic systems; 5) Bio-Based Industries (BBI) to develop new bio-based products from waste; 6) Shift2Rail for improved trains and infrastructure; and 7) Single European Sky ATM Research (SESAR) for innovative air traffic management systems. The EU funds these initiatives to the tune of about EUR 7.5 billion, with the private sector contributing around EUR 11.4 billion. Since 2014, Swiss researchers have received around CHF 53 million for their participation in these initiatives. During Switzerland's partial association from 2014 to 2016,

the Swiss government provided the Swiss project partners with funding which they would otherwise have received from the European Commission.

Euratom

The Euratom programme, which was established in 1958, covers the two areas of nuclear fusion and nuclear fission. Switzerland has participated in this programme since 1979; it has now become part of the Horizon 2020 package. Between 2014 and 2017, Switzerland made compulsory payments of EUR 11.4 million to the fusion research programme budget, and received project funding totalling EUR 18.5 million. Switzerland has also helped finance research activities at the JET reactor in the United Kingdom to the tune of EUR 7.3 million.

Twenty-eight participants from Switzerland have so far received funding of CHF 9.2 million under the Horizon 2020 nuclear fission programme, of which CHF 4.9 million was Swiss direct funding. Switzerland's research activities are focused on the areas "Nuclear Systems Safety" (12 participations) and "Radioactive Waste" (12 participations). Switzerland also participates in two projects on fission competence and two projects on radiation protection.

ITER

Switzerland's financial participation in the International Thermonuclear Experimental Reactor (ITER), launched in 2007, is also covered by the agreement between Switzerland and the EU regarding association to Horizon 2020 and Euratom. ITER is a new, dedicated nuclear fusion research facility, the first of its kind in the world, currently under construction in Cadarache (France). Its main objective is to demonstrate the efficiency of nuclear fusion as the new energy source of the future. Europe, the United States of America, China, South Korea, Japan, India and Russia are the project partners, with Europe responsible for the lion's share of ITER's construction (six parts out of eleven). The reactor is due to start operating in 2025, and it is hoped to run breakthrough experiments from 2035.

Switzerland's financial contribution is being made via the European Union. By the end of 2017, Switzerland had already invested around EUR 159.2 million. Many Swiss companies supply components to ITER. By the end of 2017, Swiss companies and research institutions had received contracts totalling around EUR 134.7 million.

2 Introduction

2.1 About this report

This publication has been prepared as part of the regular reporting on Swiss participation in the European Union's research framework programmes (FPs) required by the Swiss Parliament. This is the first report to provide a complete picture of Switzerland's participation in Horizon 2020 and associated initiatives during its partial association from 2014 to 2016, and to analyse the consequences of Switzerland's full association to Horizon 2020 since 1 January 2017. A separate report to appear in 2019 will assess the impact of Swiss participation in the FPs.

Section 3 of the report presents facts and figures showing the general trend of Swiss participation in the FPs. Section 4 assesses Switzerland's involvement in Horizon 2020 so far, from 1 January 2014 to 6 March 2018. Section 5 presents data on the research and development programmes undertaken between the EU and a number of member states or associated countries under Art. 185 TFEU (public-to-public partnerships – P2P), as well as on the Joint Technology Initiatives (JTI) between industry and the public sector under Art. 187 TFEU (public-private partnerships – PPP). Finally, Sections 6 and 7 examine Switzerland's participation in the Euratom programme and in the international ITER project.

2.2 The Research Framework Programmes of the European Union

The science and technology policy of the European Union (EU) is defined in the Treaties of Maastricht[2] and Amsterdam[3]. Its importance increased with the Lisbon Strategy agreed upon in 2000. By establishing a European Research Area (ERA), Europe wants to pave the way to become the world's most competitive and dynamic knowledge-based economic area. The FPs are the main instrument for putting this policy into practice. These multiannual funding programmes create incentives for transnational research cooperation and cooperation between public-sector institutions and industry actors. The FPs are prepared by the European Commission (EC) in consultation with member states and take account of the principle of subsidiarity. Tailor-made programme areas support careers in science, bottom-up fundamental research, market-oriented research and innovation, and research projects on the most important social challenges facing Europe.

The first framework programme was launched in 1984. The eighth generation, known as Horizon 2020 – the EU Framework Programme for Research and Innovation, has been underway since 1 January 2014. Horizon 2020 will run until the end of 2020 and has a total budget of EUR 82.3 billion (including Euratom and ITER).

FPs are financed partly by the EU member states via their regular contributions to the EU and partly by contributions from associated countries such as Switzerland, calculated on the basis of their gross domestic product (GDP). In response to specifics calls launched by the EC, project proposals are prepared either by a single researcher as an individual project or jointly by research partners from several European countries in the case of collaborative projects. In the latter case, one of the partners plays the role of project coordinator. Proposals are assessed by independent experts from the relevant specialist area and, if successful, receive funding from the EC.

With a few exceptions, calls for proposals for individual projects are only open to members of institutions from EU member states or associated countries. In the case of collaborative projects, researchers from third countries are also eligible to participate. Third countries are those that are neither an EU member state nor an associated country. Third-country participants do normally not receive funding from the EU.

All project proposals are selected solely on the grounds of their quality, i.e. according to specific criteria such as technical and scientific aspects and socio-economic importance. There are no national quotas. This means that EU research funds flow back to the participating countries on a competitive basis for the benefit of the best scientific institutions and companies.

2 Treaty on European Union, signed in Maastricht on 7 February 1992, 92/C 191/0, Official Journal of the European Communities C 191 of 29 July 1992.

3 Treaty of Amsterdam amending the Treaty on European Union, the Treaties establishing the European Communities and certain related acts – contents. Official Journal No C 340 of 10 November 1997 pp. 0001–0144.

2.3 Switzerland in the EU framework programmes

Participation in the FPs is one of the priorities of Swiss science and innovation policy. Back in 1986, Switzerland and the then European Communities concluded a framework agreement on scientific and technical cooperation[4] which explicity envisages Switzerland's participation in the FPs and which is still valid. Researchers from Swiss universities and the private sector have thus been participating in projects under the framework programmes since 1987. Since then, there has been a steady increase in the number of participations and total funding received: whereas under FP3 (1990–1994) 501 Swiss participations received funding totalling just under CHF 127 million, under FP7 (2007–2013) the figures rose to 4,269 participations and total funding of just under CHF 2,482 million. After the Swiss National Science Foundation (SNSF), the FPs are the second most important source of public funding for researchers in Switzerland overall, and the most important for researchers working in Swiss corporations and SMEs.

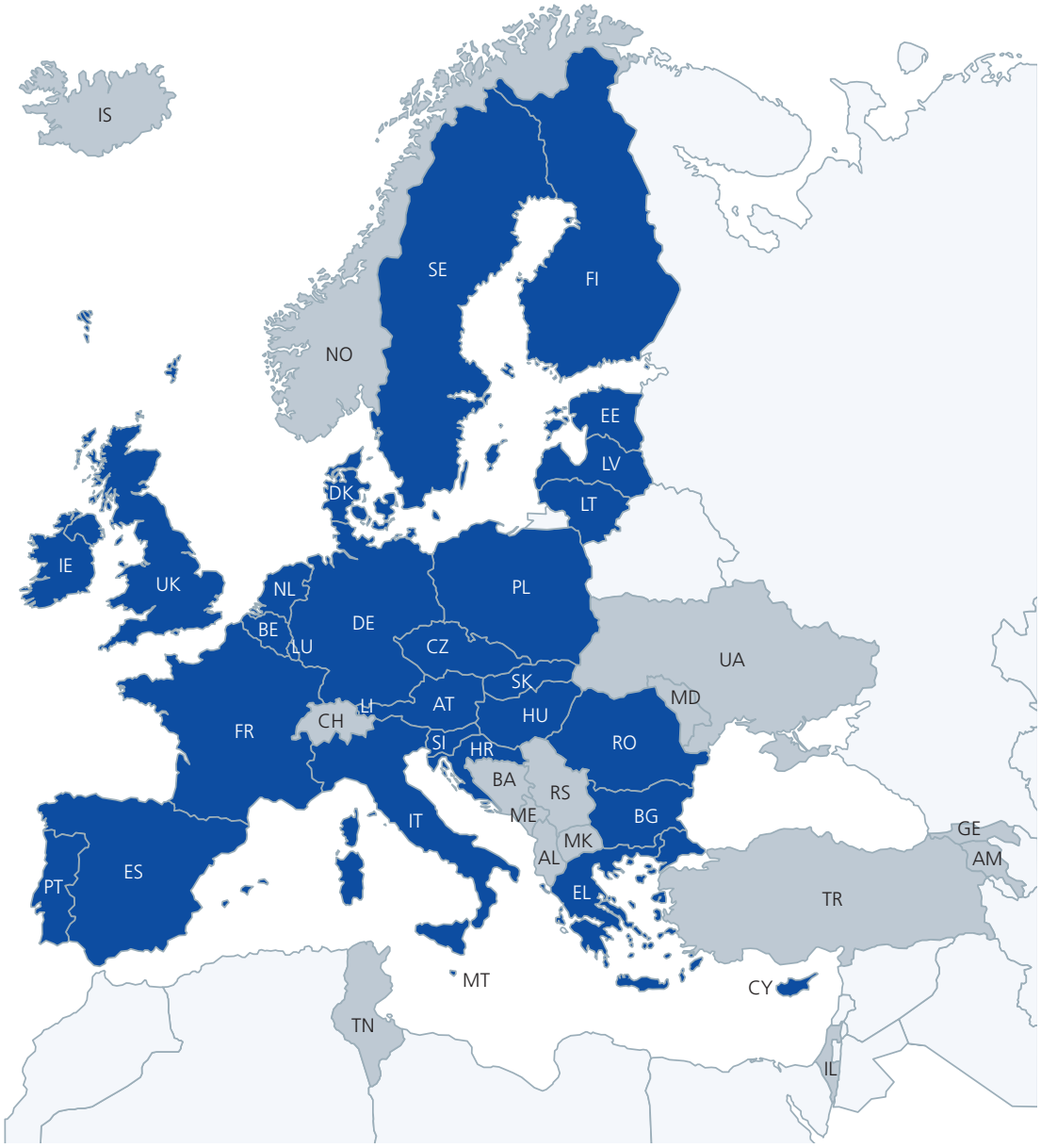
The research agreement regulating Switzerland's participation in the FPs as an associated state is one of a package of seven bilateral (sectoral) agreements signed by Switzerland and the EU on 21 June 1999. Known as the Bilateral Agreements I, the package was approved by 67.2% of Swiss voters on 21 May 2000 and came into force on 1 June 2002.

The following remarks explain Switzerland's legal status in the FPs and the resulting participation opportunities for researchers in Switzerland at different times:

- Until the end of 2003, researchers at institutions based in Switzerland, which had third-country status, only had limited opportunities to take part. Originally, project participants had to fund their own work; from 1992, the Swiss Confederation provided them with funding for their participation in FP projects (project-based funding).
- From 1 January 2004, an agreement between Switzerland and the EU (follow-up agreement to the research agreement in the Bilateral Agreements I) enabled Switzerland to participate in FP6 as an associated country with full rights and obligations. In 2007, this agreement was renewed for the whole of FP7. As a result, from 2004 onwards Switzerland paid annual mandatory contributions to the overall budget of the FPs from which successful applicants from Switzerland were funded directly. Swiss partners were now also permitted to coordinate whole projects. Associated status also meant that official Swiss delegates could sit on the management committees of the specific programmes (programme committees), as well as on various steering committees. This gave Switzerland direct access to the organisational bodies which defined the content of the following year's calls, and enabled it to participate in the implementation of ongoing EU framework programmes and to contribute to the design of future programmes.
- Fully associated status for Switzerland was also envisaged for FP8 – Horizon 2020. However, the adoption by the Swiss voters of the popular initiative against mass immigration in Switzerland on 9 February 2014, and Switzerland's subsequent non-signing of the Croatia Protocol, blocked the ongoing negotiations. Instead, as a result of a new understanding between the two sides, 5 December 2014 saw the signing of an agreement on a partial association, to apply retroactively from 15 September 2014. Switzerland had partially associated status until the end of 2016, meaning it could participate only in certain parts of Horizon 2020 (about a third of the programme) as an associated country. In the other parts of Horizon 2020 (around two thirds of the programme), Switzerland had third-country status (cf. Section 4.2). With a few exceptions, researchers in Switzerland could also participate in these programme parts and submit relevant proposals, but they did not receive any funding from the EU. On 25 June 2014, the Federal Council therefore decided that the Swiss Confederation would revert to providing direct funding for Swiss partners who did not receive any EU funding for their participation in collaborative projects in Horizon 2020, as had been the case before 2004. Whether Switzerland would automatically regain fully associated status from 2017 onwards depended on whether the free movement of persons was maintained in Switzerland and extended to Croatia. The Swiss parliament's decisions in December 2016 regarding the implementation of the mass immigration initiative paved the way for the Federal Council's ratification of the Croatia Protocol on 16 December 2016 and thereby enabled Switzerland's full association.

4 Framework agreement of 8 January 1986 on scientific and technical cooperation between the Swiss Confederation and the European Communities (SR 0.420.518).

Figure 1: Member states and associated countries in the European research framework programmes (Status as at 6 March 2018)



Source: European Commission; for country abbreviations see Table 16 in Appendix C

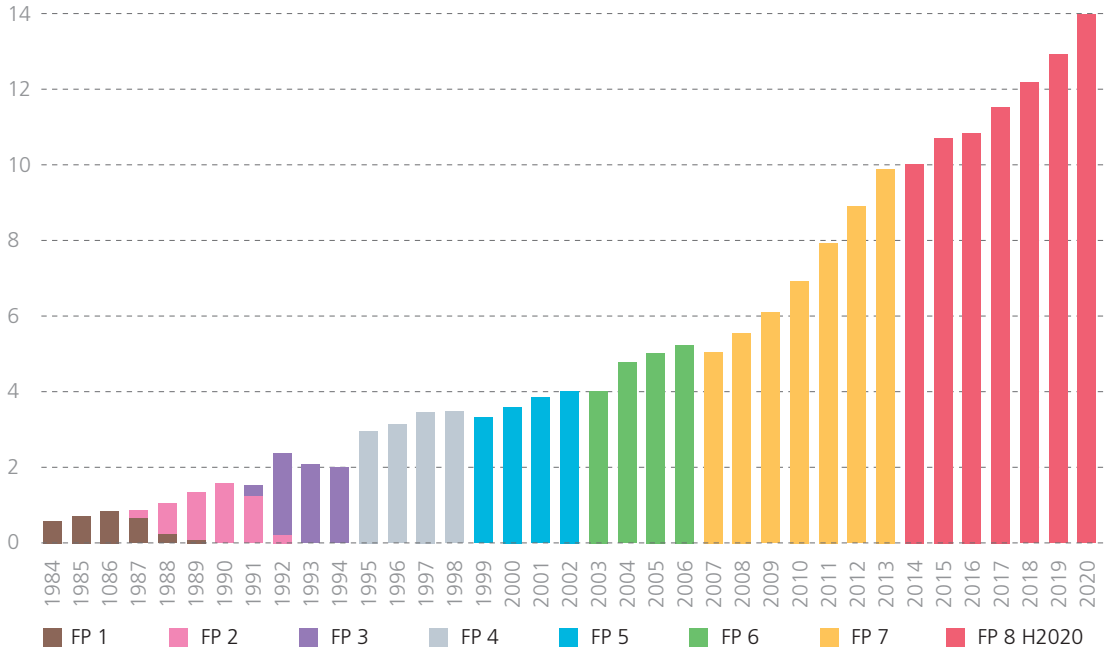
2.4 The history of the framework programmes

The history of the FPs dates back to the 1950s: in 1957 a joint research facility devoted mainly to nuclear fission began operations under the Euratom Treaty for the peaceful use of nuclear energy. In 1983, the then French president François Mitterrand proposed the ESPRIT programme, covering the field of information technology and telecommunications. On 25 July 1983, a European Council resolution introduced "framework programmes for Community research, development and demonstration activities" (FPs) with the aim of creating one package for all of the Community's research activities.[5] A year later, in 1984, the first framework programme was launched. The budget of the FPs steadily increased over time. Their content orientation also changed over the years, in line with the EU's political needs.

2.4.1 Development of the overall FP budget

Whereas the budget for FP1 was set at an average of EUR 0.6 billion per year, the average annual budget for FP6 between 2003 and 2006 came to EUR 4.8 billion. In line with the Lisbon Strategy, the EU substantially increased the annual budget for FP7: from EUR 5.1 billion in 2007 to EUR 9.9 billion in 2013. This meant a total budget of around EUR 50.5 billion. At EUR 82.3 billion, the budget earmarked for the Horizon 2020 package (including Euratom and ITER) is significantly larger. A budget of EUR 10 billion was allocated for 2014. The annual budget was originally intended to then steadily rise to EUR 14 billion by 2020. However, in accordance with the European Parliament's decision of June 2015 to back the European Fund for Strategic Investments (EFSI), the funding for Horizon 2020 was cut by a total of EUR 2.2 billion and the annual budgets were adjusted accordingly. This did not affect funds for the European Research Council (ERC), the Marie Skłodowska-Curie Actions or the Spreading Excellence and Widening Participation part of the programme. All other parts experienced proportional cuts in funding. However, in spring 2017 the European Parliament agreed to replenish the Horizon 2020 budget with EUR 200 million. These changes are not presented in Figure 2, which only shows the budgets planned at the beginning of a programme generation.

Figure 2: Annual budgets of the European Research Framework Programmes (in EUR billion, at current prices)



Source: European Commission (COM(2004) 533, 786/2004/CE, COM(2005) 119 final, SEC(2014) 357 final), cf. Table 1 in Appendix C

5 Council resolution on framework programmes for Community research, development and demonstration activities and a first framework programme 1984 to 1987, 31983Y0804(01), adopted on 25 July 1983, OJ of 4 August 2003, p.1, came into force in 1984, repealed on 31 December 1987. In EU terminology a decision is referred to as a resolution.

2.4.2 The eight programme generations to date

FP1 (1984–1987)
The first framework programme had a budget of EUR 3.3 billion (or euro equivalents, since the euro was not introduced until 1999) and ran for a five-year period. Besides covering the energy sector (with a large proportion of research on nuclear fission), which accounted for about 50% of its budget, it also addressed information and communication technologies (ICT, 25%), industry and materials (11%) and life sciences and the environment (10%). The remaining budget was allocated to measures to promote researcher mobility and grants for young scientists.

As mentioned above (cf. Section 2.3), in 1986 (i.e. while FP1 was ongoing) Switzerland and the then European Communities signed a Framework Agreement on Scientific and Technological Cooperation, which explicitly provides for Switzerland's participation in the FPs.

FP2 (1987–1991)
With the Single European Act of 1987, science became a responsibility of the Community for the first time. The same year saw the launch of FP2: Significant changes were made to the areas of research. ICT now accounted for 40% of the total budget of EUR 5.4 billion at the expense of energy, which saw its share shrink to 20%. Industry and materials almost doubled their share, while new specific programmes such as support for SMEs and international cooperation were added. The first project in the European framework programmes with Swiss participation (EPF Lausanne) began on 1 January 1988.

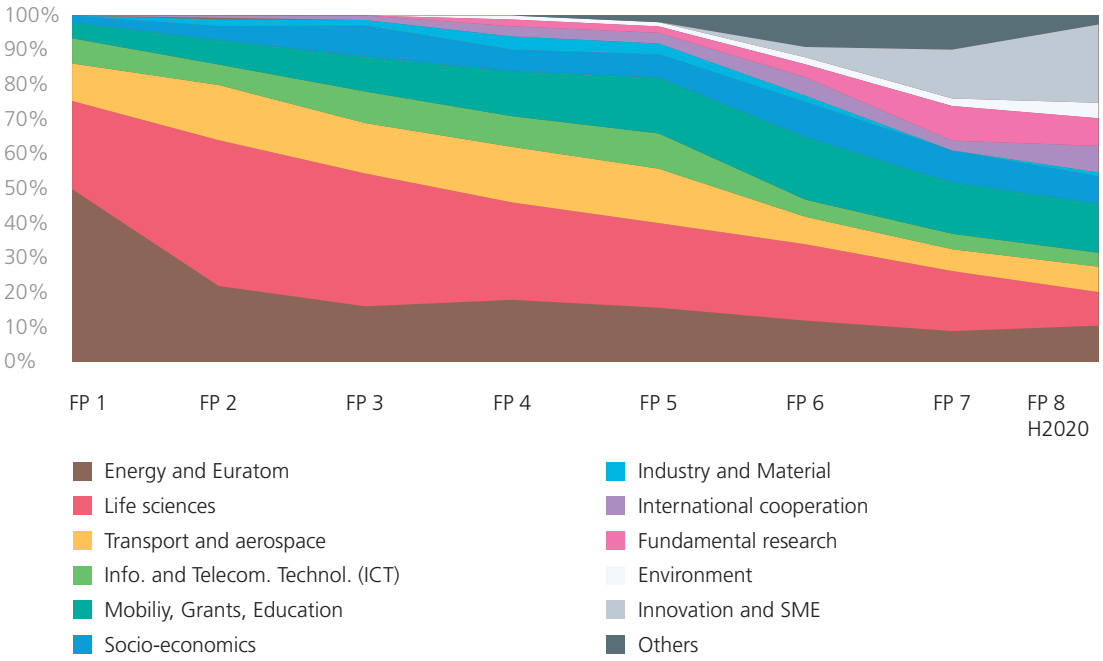
FP3 (1991–1994)
The budget for the third framework programme amounted to EUR 8.7 billion. ICT still represented the largest area of research, although their share decreased by five percent compared to FP2. The importance of the energy sector also continued to decline, while life sciences saw their relative share of the budget increase. FP3 still focused on the exact and natural sciences and was subdivided into four thematic programmes: enabling technologies (ICT, as well as industrial and materials technologies), management of natural resources (environment, energy and life sciences), management of intellectual resources (grants and mobility) and centralised actions for the dissemination and exploitation of the knowledge resulting from the specific programmes.

FP4 (1995–1998)
The fourth framework programme was a significant step forward in both financial and organisational and thematic terms compared with the previous programme. The total budget increased from EUR 8.7 to EUR 13.1 billion. 87% of the budget was allocated to the six thematic areas of research (ICT, industry, environment, life sciences, energy and transport). In addition, three horizontal programmes were implemented: 1) International cooperation, 2) Dissemination and exploitation of results, and 3) Greater promotion of researchers training and mobility. Under the programmes up to and including FP4, all participants in a project received roughly the same amount of funding. The coordinators were an exception, each being allocated 10–15% more.

FP5 (1999–2002)
The fifth framework programme differed little from its predecessor. In terms of content it was scaled back to four thematic programmes, and the three horizontal programmes were retained under different names. At EUR 14.9 billion, the overall budget also underwent little change. The scale of certain projects increased considerably during the course of the programme. More than 80 partners were involved in some projects. However, there were sometimes major differences in the distribution of funds within projects: some partners performed more important tasks than others and received higher proportions of the budget accordingly.

Under the programmes up to and including FP4, the European Commission had particularly wanted to ensure that partners from European regions with less experience of European research projects were also included. The project partners in a consortium thus had to demonstrate that they came from a number of different countries. This criterion was dropped in FP5; the quality of the submitted projects was taken as the only standard.

Figure 3: Relative development of the thematic priorities of the research framework programmes according to budgets



Sources: European Commission, SERI, cf. Table 2 in Appendix C

FP6 (2003–2006)

The sixth framework programme had a budget of EUR 19.1 billion (including Euratom). It had a different structure than the previous generation of programmes. The bulk of the budget continued to be allocated to thematic areas such as ICT, health, sustainable development and transport. The horizontal programmes now served to structure the European Research Area (a term first used at that time). Euratom was one of the main activities and was run as a separate programme component. The thematic areas generally were made more precise.

For the first time, fundamental research made up an area in its own right. In addition, two new instruments were created with the aim of ensuring the sustainable integration of partners' research capacities in a joint programme of activities. These were firstly the integrated projects – large-scale projects covering numerous research groups and endowed with a total of up to EUR 30 million each – and secondly the networks of excellence, which also received significant financial support.

From 1 January 2004 (i.e. the second year of FP6), Switzerland participated in the EU framework programmes for the first time with associated country status (cf. Section 2.3).

FP7 (2007–2013)

The seventh framework programme introduced some major changes. It was the first FP to cover a seven-year period and was linked to the financial perspective and thus to the EU's overall budget planning. The budget was set at EUR 50.8 billion (excluding Euratom and ITER), which – after factoring in the new duration – was equivalent to an increase of 51.1% compared to the previous programme. This reflected the higher priority given to research by the EU, as affirmed in the Lisbon Strategy. In terms of content, the importance of the thematic programmes was slightly downgraded. In turn, fundamental research was significantly promoted with the establishment of the European Research Council (ERC). Furthermore, fusion research was strengthened with a view to the construction of ITER.

In terms of instruments, FP7 was shaped by the EC's wish to combine the research activities of the member states, the associated countries and the private sector in a single European Research Area. This was to be achieved in a number of ways. Firstly, national funding institutions in the member states would coordinate their work in projects such as ERA-NET and ERA-NET+ (Networks of the European Research Area), and national

research efforts were to be pooled in Joint Programming Initiatives (JPIs[6]). Secondly, new instruments were created in cooperation with the private sector. For example, some of the European Technology Platforms (ETP) were restructured as Joint Technology Initiatives (JTI). This enabled the Commission to establish public-private partnerships involving industry, researchers and public actors from the member states and associated countries.

FP8 or Horizon 2020 (2014–2020)

Under Horizon 2020, which has a budget of around EUR 80 billion, there has been a further decline in the budget share of the thematic programmes from 59% under FP7 to 53% (cf. Section 4.2). The main beneficiaries are fundamental research (ERC, from 13.7% to 17% of the total budget) and the new Access to Risk Finance programme (3.7%). Another point to be mentioned is the integration of the European Institute of Innovation and Technology (EIT). Based in Budapest (Hungary), the EIT enables the launch of Knowledge and Innovation Communities (KICs), designed to boost Europe's innovative capacity by strengthening cooperation between research institutes, universities and industry. In general, Horizon 2020 attaches considerably greater importance to innovation. For this reason, innovation-related instruments and programmes have been transferred to Horizon 2020 from another European programme, the Competitiveness and Innovation Framework Programme CIP. A further new feature is facilitated access to risk finance or loans with more or less secure rates of interest for innovative companies. The aim is to help put them in a better financial position to bridge the gap, in terms of time and cost, between research results and their commercialisation.

Towards the end of FP7, the EC launched two large-scale pilot projects, known as flagship initiatives for Future and Emerging Technologies (FET flagships), which were officially added to the programme in Horizon 2020. The FET flagships receive EC funding amounting to half a billion euros each for ten years, which participants are required to match (these resources can come from member states, associated countries or the private sector). The EC can also participate in the public-to-public partnership initiatives (P2P) of several member states. The JPIs are also continuing under Horizon 2020.

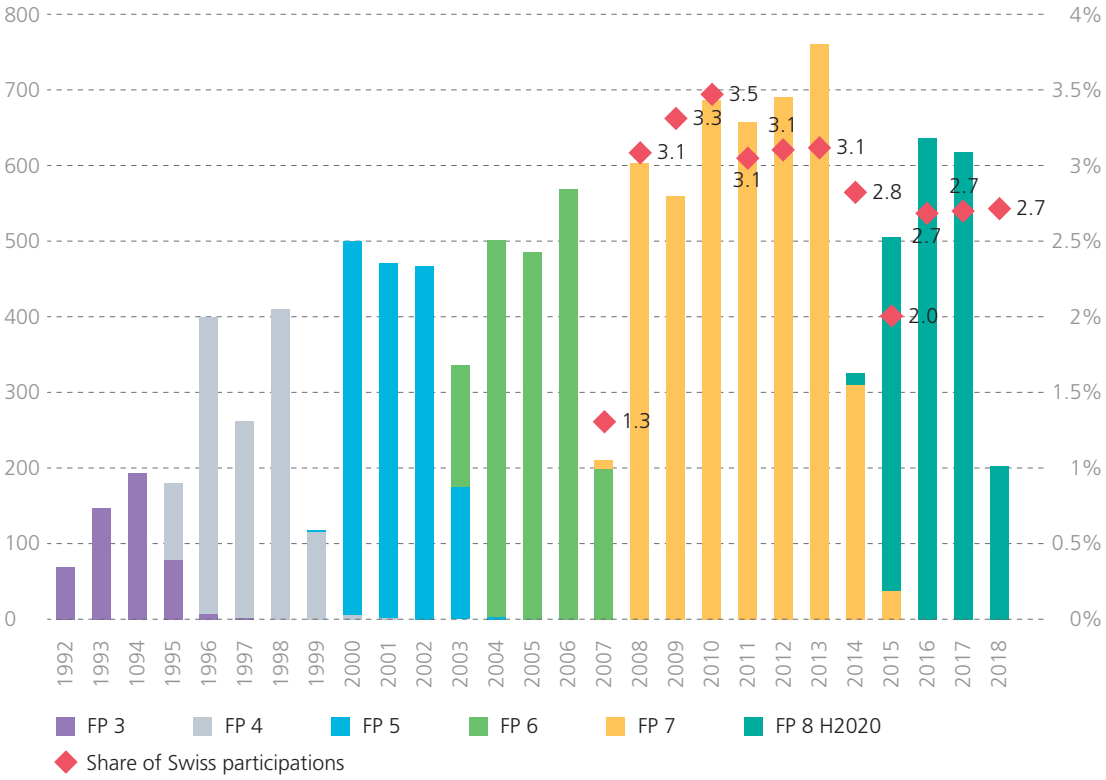
6 Instrument to implement the greatest challenges facing European society, coordinated at European level (with a broad interpretation of the concepts science and technology).

3 Development of Swiss participation in the FPs

3.1 Swiss participation in the FPs since 1992

The average number of Swiss participations in European research projects has steadily increased since 1992. This trend went hand in hand with the growing FP budgets. The number of project participations is always significantly lower in the first year of an FP than in subsequent years. This is because, following the publication of the first calls for project proposals under a framework programme, a certain amount of time is required to evaluate project proposals and negotiate and draw up agreements before the first projects can be approved and actually launched.

Figure 4: Number and share of new Swiss participations in FPs per year (by project start)



Sources: European Commission, SERI, cf. Table 3 in Appendix C

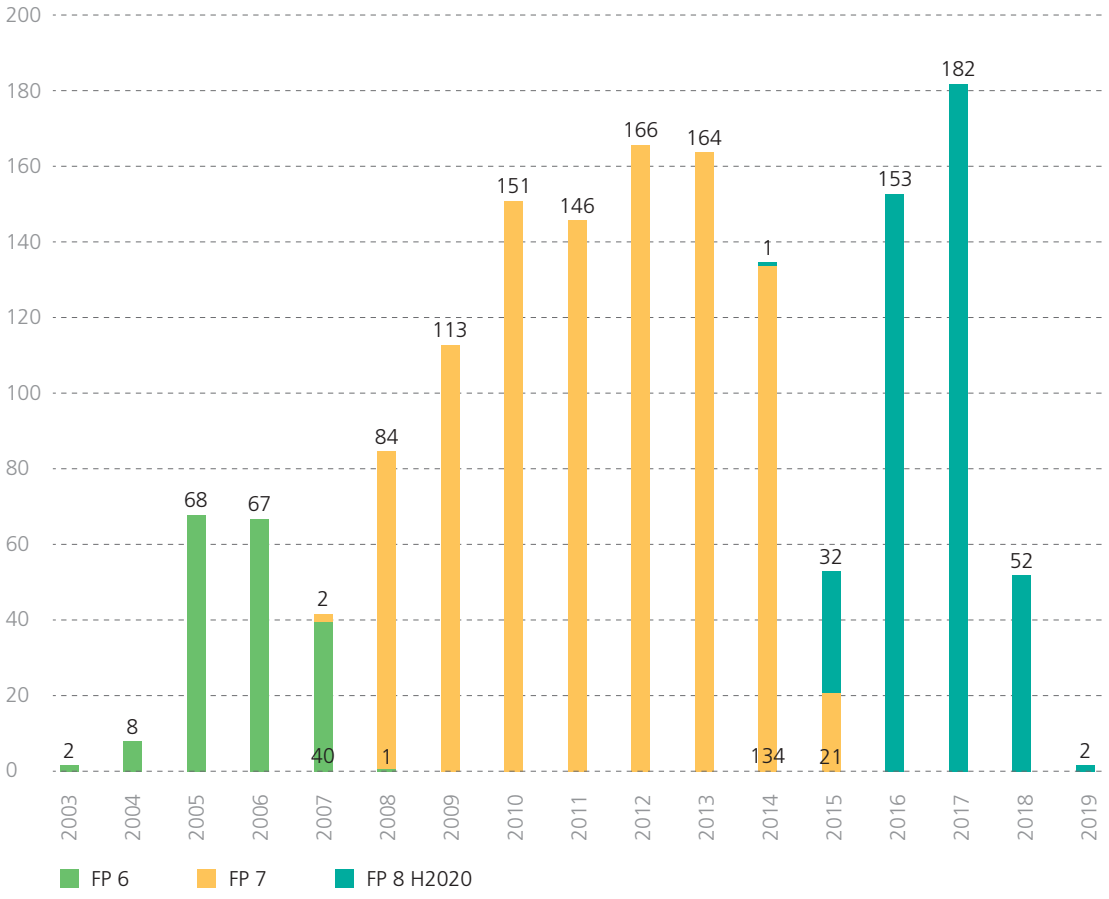
Since FP3, the number of Swiss project participations has increased steadily and now totals 11,558. Under FP7, there were 4,323 Swiss participations in European research projects.

The number of Swiss participations so far under Horizon 2020 is 1,942. This figure will rise for 2017, 2018 and 2019 as it is based on the number of grant agreements contained in the database as at 6 March 2018. Not all Swiss participations from 2017 have yet been recorded. Based on the experience of previous years, it may be assumed that about 95% of all grant agreements for projects beginning in 2017 were signed by the end of February 2018.

The results indicate that the situation in Switzerland following the adoption of the mass immigration initiative in 2014 and the subsequent suspension of negotiations over Switzerland's full association to Horizon 2020 created a great deal of uncertainty among researchers in Switzerland and Europe alike. The temporary solution involving Switzerland's partial association to Horizon 2020 until the end of 2016 and the transitional measures adopted by the Federal Council could not entirely resolve this uncertainty, as was clear from the regular contact between SERI and researchers. The confusion among Swiss researchers and their EU partners, along with Switzerland's exclusion from two pillars of Horizon 2020, temporarily had a negative impact on the number of Swiss participations in Horizon 2020, particularly on the number of projects coordinated by Switzerland. Figure 5 illustrates this clearly. In 2015, the year following the adoption of the mass immigration initiative, only 53 new projects were coordinated by researchers from Switzerland, compared to 135 in 2014.

The reason for the delayed effect is that generally EU projects are launched in the year after they are submitted. From 2016 onwards, the number of participations rose again, and the number of projects coordinated by researchers from Switzerland are now back up to FP7 levels.

Figure 5: Number of new projects coordinated by Switzerland in FPs per year (by project start)

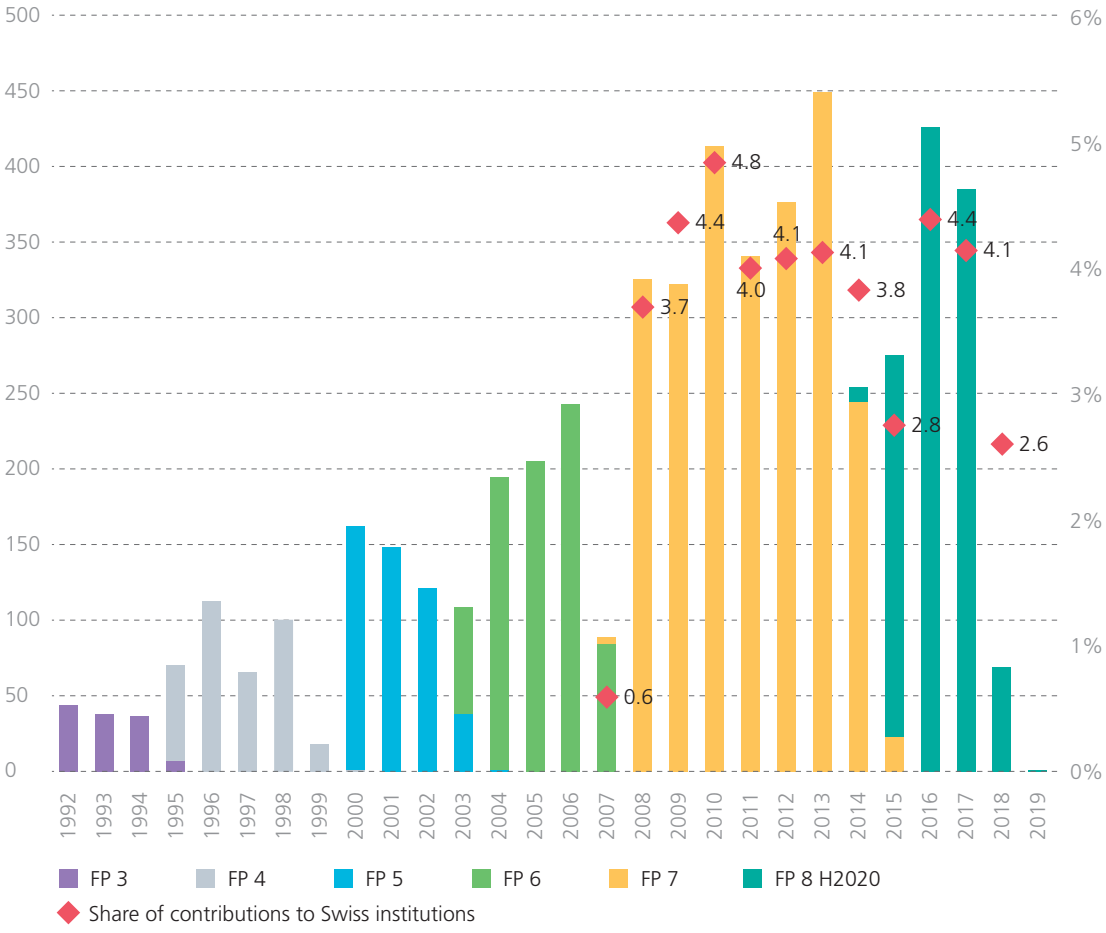


Sources: European Commission, SERI, cf. Table 4 in Appendix C

3.2 Funding Swiss research and innovation in the FPs since 1992

Since 1992, a total of CHF 5,321 million has gone towards funding Swiss participations in European projects. Of this amount, CHF 2,495.9 million was awarded under FP7. The amounts committed have grown considerably over time. Under Horizon 2020, CHF 1,141 million in funding has been committed so far, partly by the EU and partly by the Swiss government.

Figure 6: Amounts committed to Swiss institutions since FP3 per year (in CHF m), absolute values and in %



Sources: European Commission, SERI, cf. Table 5 in Appendix C

As mentioned above, there is always a delay between a project being submitted and approved and its actual start. This explains why the total amount of committed funds in the first year of a new framework programme is much less than in the following years. With the exception of these initial years, the amount of research funding has increased continuously over the years.

3.3 Breakdown of funding by type of institution

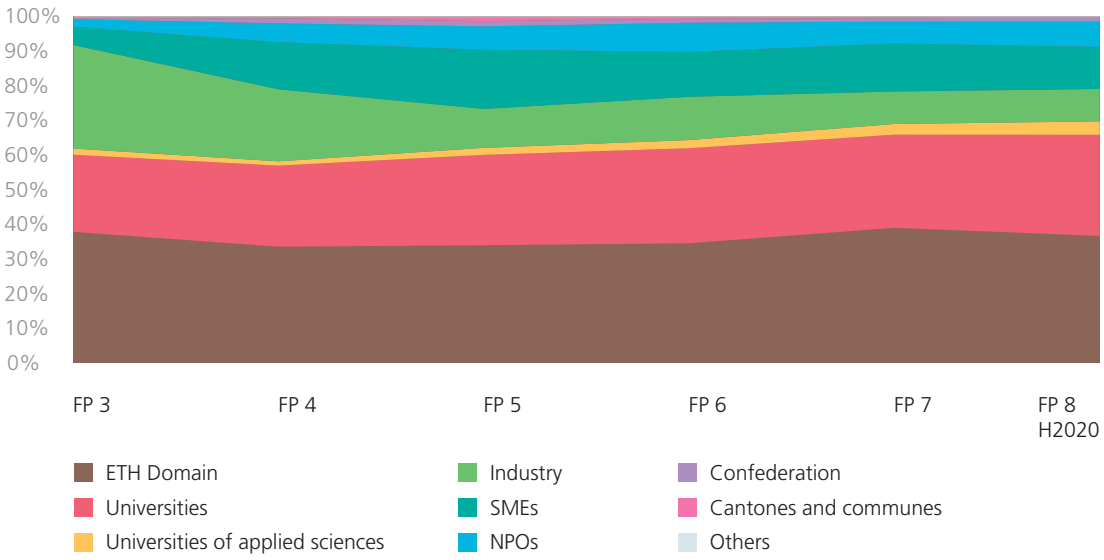
The following chart shows the relative distribution of EU funding going to Switzerland by type of institution. The distribution has remained remarkably stable over the past project generations.

Over the whole period since 1992, the universities and the ETH Domain have received about two thirds of all contributions annually. Institutions of the ETH Domain accounted for almost half of this share; the ETH Domain is generally the strongest player among Swiss participants, receiving on average 36.9% of all funding for Switzerland. The cantonal universities received an average of approximately 27.1% of all funding over this period.

The percentage of contributions for small and medium-sized enterprises (SMEs) and industry varied widely, averaging 11.1% for industry and 13.4% for SMEs. In FP7 the official target was a total financial share of 15% for SMEs, and in Horizon 2020 this target has increased to 20%. It can therefore be assumed that the average share of SMEs will also continue to grow in the coming years.

Non-profit organisations (NPOs) have long accounted for approximately 6–7% of FP funding for Switzerland. Swiss universities of applied sciences still play a minor role in European research, with an average share of just under 3%.

Figure 7: Contributions to Swiss participants in FPs by type of institution, since 1992 (in CHF m)



Sources: European Commission, SERI, cf. Table 6 in Appendix C

4 Switzerland's participation in Horizon 2020 (2014–2020)

4.1 Introduction

The following presentation of Switzerland's participation in Horizon 2020 is based on the analysis of data from the period between 1 January 2014 to 6 March 2018. It should be noted that about eight months pass from the time a project is submitted to the time it is officially approved and a grant agreement is concluded. The available analyses therefore do not take into account all projects submitted in response to calls in 2017 and 2018, and so Swiss participation in Horizon 2020 cannot yet be conclusively monitored. However, an interim assessment can be made and statistically founded prognoses drawn.

Under Horizon 2020 the European Commission has so far committed a total of EUR 32.4 billion to finance research projects (as at 6 March 2018). This is almost 42% of the EUR 82.3 billion budgeted for the framework programme. 16,338 research projects have been funded with this money, resulting in a total of 80,514 project participations in Horizon 2020 so far. Swiss research institutions have been responsible for coordinating 422 projects. There have been a total of 1,942 participations from Switzerland with a total contribution of CHF 1.14 billion, which is paid partly by the EU and partly by the Swiss Confederation.

Owing to the strained relationship between Switzerland and the EU in 2014, participants from Switzerland were excluded from two calls for proposals made by the European Research Council (ERC) and were not admitted to all calls under Horizon 2020 until the end of 2016. During this time, their participation in European projects was funded either by the European Commission (EC) or by the Confederation, depending on the programme area (cf. also Section 2.3). Since the beginning of 2017, participants from Switzerland have been able to take part in all programme areas as an associated partner, receiving funding from the EU. These factors should be borne in mind when interpreting the results presented below.

4.2 Structure of Horizon 2020 and Switzerland's current status

Compared to its predecessor programmes, Horizon 2020 includes a number of organisational simplifications, and various administrative processes have been streamlined. For example, the duration between project approval and the conclusion of grant agreements has been shortened considerably, and project accounting is more often based on flat-rate costs, thereby reducing administration.

Like the previous framework programmes, Horizon 2020 covers practically the whole value chain, from fundamental research to applied research and technological development. Compared to FP7, it gives even greater priority to innovation and support for SMEs. In most programme areas, 20% of the budget is targeted for SMEs compared to 15% under FP7, and there is a new funding instrument focused specifically on SMEs. Horizon 2020 deviates only slightly from its predecessor programme in thematic terms. Although its structure differs from that of FP7, the disciplines covered are roughly the same. That being said, greater emphasis is being put on promoting transdisciplinary projects across several thematic areas, which sometimes takes place in joint calls on different areas.

Brief descriptions of the various programme areas of Horizon 2020 are given below, and the various conditions for participation which applied for Swiss participants during the period of partial association (September 2014 to the end of 2016) are explained.

Horizon 2020 is structured on three programme pillars (cf. also Figures 8–11):

1) Pillar I

Excellent Science (budget: EUR 24.4 billion or 31.7% of the total Horizon 2020 budget) – Principle: Promoting the excellent fundamental and pioneering research in Europe. Pillar I incorporates two important individual funding instruments. First, the ERC, which was only founded in 2007 but has already established a strong reputation, funds promising research projects of individual scientists from all disciplines with highly remunerated grants. Second, the proven Marie Curie Actions (now Marie Skłodowska-Curie Actions, MSCA) provide important training and mobility opportunities for young researchers. In addition, in Pillar I funding is awarded (a) to cross-disciplinary collaborations in innovative fields of research with a view to developing future tech-

nologies (Future and Emerging Technologies, FET[7]) and (b) for ensuring high-quality research infrastructures for the common use of scientists within Europe and beyond.

Switzerland's status: Since 15 September 2014, participants from Switzerland can apply to all calls for proposals of Pillar I; if successful they are directly funded by the EU. In the case of calls with submission deadlines before 15 September 2014, Swiss participations in successful[8] collaborative projects are funded by SERI. Before 15 September 2014, participants from Switzerland were completely excluded from ERC grants and certain MSCA instruments, as these are individual funding schemes. This affected two ERC calls in particular, Starting and Consolidator Grants 2014 for young researchers (2 – 7 or 7 – 12 years after obtaining a doctorate) and the MSCA Global Fellowships. In view of the great importance of ERC grants for research in Switzerland, in March 2014 the Swiss National Science Foundation (SNSF), with the support of SERI, introduced back-up measures for researchers at Swiss institutions[9] in record time. These measures will not be considered in the analyses that follow, as they are not European projects.

2) Pillar II

Industrial Leadership (EUR 17 billion or 22.1%) – Principle: Investments in research and development in key areas of industry (information and communication technologies, nanotechnologies, advanced materials, biotechnology, advanced manufacturing and processing and space). In addition, Pillar II offers innovative companies access to risk finance and includes financial measures focused specifically on SMEs in order to help them establish themselves in the market.

Switzerland's status: Participants from Switzerland had the status of third-country participants in all calls for proposals under Pillar II until the end of 2016. This means that if successful, their participation in a European collaborative project was funded by SERI and not by the EU. Third-country status meant for Swiss institutions that they were completely excluded from individual funding schemes relating to risk finance and the SME instrument. Switzerland has been a fully associated participant in the Pillar II programme since 2017.

3) Pillar III

Societal Challenges (EUR 29.7 or 38.5%) – Principle: Research geared to the political priorities of the Europe 2020 strategy. These measures are focused on current social issues whose solutions require interdisciplinary cooperation, in particular also from the humanities and social sciences. Pillar III is structured into seven thematic areas: health; food, agriculture and fisheries; energy; transport; environment (including climate change); inclusive societies; security.

Switzerland's status: As in the case of Pillar II, up to the end of 2016 participants from Switzerland in European collaborative projects under Horizon 2020's Pillar III were not eligible to receive EU contributions and were therefore also funded nationally via SERI. Switzerland has also been granted associated status in this pillar since 2017.

4) Other programme areas and initiatives

Horizon 2020 has further components in addition to the three pillars: the Euratom programme focusing on nuclear fission and radiation protection (cf. Section 6); the Spreading Excellence and Widening Participation and Science with and for Society programmes; and the activities of the Joint Research Centre (excluding the nuclear sector) and of the European Institute of Innovation and Technology (EIT). In 2017 the European Innovation Council (EIC) was established; which does not yet have its own budget, but combines under one roof various innovation funding schemes (e.g. the "Fast Track to Innovation pilot programme").

Finally, Horizon 2020 also contributes to the budgets of numerous other research and innovation programmes, such as COST (European Cooperation in Science and Technology) or the initiatives under Art. 185 and Art. 187 TFEU (cf. Section 5). Horizon 2020 also provides financial support for the Competitiveness of Enterprises and Small and Medium-sized Enterprises programme (COSME, formerly CIP).

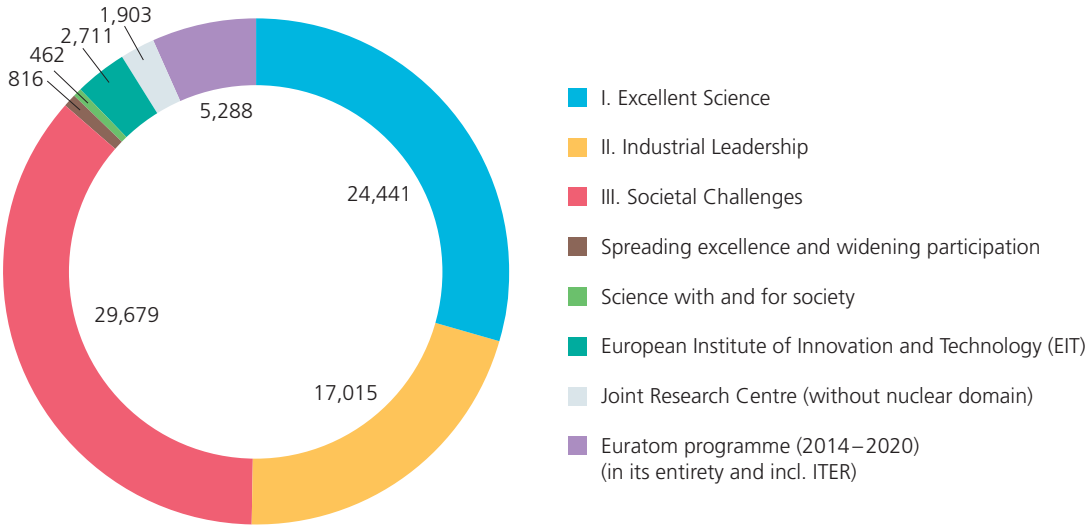
7 The FET programme established the FET flagships, launched as pilot projects at the end of FP7, as a permanent instrument.

8 'Successful' here means: rated as excellent in the EC evaluation process and put on the list of projects to be funded.

9 Further information can be found in the SNSF's Report on the SNSF Temporary Backup Schemes, 2015. www.snf.ch/SiteCollectionDocuments/temporary_backup_schemes_report.pdf (29.08.2018).

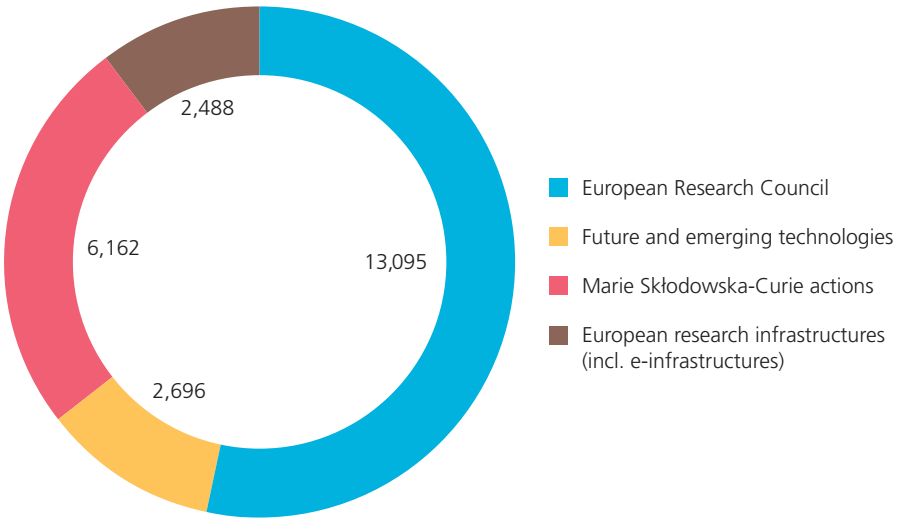
Whereas Switzerland has had associated status in Euratom and in the Spreading Excellence and Widening Participation sub-area since September 2014, it counted as a third country in all other initiatives until the end of 2016 and as an associated country only from 2017. Here, the conditions already described under Pillars II and III apply.

Figure 8: Breakdown of the Horizon 2020 budget by programme areas (in EUR m)



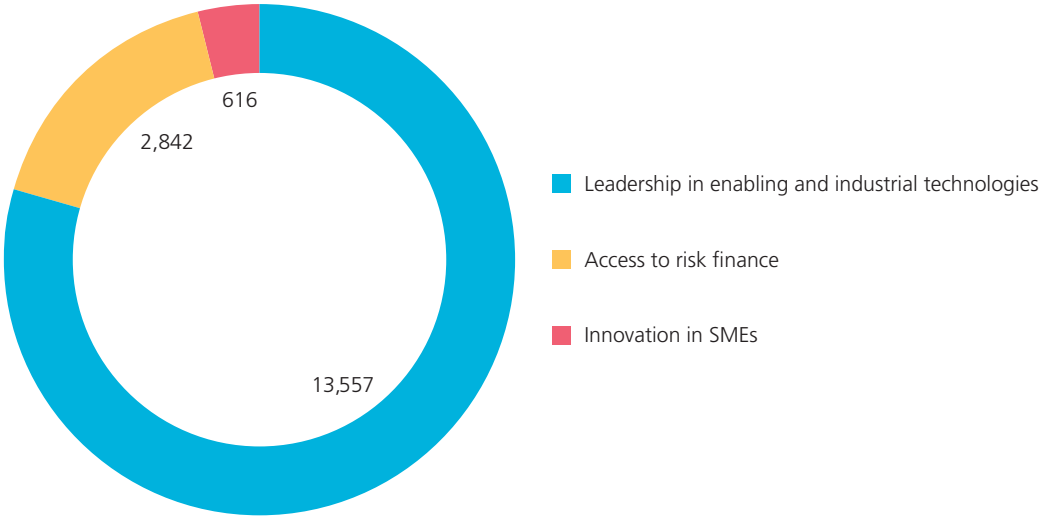
Source: SEC(2014) 357 final, STATEMENT OF ESTIMATES OF THE COMMISSION FOR 2015, (Preparation of the 2015 Draft Budget), Document II, Financial programming 2016, 2020, (Provisional figures), 11.6.2014, cf. Table 7 in Appendix C

Figure 9: Breakdown of the Horizon 2020 budget by programme areas in the Excellent Science pillar (in EUR m)



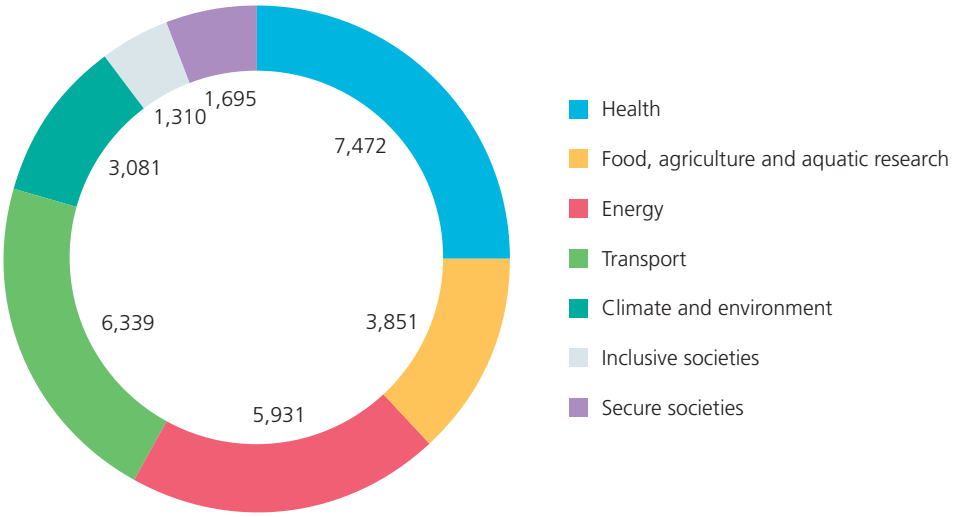
Source: SEC(2014) 357 final, STATEMENT OF ESTIMATES OF THE COMMISSION FOR 2015, (Preparation of the 2015 Draft Budget), Document II, Financial programming 2016, 2020, (Provisional figures), 11.6.2014, cf. Table 7 in Appendix C

Figure 10: Breakdown of the Horizon 2020 budget by programme areas in the Industrial Leadership pillar (in EUR m)



Source: SEC(2014) 357 final, STATEMENT OF ESTIMATES OF THE COMMISSION FOR 2015, (Preparation of the 2015 Draft Budget), Document II, Financial programming 2016, 2020, (Provisional figures), 11.6.2014, cf. Table 7 in Appendix C

Figure 11: Breakdown of the Horizon 2020 budget by programme areas in the Societal Challenges pillar (in EUR m)



Source: SEC(2014) 357 final, STATEMENT OF ESTIMATES OF THE COMMISSION FOR 2015, (Preparation of the 2015 Draft Budget), Document II, Financial programming 2016, 2020, (Provisional figures), 11.6.2014, cf. Table 7 in Appendix C

4.3 Swiss participations and coordinations by type of institution

As already noted in Section 3, Switzerland counts 1,942 project participations in Horizon 2020 so far (as at 6 March 2018), with funding totalling CHF 1.14 billion, provided partly by the EU and partly by the Swiss government. This corresponds to 2.4% of all project participations registered in the database so far and 3.5% of all funding from Europe and Switzerland combined. The average cost of a Swiss project participation is CHF 587,000.

In each joint project in a framework programme, one of the partners acts as project coordinator – more often than not, the initiator of the project proposal. They assume the general leadership of the project and select the project partners. Swiss researchers have only been able to take on this role since Switzerland's association to the FPs in 2004. So far under Horizon 2020, Swiss researchers have acted as project coordinators in 422 or 21.7% of all Swiss participations (including the monobeneficiary projects of the ERC and the MSCA where the grantees are counted as coordinators as well). This is comparable to the figure for FP7: between 2007 and 2013, 22.8% of all Swiss participations were project coordinations. The current figure is a positive one, seeing as researchers from Switzerland were excluded from participating in two ERC calls in 2014, and at the time there was considerable uncertainty over the form of Switzerland's participation in and coordination of projects under Horizon 2020.[10]

Figures 12 and 13 show which types of institution have been particularly involved in Horizon 2020 and have acted as project coordinator (Fig. 12), and which have received the most in funding (Fig. 13).

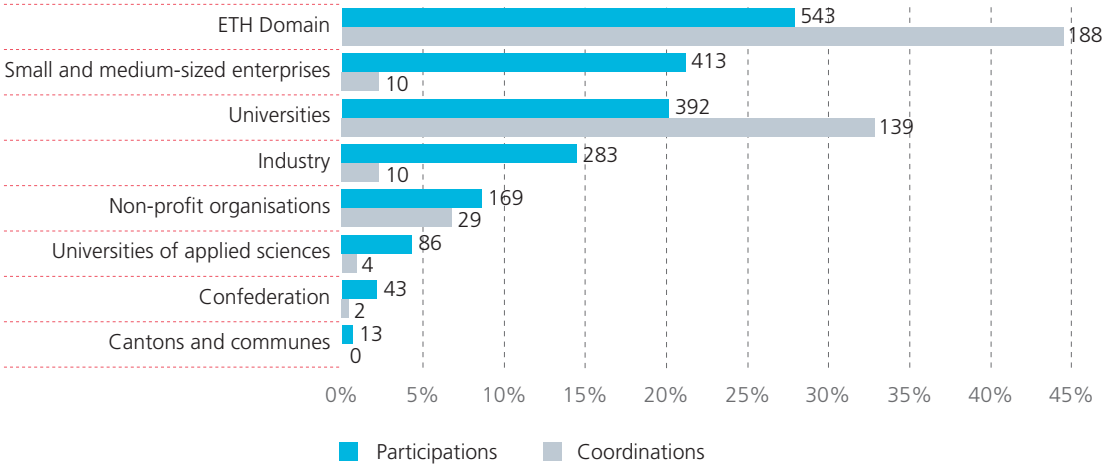
The ETH Domain clearly has the largest number of Swiss participations (543/28%) and coordinations (188/44.5%), as well as the largest share of contributions in favour of Swiss research institutions (CHF 413.1 million / 36.2%). The two federal institutes of technology in Lausanne and Zurich are particularly major players here, with 215 and 218 participations respectively. EPF Lausanne has so far played the slightly stronger role, with 97 project coordinations and funding of CHF 181.2m, compared to ETH Zurich's coordinating role in 80 projects and funding of CHF 172.2m (cf. Table 8 in the Appendix).[11]

10 This presumably discouraged a lot of researchers in Switzerland and abroad from submitting project proposals with a coordinator from Switzerland, or from taking part in such projects.

11 The last time the data were collected, the situation was the other way round (SERI 2016, based on Facts and Figures 2015).

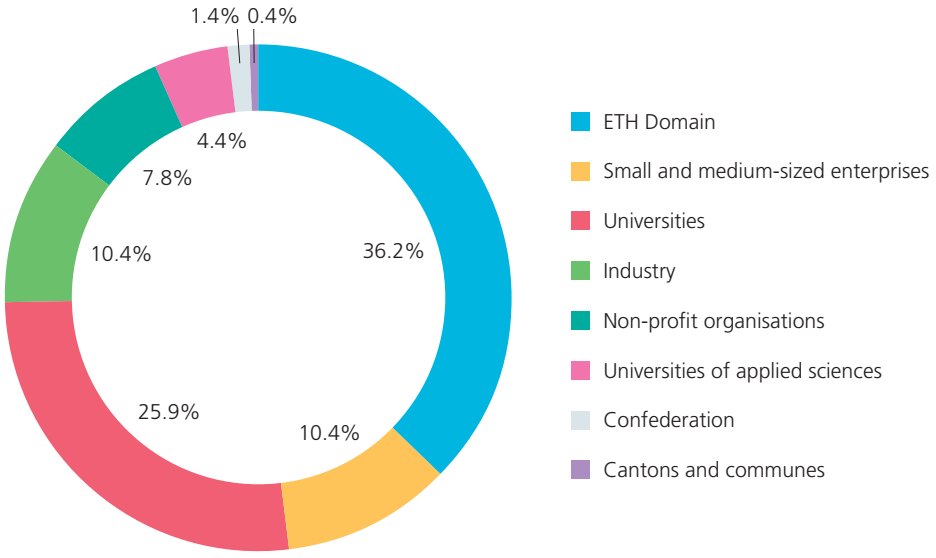
In contrast to FP7, the second biggest players in terms of participations, just ahead of the universities, are SMEs, with 413 participations or 21.3% of the Swiss total. This could be due to the missed ERC calls in the first year of Horizon 2020, given that the main recipients of ERC grants in Switzerland are the ETH Domain and the universities. However, as far as coordinations and contributions are concerned, the SMEs are well behind the universities. Only 13.5% of all funds committed to Swiss participants go to SMEs. Thus, well over half-way into Horizon 2020, SMEs in Switzerland still have a long way to go to meet the EC's target of securing approximately 20% of all funding for SMEs.

Figure 12: Swiss participations and coordinations under Horizon 2020 by type of institution



Sources: European Commission, SERI, cf. Table 8 in Appendix C

Figure 13: Share of contributions to Switzerland under Horizon 2020 by type of institution

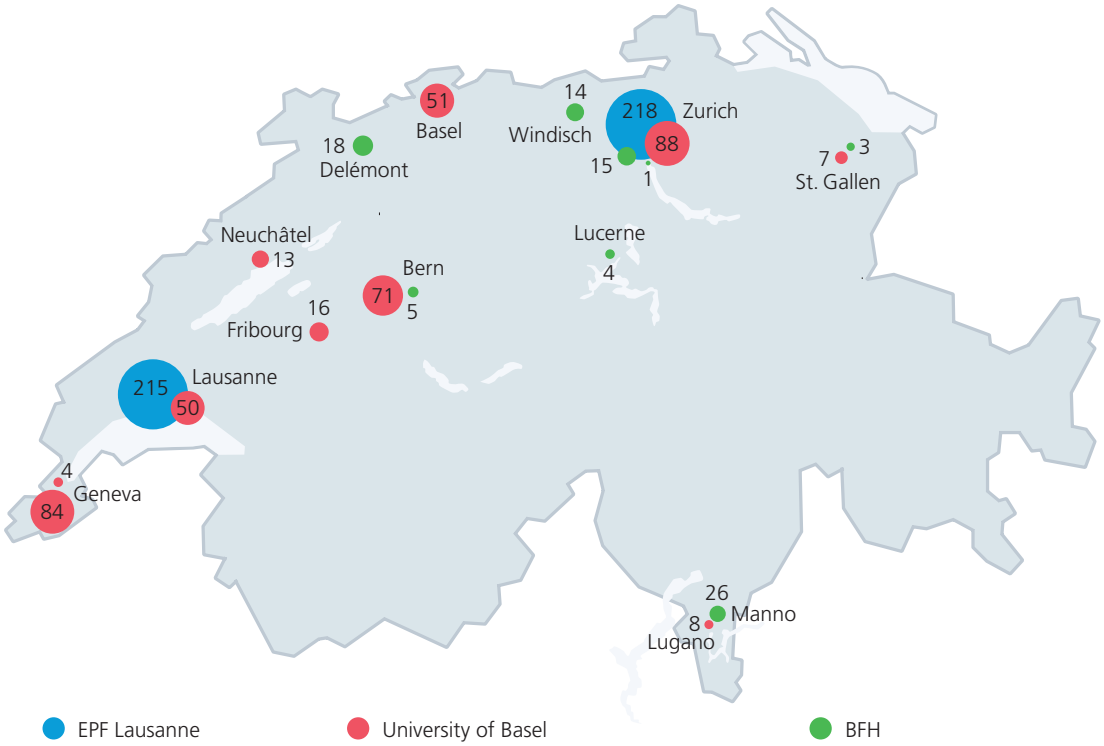


Sources: European Commission, SERI, cf. Table 8 in Appendix C

After the ETH Domain, universities account for the largest share of Swiss coordinations and funding (32.9% and 25.9% respectively). The universities of Bern and Zurich have the most project participations, followed closely by the universities of Geneva and Lausanne (cf. Table 8 in the Appendix). Industry, i.e. large corporations, and non-profit organisations follow closely on their heels with 283 (14.6%) and 169 (7.8%) participations worth CHF 118.3m and CHF 89.5m respectively, whereby non-profit organisations on average receive slightly more

funding per participation than participants from industry (CHF 529,000 vs. CHF 420,000). This is in contrast to the situation under FP7, where the non-profit sector participated far less than commercial businesses. As in previous years, the universities of applied sciences rank third-but-last in terms of numbers of participations (86 participations totalling CHF 50m). However, in comparison with FP7, the universities of applied sciences have gained ground in relative terms as they have increased both their share of participations (from 4% to 4.4%) and their share of funding (from 3.2% to 4.4%). They also coordinate four projects. Finally, the federal, cantonal and local authorities are the least significant players in terms of participations and funding.

Figure 14: Participations in Horizon 2020 by location and higher education institution



Sources: European Commission, SERI, cf. Appendix B for abbreviations

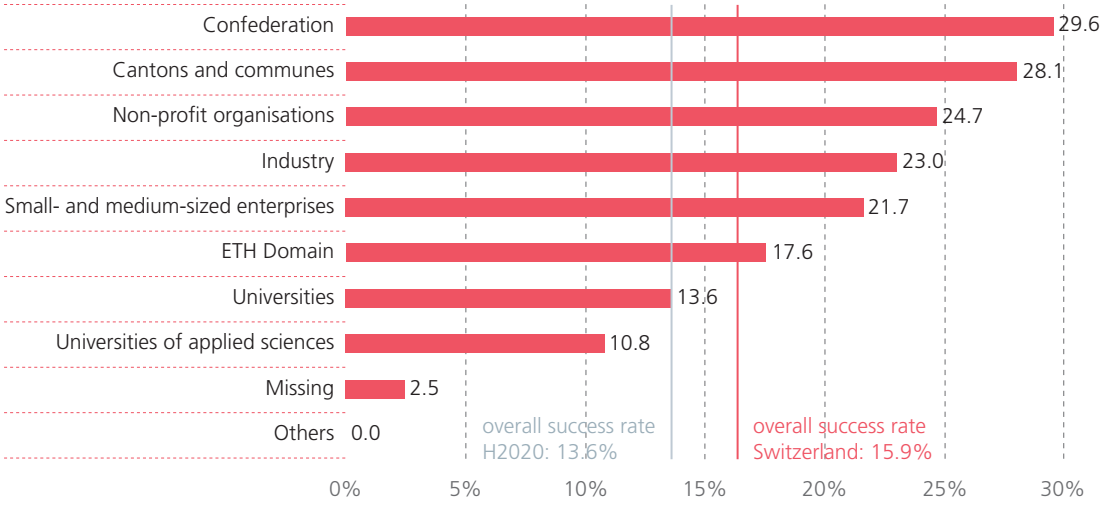
One important aspect of Swiss participation in Horizon 2020 is the success rate, defined as the ratio between the number of funded projects and the number of project proposals submitted (cf. Table 10 in the Appendix).[12]

It is immediately noticeable that the ranking of the types of institutions by success rate is almost the reverse of that for participations and received funding. The fact that ETH Domain institutions and universities have lower success rates than SMEs and industry may be explained by the fact that they are heavily involved in the highly competitive calls for proposals under Pillars I and II for excellence-based basic and applied research,

12 This analysis is based on a different database to that used in most other sections of this report (database of project proposals for Horizon 2020, data supplied by the European Commission on 6 March 2018). In particular, the information in Table 10 on the number of participations differs from the information found in the other parts of the report. The success rates reflect the number of projects selected for funding at the end of the evaluation. This number does not necessarily correspond to the actual number of grant agreements concluded following a call, as depending on the budget available further projects from the reserve list may receive funding or some agreements may not be implemented.

which generally have low success rates.[13] However, if the success rates are set in relation to the overall success rate in Horizon 2020, Swiss universities are quite successful (cf. Section 4.4.3).

Figure 15: Success rate by type of institution



Sources: European Commission, SERI, cf. Table 10 in Appendix C

At 29.6% and 28.1%, federal, cantonal and communal institutions have the highest success rates. This indicates the quality of sectoral research by the various federal and cantonal offices, but also reflects the fact that these public institutions respond to calls specifically for this type of institution. With a 24.7% success rate, non-profit organisations are also very successful; these include research and innovation promotion organisations such as the SNSF and Innosuisse (formerly the Commission for Technology and Innovation CTI). Industry and SMEs also have strong success rates of 23% and 21.7% respectively.

The success rates of the ETH Domain institutions all hover around the average success rate of 17.6% [Eawag: 15.8%; EPF Lausanne: 17.1%; ETH Zurich: 18%; WSL: 19%]. The cantonal universities have an average success rate of 13.6%, exactly the same as the European reference rate, although 2.3 percentage points below the overall Swiss success rate. The spread in this category is, however, broader [USI: 8.8%; University of Bern: 17.6%]. At 17.6%, 15.9% and 14.9% respectively, the success rates of the universities of Bern, Neuchâtel and Basel are up among those of the ETH Domain institutions.

The universities of applied sciences bring up the rear with an average success rate of 10.8%, whereby there is also a wide spread of rates in this category [HES-SO: 7.2%; SUPSI: 15.6%].[14] The low success rate of some universities of applied sciences can presumably be attributed to their limited experience with the modalities of participation in FP calls for proposals compared to the cantonal universities, and to the high degree of technical specialisation of call topics, which may not have corresponded with the specific expertise of universities of applied sciences in Switzerland.

13 The success rate in the FET open calls (fundamental research without predefined topic) was only 3–7%.

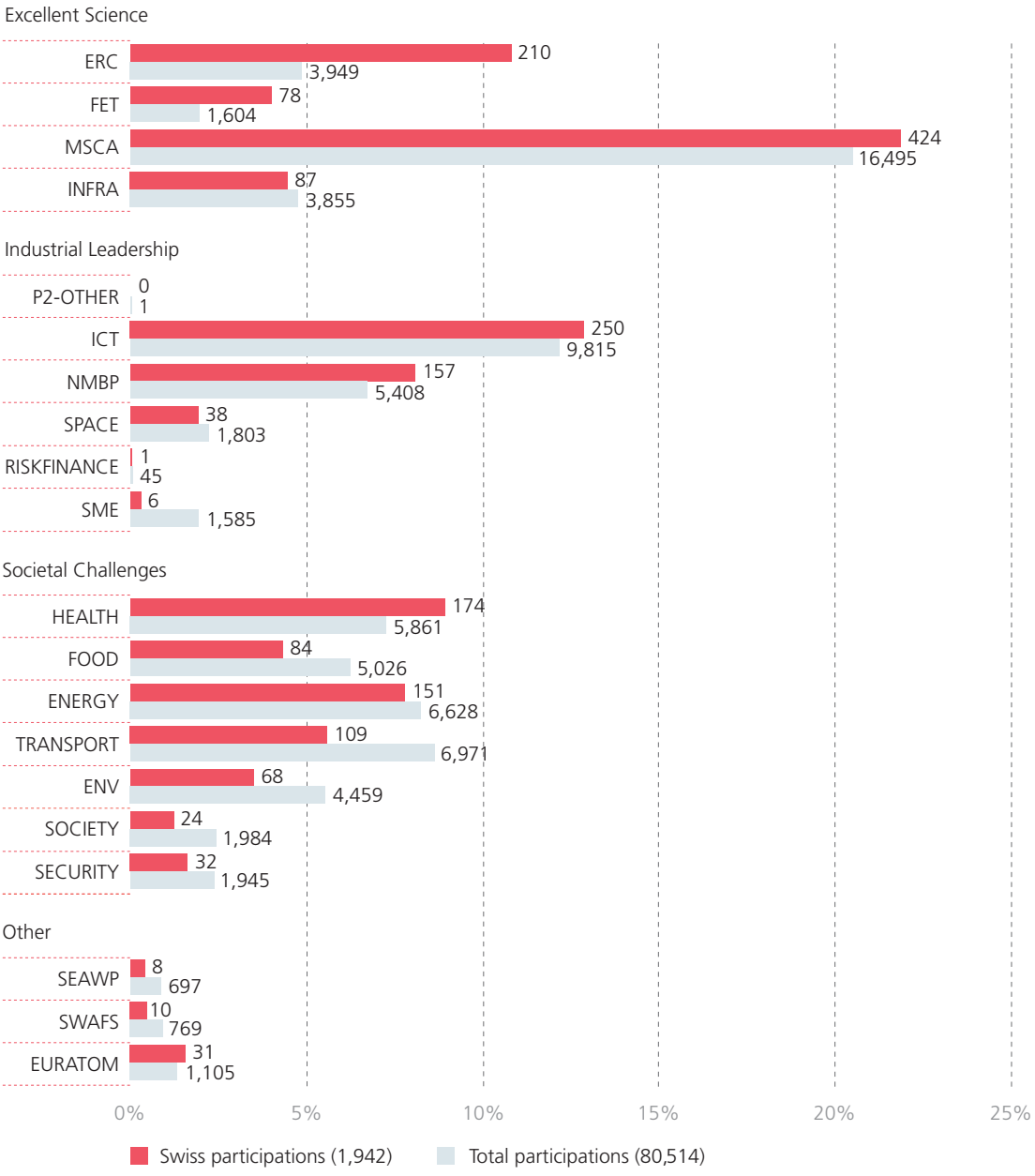
14 The FH-Kalaidos success rate of 50% is not representative, as only two project proposals were submitted.

4.4 Swiss participations by programme area

4.4.1 Number of participations by research area

Figure 16 shows an analysis of the 1,942 Swiss participations in research projects under Horizon 2020 to date by programme area. It illustrates clearly that Swiss institutions are primarily involved in the following research priority areas and programmes: mobility measures under MSCA (424 participations, 21.8% of all Swiss participations); information and communication technologies (ICT; 250/12.9%); ERC (210/10.8%); health (174/9%) and nanotechnologies, materials, biotechnologies and production technologies (NMBP; 157 / 8.1%).

Figure 16: Participations in Horizon 2020 by programme area, in relation to all projects



Sources: European Commission, SERI, cf. Table 11 in Appendix C

Legend 1: Abbreviations

Abbreviation	Programme / research priority
ERC	European Research Council
FET	Future and Emerging Technologies
MSCA	Marie Skłodowska-Curie Actions
INFRA	European Research Infrastructures (incl. e-infrastructures)
LEIT-CROSST	Industrial Leadership – cross-sectional themes
LEIT-ICT	Information and Communication Technologies
LEIT-NMBP	Nanotechnologies, Advanced Materials, Advanced Manufacturing and Processing, and Biotechnology
SPACE	Space
RISKFINANCE	Access to Risk Finance
INNOSUPSME	Innovation in SMEs
SC-CROSST	Societal Challenges – cross-sectional themes
HEALTH	Health
FOOD	Food, Agriculture and Aquatic Research
ENERGY	Energy
TRANSPORT	Transport
ENV	Climate Protection and Environment
SOCIETY	Inclusive Societies
SECURITY	Secure Societies
WIDESPREAD	Spreading Excellence and Widening Participation
SWAFS	Science with and for Society
EURATOM	Euratom Programme
CROSST	Other H2020

Sources: European Commission, SERI, cf. Table 7 in Appendix C

In the above programmes, Switzerland has higher participation rates than the European total (cf. also Section 4.4.3). However, Switzerland is relatively poorly represented in the fields of transport, environment and food. Indeed, Switzerland's participation in the third pillar, Societal Challenges, is below average compared to all participations, with the exception of the health domain. In particular, Swiss participation in the Inclusive Societies programme, which primarily concerns calls for projects in the social sciences and humanities (SSH), has declined from an initial 3.5% to 1.2%, and so lies below the 2.5% of participations from all countries. It is regrettable that the encouraging rate of participation in this area at the beginning of Horizon 2020 could not be maintained, since Swiss researchers from the SSH disciplines were not particularly active or successful in FP7 either.

In addition to the disciplines mentioned, Swiss institutions also exhibit a comparatively strong involvement in Future and Emerging Technologies (FET), a funding programme newly introduced in Horizon 2020 (78 participations or 4.0% of all Swiss participations). This may be in no small measure due to Switzerland's great success in the FET flagship projects. The European Commission is currently promoting two of these prestigious large-scale international projects, which are due to run for a ten-year period and have a project volume of approximately EUR 1 billion each. One of them is the "Human Brain Project", in which researchers from 118 partner institutions in 24 countries are participating; Switzerland is represented by eight institutions and by the coordinating institution, EPF Lausanne. Switzerland is also participating in the "Graphene" flagship, with seven out of a total of 150 institutions from 23 countries involved. The strongly positioned Swiss quantum research community is also likely to respond actively to calls in the new FET flagship on quantum technologies (QT). Moreover, evaluations are ongoing of the pilot projects for one or two future FET flagships: 24 Swiss institutions are involved in the 17 project applications which have successfully reached the second evaluation stage. It can therefore be hoped that Swiss participants will still be represented in the six flagship pilot projects which will be promoted beyond the second evaluation stage and from which one or two new flagship projects will finally be selected (status March 2018).

Despite the unusually low participation in ERC at the beginning of Horizon 2020, a consequence of Swiss institutions being excluded from the first two ERC calls for proposals in 2014, the figures were very strong thereafter. With 210 or 10.8% of all Swiss participations, the number of ERC projects as a share of all Swiss participations in Horizon 2020 is currently twice as high as the share of ERC projects from all countries.

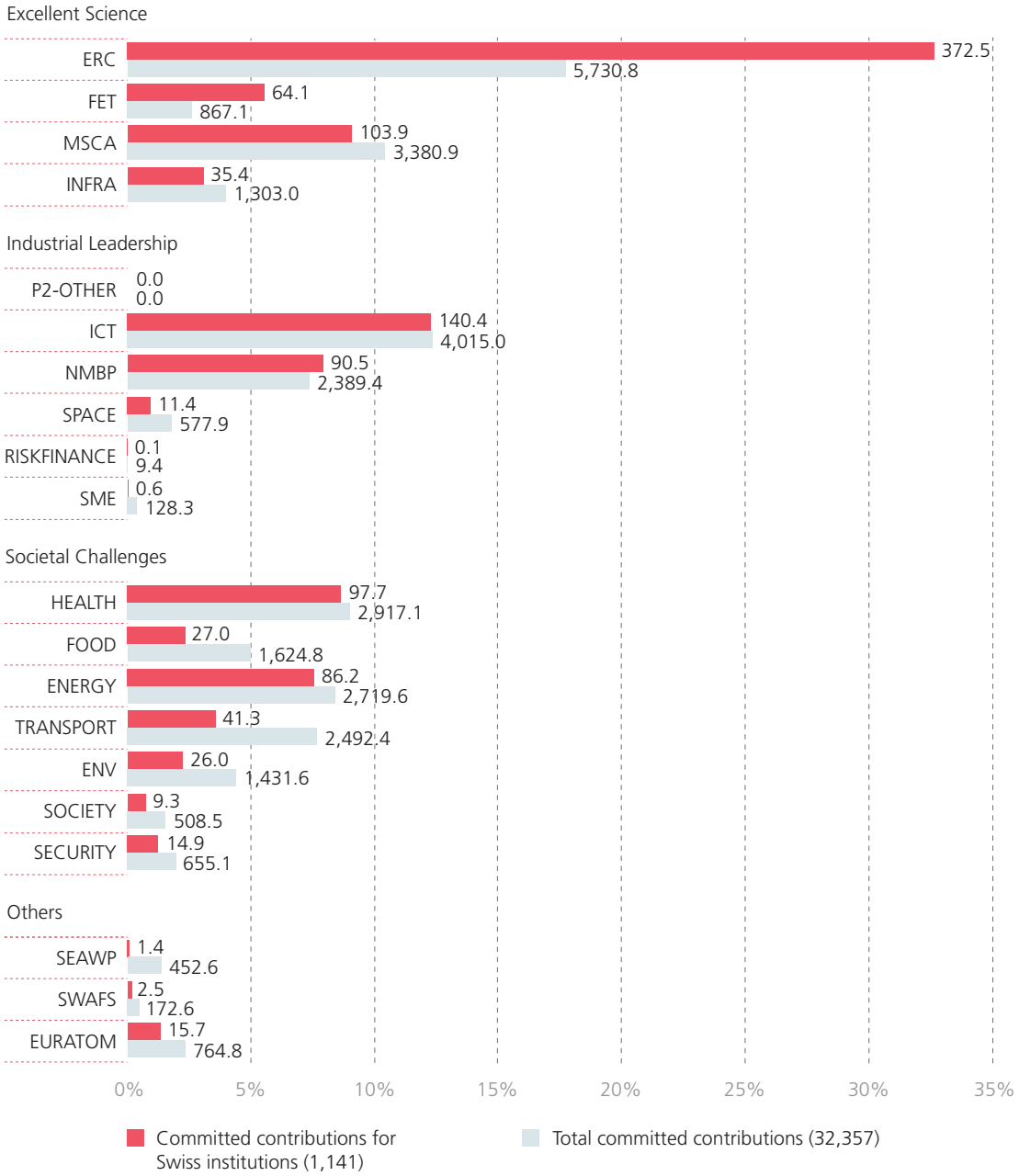
Some projects or project calls are administered by organisations other than the European Commission. In these cases, funding is first paid out to the organisation in question and then transferred by the latter to the researchers involved. The European Commission's database then contains no data about the final recipients or the amount of funding paid out to them. The actual number of projects funded in Switzerland is therefore higher than the figure given here. This discrepancy is particularly high in the space domain, in which many projects are co-funded under Horizon 2020 but managed by the European Space Agency (ESA). Projects supported via the ERA-NET instrument, by the European Institute for Innovation and Technology (EIT) or via initiatives under Article 185 of the Treaty on the Functioning of the European Union (TFEU) do not appear in the data delivered by the EU either. Swiss projects run under Articles 185 and 187 TFEU are dealt with in a separate section (Section 5). Finally, projects in the field of nuclear fusion only involve activities to improve networking and coordination in European nuclear fusion research. The actual research projects in this field are run under the Euratom programme, which is governed by a special European agreement and is subject to other funding regulations (cf. Section 6).

4.4.2 Contributions by research area

So far under Horizon 2020, Swiss institutions have received a total of CHF 1,141.1 million in funding. The research areas and instruments which have received by far the most funding are primarily those in which the number of Swiss participations is or has been high (cf. Section 4.4.1). ERC grants account for the largest amount of funding, namely CHF 372 million, 32.6% of all funding paid out to Swiss institutions. Next come ICT (CHF 140.4m/12.3%), the Marie Skłodowska-Curie Actions (CHF 103.0m/9.1%) and health (CHF 97.7m/8.6%) (cf. Figure 17).

However, parallels between the number of participations and the funding volume per research area can only be drawn to a certain degree because the amount of funding awarded varies greatly according to research area. The average funding volume per Swiss participation in Horizon 2020 across all research areas is around CHF 587,540. In Innovation in SMEs, the funding per participation is very low, at about CHF 100,000 on average. In contrast, projects in Switzerland awarded funding by the ERC receive an average of CHF 1.77 million, above the EU average of CHF 1.45 million in this programme. In the MSCA, Swiss researchers receive an average of CHF 245,047 in funding, compared to the European average of CHF 204,965.

Figure 17: Funding under Horizon 2020 by programme area (CHF m), in relation to total funding



Sources: European Commission, SERI, cf. Table 11 in Appendix C

4.4.3 Intensity and quality of Swiss participations by research area[15]

European research funding is awarded on a competitive basis. Each project proposal is assessed by a committee of experts and evaluated in comparison with the other submissions. Only the best proposals are awarded funding. The success rate is equivalent to the approved proposals as a proportion of the total number of proposals evaluated.[16] A country's success rate therefore depends greatly on the quality of the proposals submitted by its institutions. The general success rates are, however, very different in the different programme areas. They depend primarily on the relationship between the budget for the programme area, the total number of submissions and the average amount of funding per selected project. Some areas have a considerable overall budget yet only target a limited circle of possible funding recipients. This restricts the number of submissions. Other areas, meanwhile, have a large number of potential recipients but a smaller budget.

By taking a look at all Swiss project submissions in Horizon 2020, an impression of the quantity (participation intensity) and quality of the submitted proposals in each research area can be gained. These two variables are expressed for each research area as an activity index and a success index.

In order to establish the activity index, the share of Swiss project proposals in a given area is compared with the share of proposals from all countries in this area. The more intense Switzerland's participation, the higher the index value, i.e. an index value below 1 indicates that the activity of researchers from Switzerland in the given programme area is under-proportional. A value of 1 indicates equal participation, and a value above 1 indicates that Switzerland's activity is over-proportional. If, for example, 10% of all Swiss project proposals are in the health area, and this area accounts for only 5% of all project proposals, this gives an index value of 2 and reflects Switzerland's over-proportional activity in this field. The success index of Swiss project proposals reflects the ratio of the success rate of applications from Switzerland to the success rate of those from all countries in a given area. The index value behaves in the same way as the activity index: the higher the success rate of Swiss project proposals in comparison with the overall success rate, the higher the index value is. And in the same way, a value of 1 indicates a comparable success rate.

The graphic representation of the activity and success indices for the individual programmes and research priorities in Horizon 2020 (Figure 18) shows that the success rate of Swiss project proposals in most areas lies above the European overall average (indicated by the horizontal line at index=1). Furthermore, it makes clear Switzerland's excellent position with regard to the ERC and the FET programme, both in terms of activity and of success.

The Swiss success index lies even higher in the Access to Risk Finance programme, although the result is not so informative as there were only four project submissions.

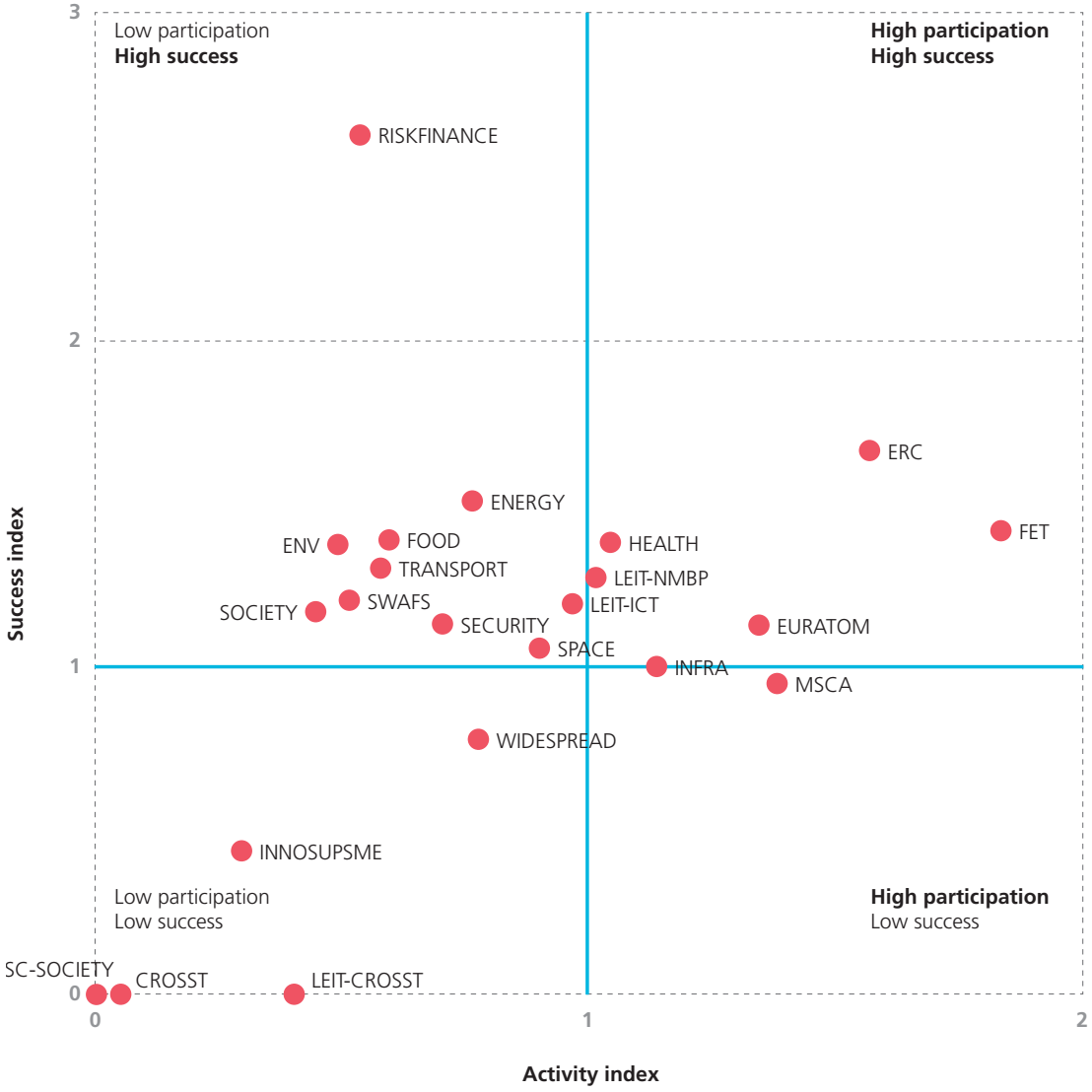
It can also be seen that very few research areas appear in the bottom right quadrant of the diagram. In Switzerland, high participation in a specific research area thus generally means a high success rate.

The areas in the upper left quadrant indicate a sound success rate but comparatively low activity. They suggest untapped funding potential for Swiss institutions in the fields of the environment, food, agriculture and aquatic research, energy, transport, secure societies, space exploration, social sciences and humanities ("Inclusive Societies") and "Science with and for Society".

15 These assessments are based on figures from a different database to that referred to in other sections of the report (database of project proposals for Horizon 2020, data provided by the European Commission on 6 March 2018). The data in Table 12 (cf. Appendix) on the number of participations are therefore different from the data found elsewhere in the report. The latter are based on the contracts database.

16 In other words, submissions which are withdrawn by the applicant or do not meet formal requirements are not considered in the calculation of the success rate. This is also true for double applications or applications which are subsequently assigned to another area. It should also be noted that the success rates reflect the number of projects selected for funding once the process is over. evaluation process is over. This number does not necessarily correspond to the actual number of grant agreements concluded following a call, as depending on the budget available further projects from the reserve list may receive funding or some agreements may not be implemented.

Figure 18: Activity index and success index of Swiss project proposals in Horizon 2020 by specific programme and research priority



Sources: European Commission, SERI, cf. Table 12 in Appendix C

The European Research Council (ERC) finances pioneering projects mainly in fundamental research in a wide range of fields. Researchers are free to choose their own area of research. An analysis of the activity and success indices within this programme (Figure 19) shows that Swiss project proposals in almost all areas perform well to very well, although the activity index is under-proportional in all but three areas. Swiss research is particularly strong in the physical and engineering sciences. Here the success rate of Swiss submissions is up to twice as high as the European overall value. In grants for young scientists (Starting Grants, StG) it is 16%, in grants for established researchers (Consolidator Grants, CoG) 29.5% and in grants for advanced researchers (Advanced Grants, AdG) it is 17.3% (cf. Table 13 in the Appendix). The life sciences also show high success rates, namely 19.7% in Starting Grants, 27.1% in Consolidator Grants and 18.4% in Advanced Grants. These figures are on average 1.7 times higher than the overall value for all countries. A comparatively high degree of activity can be observed in these two thematic areas for Advanced Grants. The results are more nuanced in the social sciences and humanities, where Switzerland's activity is generally below that of the European reference value. All instruments in this area show a Swiss success index above 1. However, this is only just the case for applications for Starting and Consolidator Grants, where the success rates are lowest at 10.9% and 14.7% respectively; in Advanced Grants the success rate is slightly higher, at 16%.

The "Proof of Concept" grant aims to boost the innovation potential of funded ERC projects and is thus aimed exclusively at researchers who have already received an ERC grant. In this area Swiss researchers are very active and have a success rate of around 47.7%, which is above the European reference value. There is, however, limited funding available compared to other ERC grants; grants are worth a maximum of EUR 150,000.

Figure 19: Activity and success indices of Swiss project proposals to the European Research Council (ERC) under Horizon 2020 by discipline

Sources: European Commission, SERI, cf. Table 13 in Appendix C

Legend 2: Abbreviations for ERC grants by discipline

Abbreviation	Grant type
ERC StG-LS	ERC Starting Grant Life Sciences Domain
ERC StG-PE	ERC Starting Grant Physical Sciences and Engineering Domain
ERC StG-SH	ERC Starting Grant Social Sciences and Humanities Domain
ERC CoG-LS	ERC Consolidator Grant Life Sciences Domain
ERC CoG-PE	ERC Consolidator Grant Physical Sciences and Engineering Domain
ERC CoG-SH	ERC Consolidator Grant Social Sciences and Humanities Domain
ERC AdG-LS	ERC Advanced Grant Life Sciences Domain
ERC AdG-PE	ERC Advanced Grant Physical Sciences and Engineering Domain
ERC AdG-SH	ERC Advanced Grant Social Sciences and Humanities Domain
ERC PoC	ERC Proof of Concept
ERC Other	ERC Other and Support Actions

The results shown above demonstrate that the scientific quality of Swiss project proposals is excellent in a European comparison. 210 Swiss projects are funded by the ERC, at a success rate of overall 21.2%, compared to the European rate of 12.7%. An EC study shows that in FP7 Switzerland was the country with the highest success rate for ERC grants.[17]

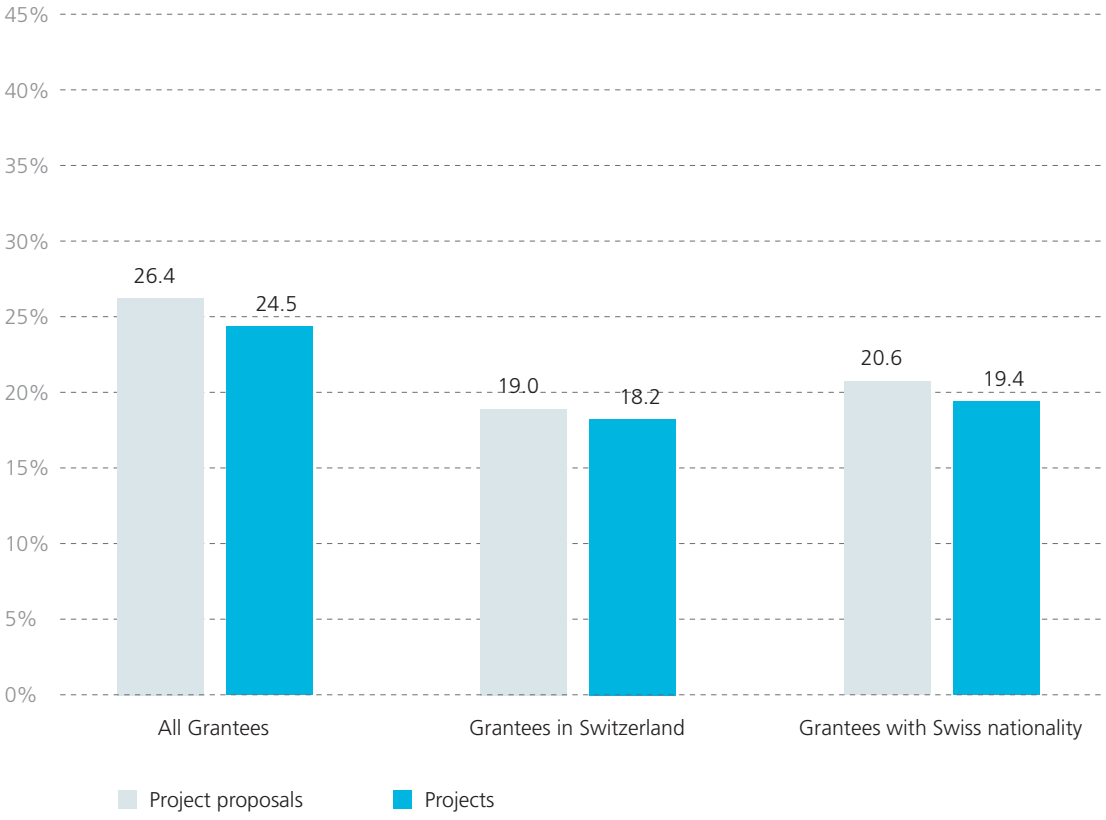
It should be noted that the geographical location of the institution determines which country a project is assigned to, not the nationality of the person submitting the proposal or the place they studied. If we just take the researchers with Swiss nationality, then 98 of their proposals were selected to receive funding following the evaluation procedure in Horizon 2020. This corresponds to a success rate of 19.8% and brings Switzerland up to fourth place in the success rate rankings by nationality (after New Zealand, Malta and Israel). 64% of these researchers are conducting their project in an institution in Switzerland. 70% of the ERC grant recipients working in a Swiss research institution are from abroad (cf. Section 4.7.2). In other words, the success of Swiss institutions is in large part thanks to the attractive conditions in Switzerland, which attract top-class researchers from all over the world.

17 European Commission, 2015, ERC funding activities, 2007-2013, Key facts, patterns and trends.

4.5 Participation by gender[18]

The European Commission's data on Horizon 2020 also allow an analysis of participation by gender among project applicants. Reliable information, however, is only available for individual grants funded under the ERC and the Marie Skłodowska-Curie Actions (MSCA).

Figure 20: Share of female applicants and grantees in European Research Council projects



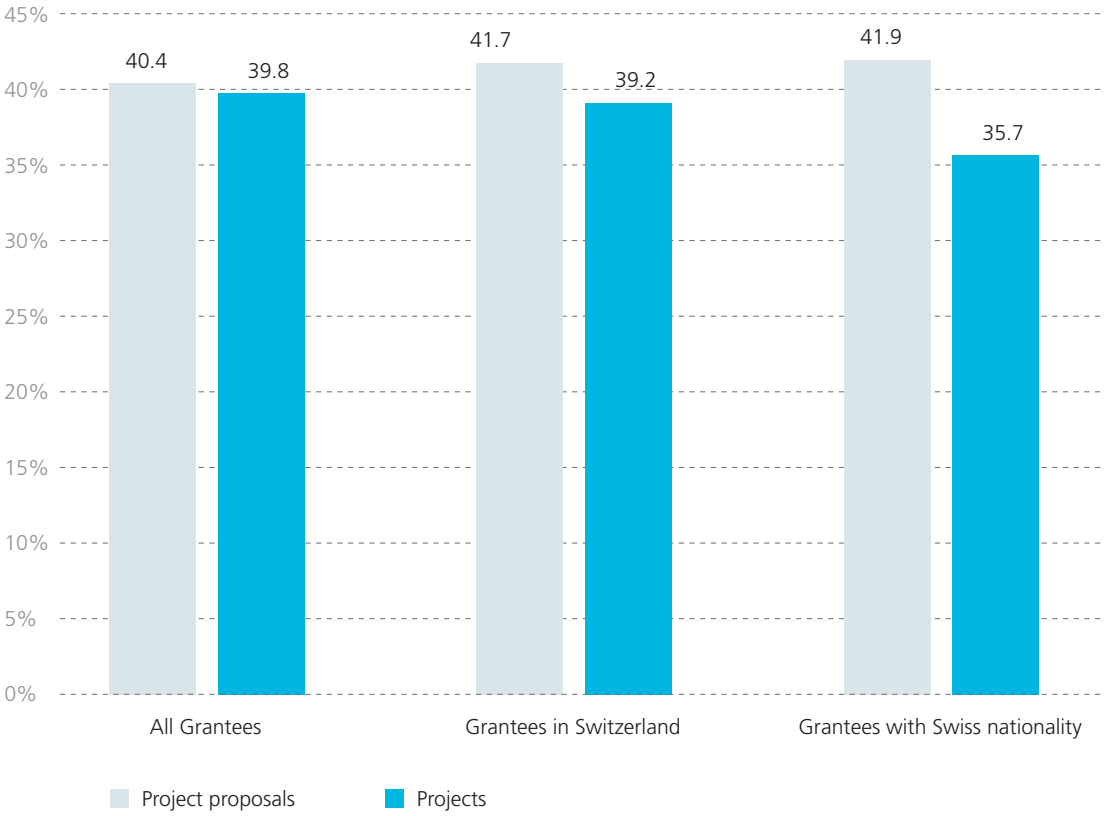
Sources: European Commission, SERI, cf. Table 14 in Appendix C

As Figure 20 shows, just under a fifth (19%) of project applications from Switzerland for ERC individual grants are made by women. 20.6% of applicants with Swiss nationality are women. The proportion of women involved in projects which are awarded funding is only slightly lower (18.2% for projects in Switzerland and 19.4% for Swiss nationals). This suggests that the relatively low proportion of women is due to a lower rate of participation among female researchers rather than poorer success rates. This also holds true looking at the figures for all European countries combined: there is no significant difference between the proportion of women applying and the proportion being awarded ERC funding. It can also be seen that these values are slightly higher than the rates for Switzerland. In all, around a quarter of all ERC grant applicants and grantees are female. Although promoting the careers of female scientists is an expressed aim in the European Commission's research policy,[19] there is still a long way to go before there is a balance in the participation of men and women in European research projects, at least those funded by the ERC. But this not only applies to the FPs; in the EU, 33% of research positions and 21% of professorships are held by women, and only one fifth of universities have a woman at their head.

18 The data on Swiss and European institutions outside of the FPs presented in this section are taken from the EU publication 'She figures 2015, Gender in Research and Innovation, Statistics and Indicators' (2014).

19 In 1999 the European Commission set the goal of raising the percentage of female recipients of Marie-Curie grants to at least 40% (European Commission, 1999, Communication of the European Commission on Women and Science – Mobilising Women to Enrich European Research (COM (1999)76, Brussels). This aim was then extended to all levels of implementation and management of the research programmes (Council Resolution of 26 June 2001 on Science and Society and Women in Science, 2001/C/199/01).

Figure 21: Share of female applicants and grantees in Marie Skłodowska-Curie Actions



Sources: European Commission, SERI, cf. Table 15 in Appendix C

The number of female researchers is actually increasing faster in all sectors than the number of their male colleagues. For example, the average annual increase in the number of female researchers in Switzerland between 2005 and 2011 was 4.8%, compared to 3.3% for men. However, it will still be many years before a balance between the sexes is reached.

The discrepancy between numbers of men and women is less marked in an analysis of the MSCA (cf. Figure 21). Here the under-representation of women in Switzerland, or among researchers with Swiss nationality, is about the same as the European average. Around 40% of project proposals are made by women, and similarly around 40% of funding recipients are women (European average: 39.8%, grantees in Switzerland: 39.2%; Swiss nationals: 35.7%). As in the ERC evaluation, there is no great difference between the percentage of women in project applications and that in funded projects. Among MSCA participants with Swiss nationality, however, there is a difference of 7.2 percentage points between project applications and funded projects.

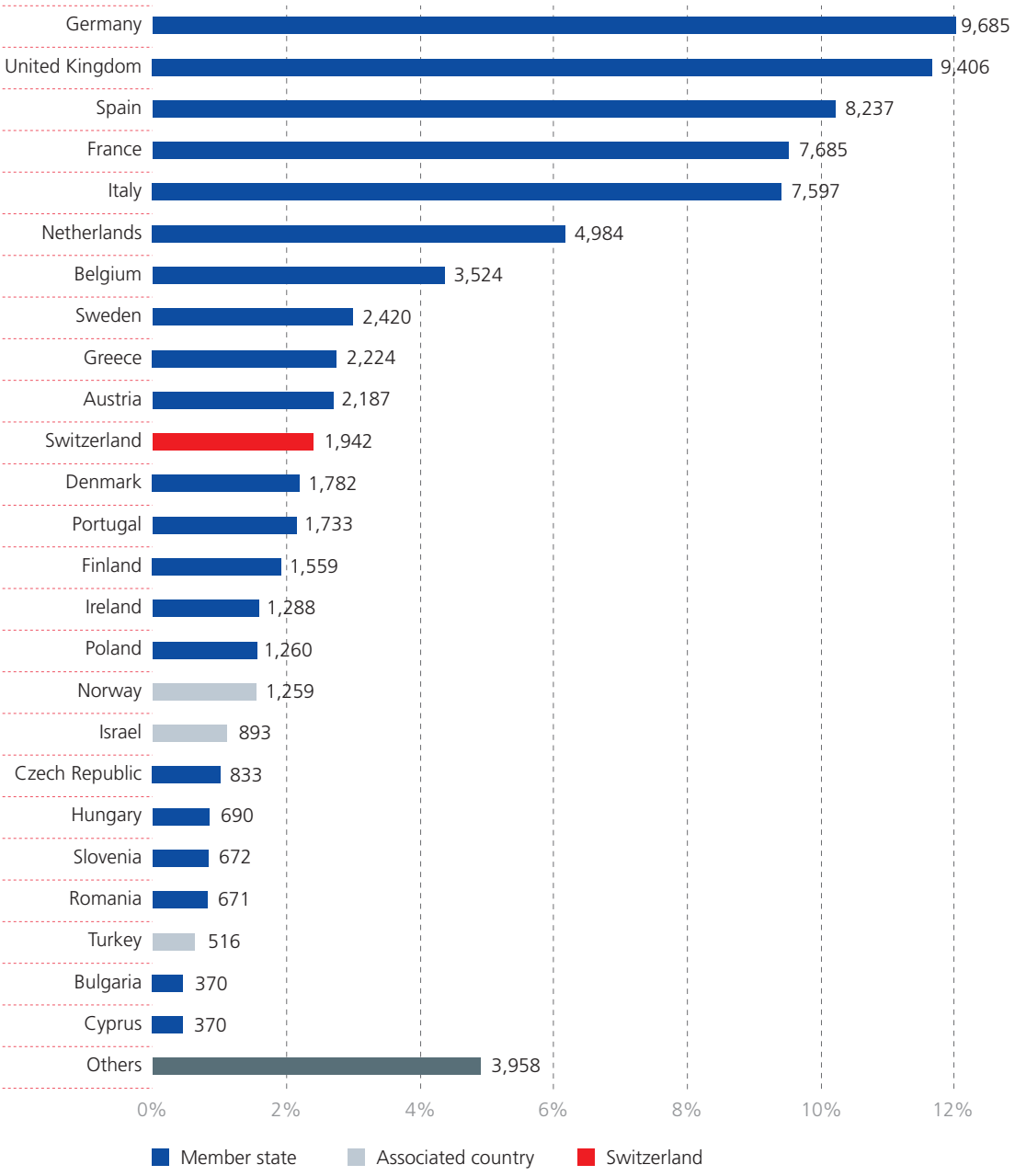
4.6 Switzerland and Europe compared

This section looks at Switzerland's position in Horizon 2020 compared with other European countries. This is considered both in terms of the number of project participations and coordinations, and awarded funding and success rates.

4.6.1 Number of participations per country

Of the 80,514 project participations under Horizon 2020 so far, Germany and the United Kingdom account for the largest numbers (12% and 11.7% respectively), followed by Spain, France and Italy. These large countries also topped the rankings in FP7. Switzerland is still the associated country with the most project participations, ahead of Norway and Israel. But while Switzerland ranked ninth in the previous programme, it fell back to eleventh place in the first half of Horizon 2020, a decline from 3.2% to 2.4% of all participations. This negative trend is due to Switzerland's situation after 9 February 2014 and the exclusion of Swiss institutions from two ERC calls, which is still reflected in the figures three years later.

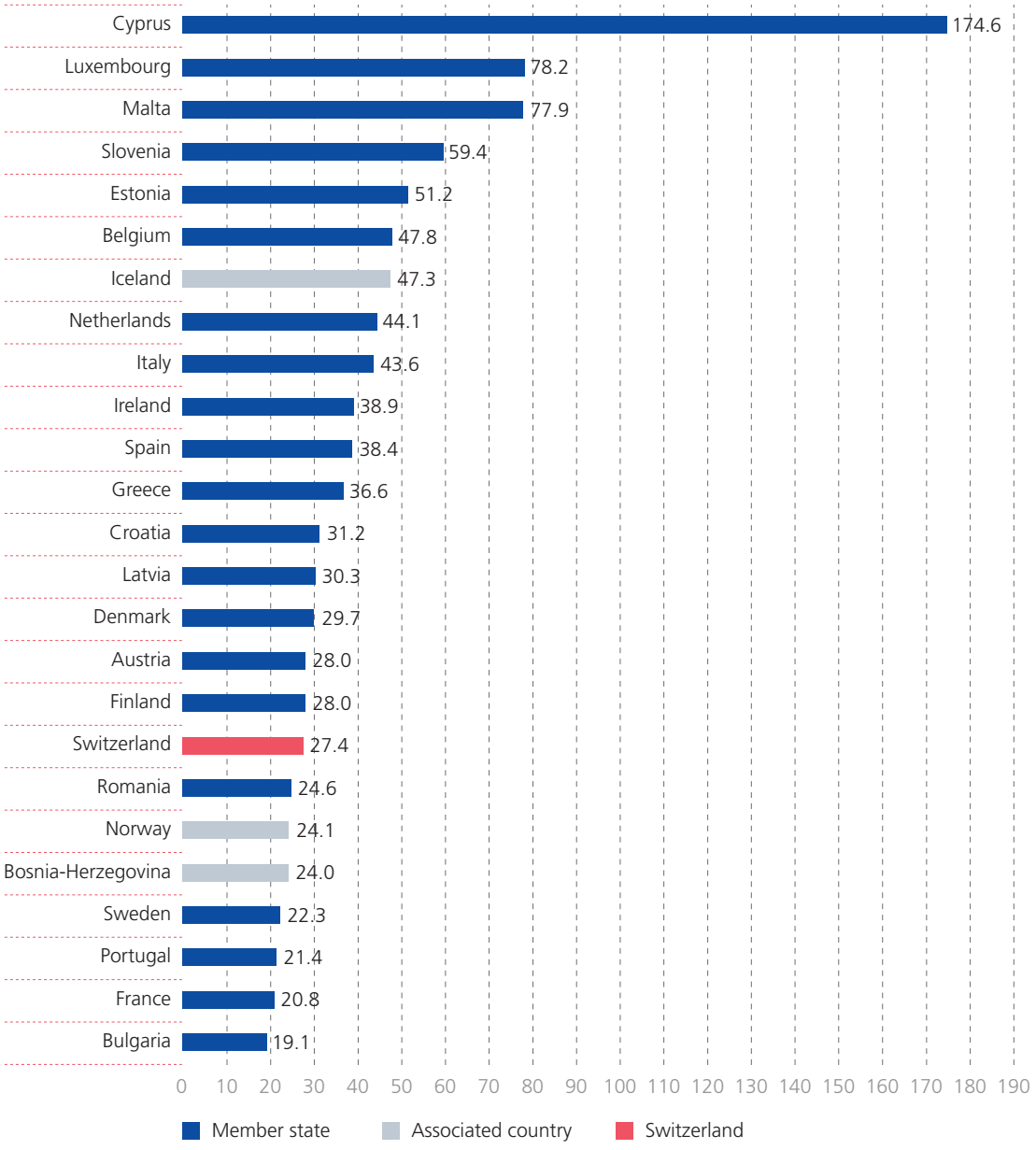
Figure 22: Share of participations in Horizon 2020 per country



Sources: European Commission, SERI, cf. Table 16 in Appendix C

A different picture is presented when the number of participations per country is compared with the number of researchers in that country. Figure 23 shows the number of project participations in Horizon 2020 per 1,000 researchers. It is not surprising that, using this calculation method, small countries such as Cyprus, Luxembourg and Malta head the table. However, there is a surprisingly large difference between Cyprus in first place with 174.6 project participations per 1,000 researchers and Luxembourg in second place with 78.2. Some larger countries are also towards the top of the rankings, such as Italy (9th place) and Spain (11th place). Iceland lies in seventh place with 47.3 project participations per 1,000 researchers, and is thus the best-ranked associated country before Switzerland, which lies in eighteenth position. Interestingly, Switzerland performs worse in this ranking than in the unweighted figures (cf. Figure 22). This suggests that it has a large number of researchers as a proportion of the population, or else other relatively good funding opportunities.

Figure 23: Number of participations in Horizon 2020 per 1,000 researchers per country

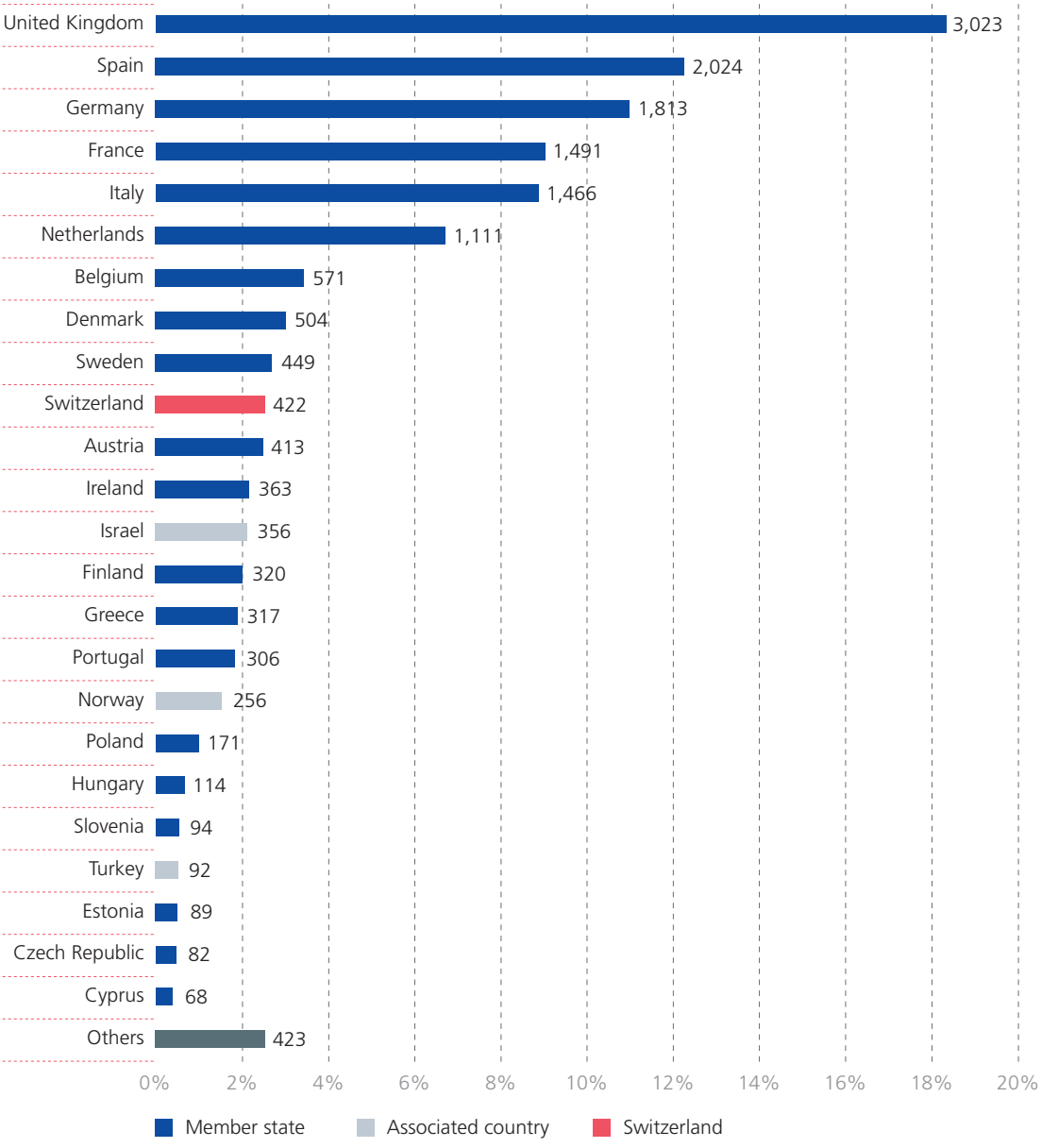


Sources: European Commission, Eurostat, OECD, UNESCO, SERI, cf. Table 16 in Appendix C
NB: The absolute number of researchers in a country from the last available year (usually 2015) was taken as the weighting variable.

4.6.2 Number of coordinations per country

A comparison of the absolute number of project coordinations presents at the top a similar picture to that for the absolute number of project participations. With 18.5% of all coordinations, the United Kingdom ranks first by a wide margin, ahead of Spain at 12.4% (see Figure 24). The relative decline in Switzerland's position in Horizon 2020 compared to FP7 is somewhat more pronounced when it comes to coordinations. Whereas in the previous programme Switzerland ranked seventh, with 3.9% of all project coordinations, so far in Horizon 2020 its share has dwindled to just 2.6%, leaving it in tenth place. However, it should be pointed out that this result is considerably better than the figure for the first 18 months of Horizon 2020. In mid-2015, the Swiss share of coordinations was just 0.3%, placing Switzerland 24th in the European rankings. This was due to the fact that in spring 2014 it was unclear whether third-country participants would be permitted to coordinate projects. For this reason, while many consortia had actually envisaged a Swiss coordination while preparing a project proposal, they transferred the leadership role to another project partner at short notice.

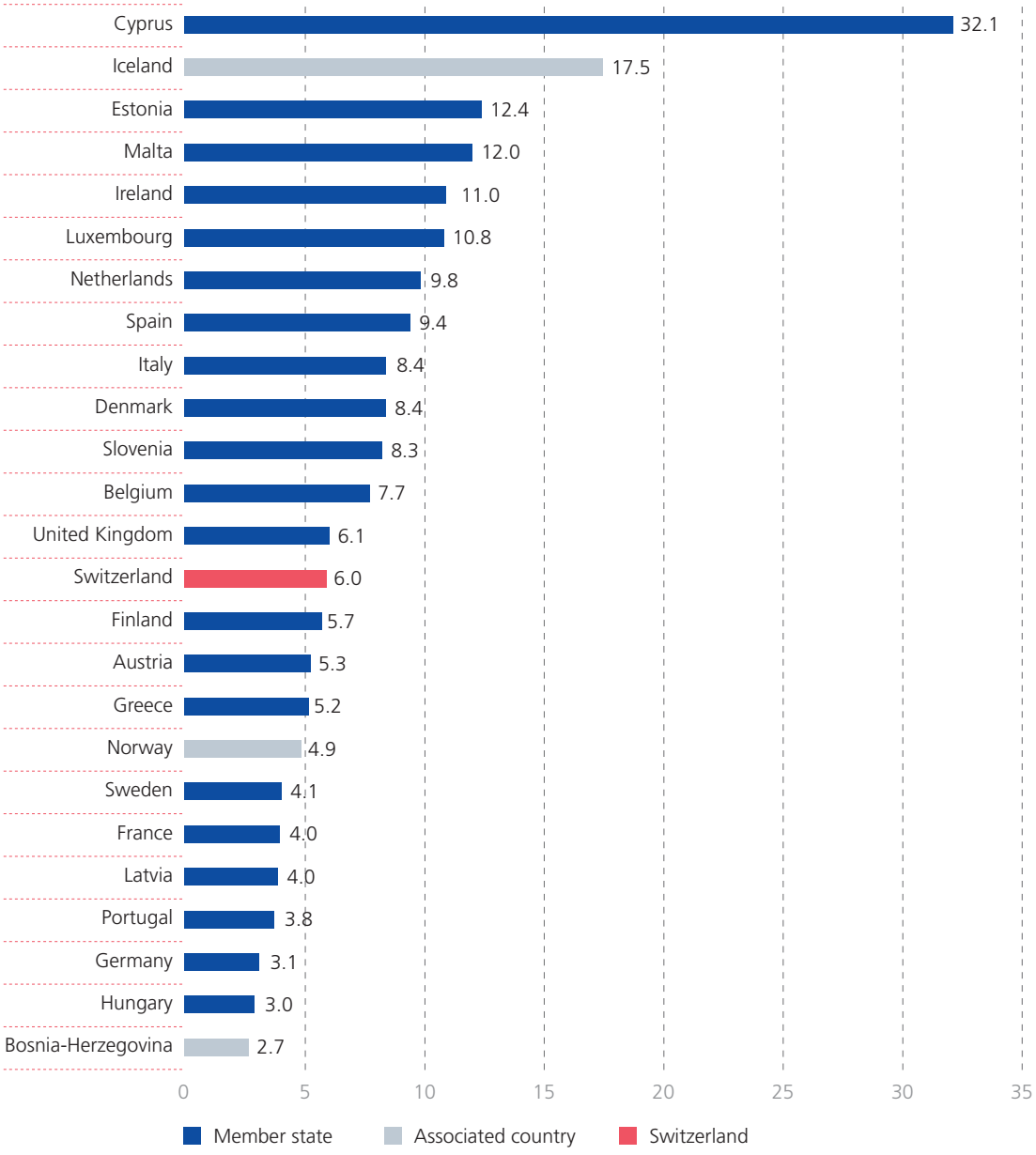
Figure 24: Share of coordinations in Horizon 2020 per country



Sources: European Commission, SERI, cf. Table 16 in Appendix C

If, instead, the number of coordinations per country in Horizon 2020 is weighted with the country's number of researchers – as shown in Figure 25 – Cyprus again heads the ranking by a large margin, with 32.1 coordinations per 1,000 researchers. Iceland is in second place with 17.5, ahead of Estonia and Malta. The highest-ranking larger countries are once again Spain (7th) and Italy (8th). With six coordinations per 1,000 researchers, Switzerland lies in 14th place and so is once again the second best-placed associated country. Just above Switzerland in the rankings is the United Kingdom, which does not even appear in the top 25 countries in the weighted number of project participations (see Figure 23).

Figure 25: Number of coordinations in Horizon 2020 per 1,000 researchers per country

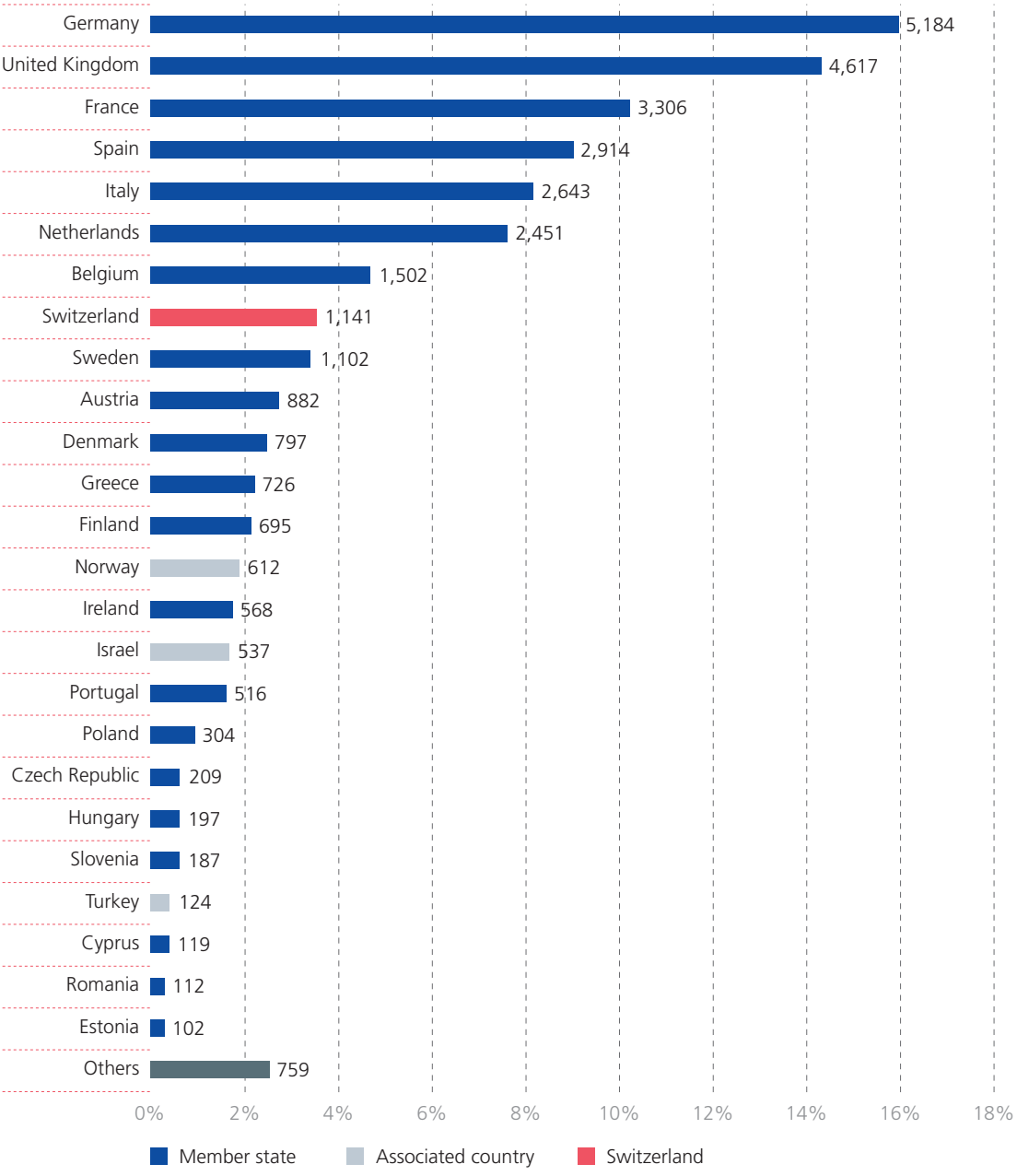


Sources: European Commission, Eurostat, OECD, UNESCO, SERI, cf. Table 16 in Appendix C
NB: The absolute number of researchers in a country from the last available year (usually 2015) was taken as the weighting variable.

4.6.3 Distribution of committed funding among participating countries

As in the absolute number of project participations, the big European countries also dominate when it comes to the distribution of committed funding (cf. Figure 26). Germany accounts for the largest share with CHF 5,184.0 million, or 15.9%, followed by the United Kingdom, with 14.3% of all funding. These two countries also topped the ranking of funding recipients under FP7, receiving almost equal amounts of funding with 15.9% (Germany) and 15.3% (UK). With 3.5% of all funding, Switzerland finds itself in eighth position after Belgium and still ranks first among the associated countries. However, there has been a slight deterioration, given that Switzerland was the seventh largest recipient of funding under the previous programme (4.3%).

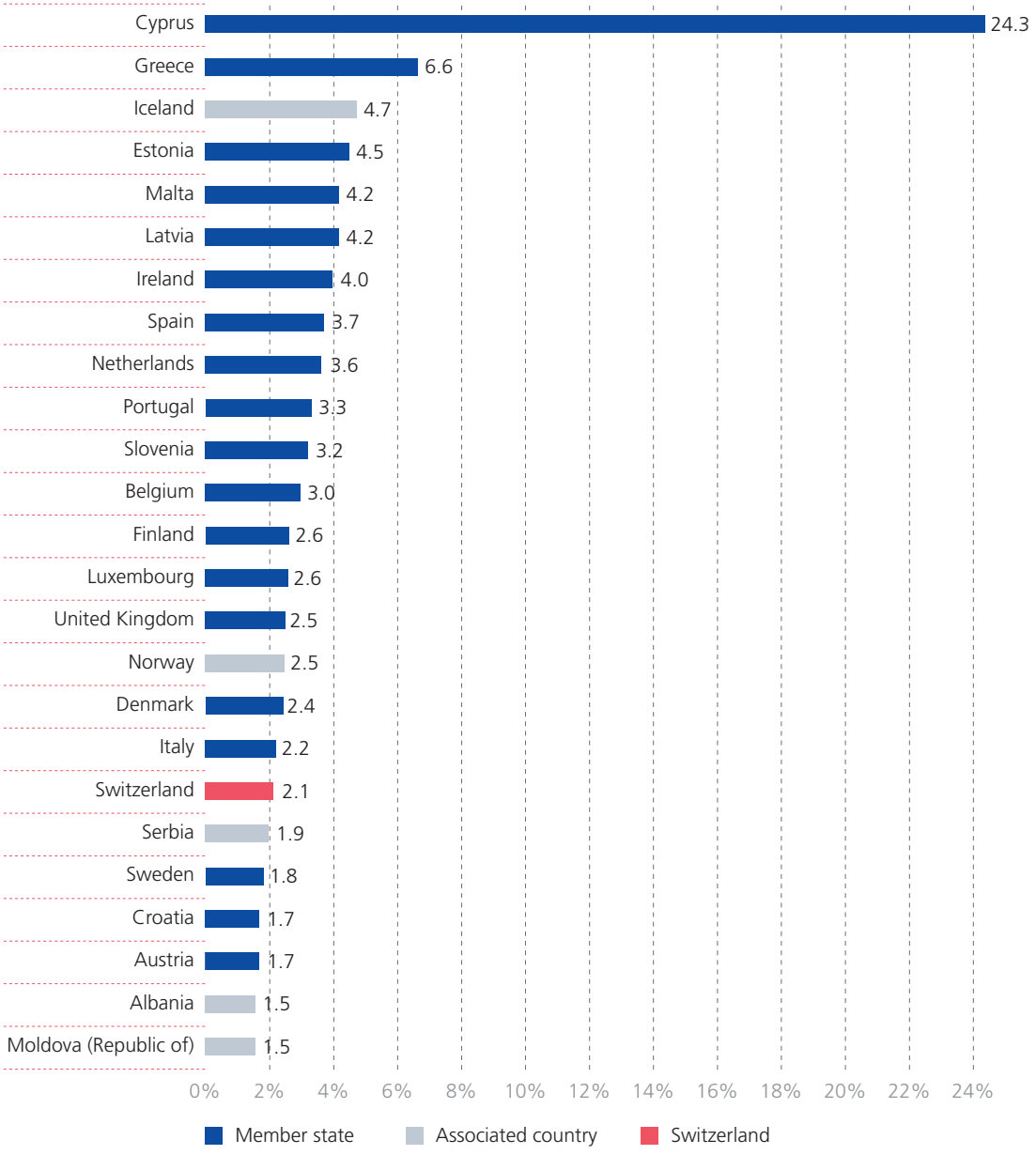
Figure 26: Share of committed funding in Horizon 2020 by country (in CHF m)



Sources: European Commission, SERI, cf. Table 16 in Appendix 16

The amounts of committed funding per country under Horizon 2020 are analysed below in weighted form as well. Figure 27 shows the average funding received per year by each country as a percentage of its annual gross domestic expenditure on research and development (GERD). Cyprus once again occupies a lonely position at the top. Whereas Horizon 2020 funding received by research institutions in Cyprus represents about 24.3% of the country's R&D expenditure, for Greece, in second position, this figure is almost four times less, at 6.6%. In third place is Iceland, an associated country, ahead of Estonia and Malta. Smaller European countries thus dominate the rankings; the highest-placed larger states are 8th (Spain, 3.7%) and 15th (United Kingdom, 2.5%). Switzerland holds third position among the associated countries behind Iceland and Norway, and at 2.1% is 19th overall.

Figure 27: Average amount of committed funding per year under Horizon 2020 as % of a country's gross domestic expenditure on research and development



Sources: European Commission, UNESCO, SERI, cf. Table 16 in Appendix C
NB: The weighting variable used was the level of a country's gross domestic expenditure on research and development in purchasing power parities, according to the last available year (usually 2015).

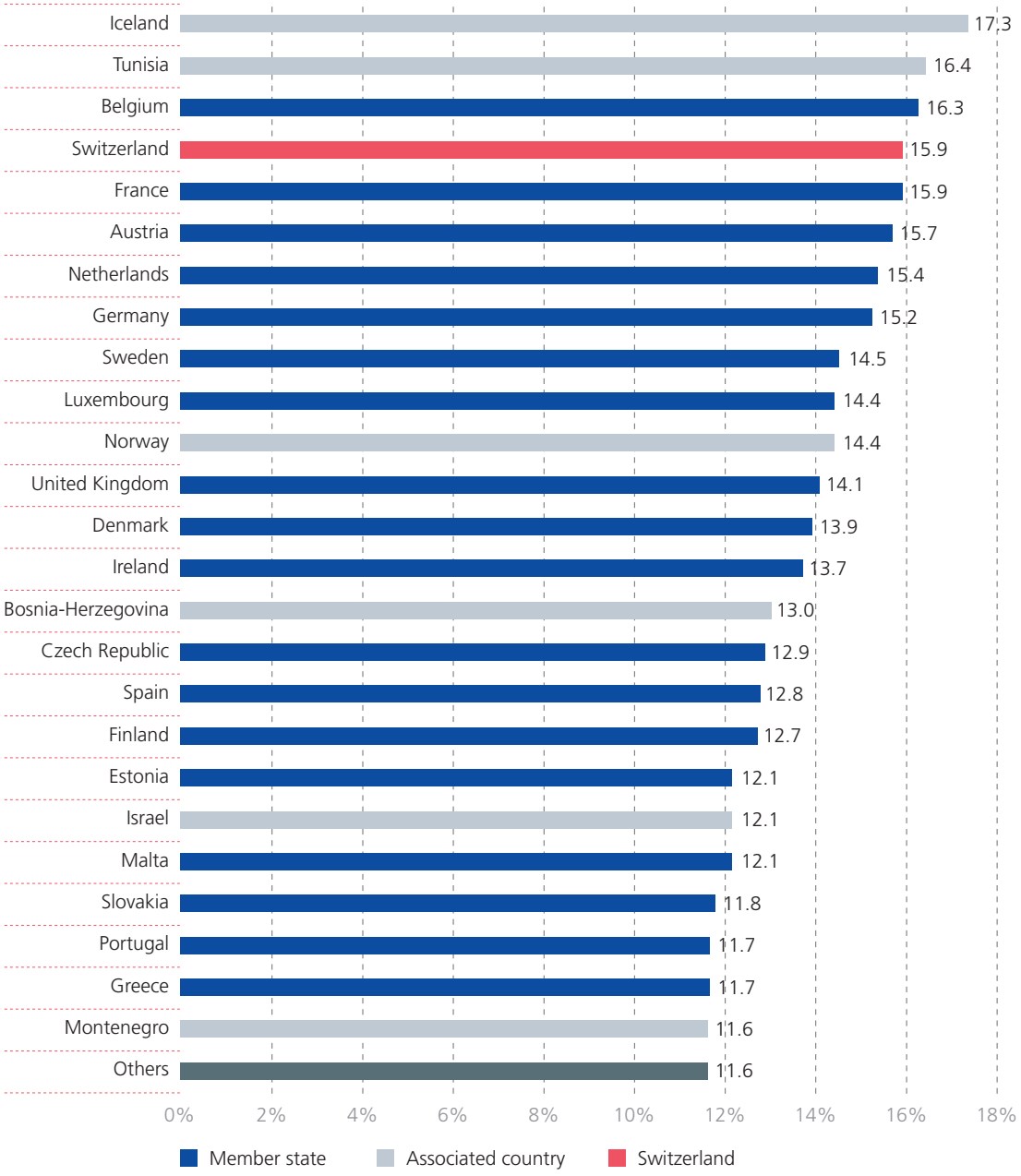
4.6.4 Project proposal success rates[20]

The success rate for each country shows how successful a country is in competing against others in the project-approval process. With a success rate of 15.9% in Horizon 2020, Switzerland occupies fourth place in the European rankings (cf. Figure 28). Roughly every sixth project proposal from a Swiss institution is thus accepted by the European Commission. This is a very good result. Iceland (17.3%) in first place and Tunisia (16.4%) in second place are also associated countries, but they conduct far fewer projects than Switzerland (cf. Table 17 in the Appendix). Belgium is ranked third, with a success rate of 16.3%. Switzerland's fourth place in the success rate rankings has not changed since FP7; however, under the previous programme the Swiss success rate amounted to 24.1% and has thus declined by 8.2 percentage points in Horizon 2020.

Overall it is noticeable that the success rates under Horizon 2020 are significantly lower than under FP7: whereas between 2007 and 2013 the overall success rate across all project proposals and countries stood at 21.2%, since the beginning of 2014 it has fallen to 13.6%. This decline is explained by the fact that calls since 2014 have generally been formulated more openly. This reflects the EC's desire to counter the criticism frequently levelled in FP7 that the conditions set by the calls were too narrow and therefore the research was too closely predefined. However, a more open formulation has had the unwanted side effect of the calls being oversubscribed, i.e. they attract too large a number of project proposals, which naturally reduces success rates.

20 These evaluations are based on a different database to that used in other sections of this report (database of project proposals for Horizon 2020, data supplied by the European Commission on 6 March 2018). In particular, the information in Table 17 in the Appendix on the number of participations differs from the information found in the other parts of the report. The success rates reflect the number of projects selected for funding at the end of the evaluation. This number does not necessarily correspond to the actual number of grant agreements concluded following a call, as depending on the budget available further projects from the reserve list may receive funding or some agreements may not be implemented.

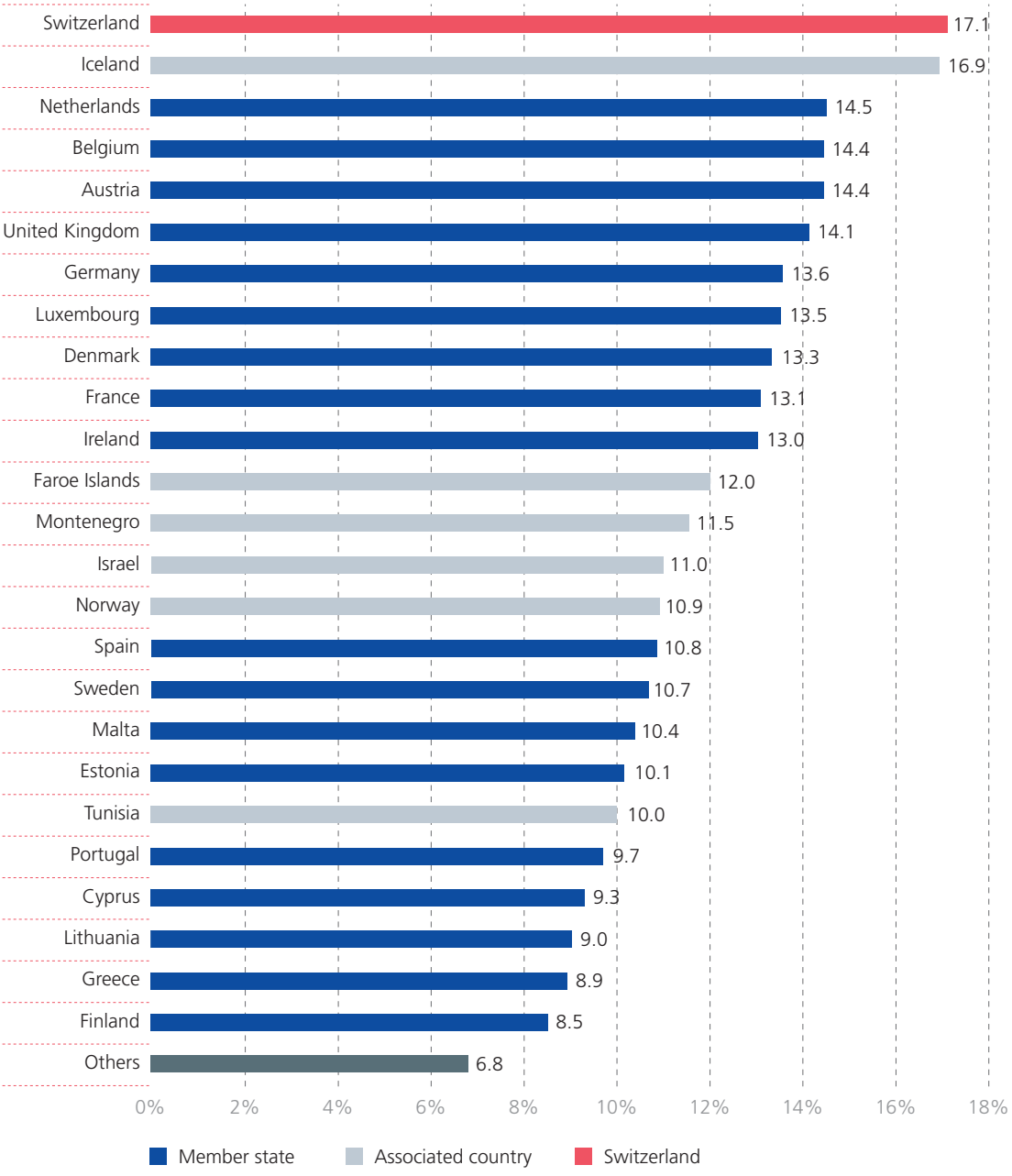
Figure 28: Project proposal success rate in % under Horizon 2020 by country



Sources: European Commission, SERI, cf. Table 17 in Appendix C
NB: 25 best-ranked member and associated countries. Countries with fewer than 100 project proposals (Faroe Islands) are not included.

Switzerland ranks better when only the success rates for projects in which they play a coordinating role are considered. As Figure 29 shows, this statistic places Switzerland in first place, with a 17.1% success rate. Iceland ranks second (16.9%) and the Netherlands third (14.5%). Apart from a few changes in position, the ranking resembles that for success rates for all participations per country. However, there are some marked differences: Tunisia and to a lesser extent Sweden and Finland drop some way down the list when only the coordination success rates are considered. Montenegro and the United Kingdom, by contrast, rise several positions.

Figure 29: Success rate for project proposals as coordinator under Horizon 2020



Sources: European Commission, SERI, cf. Table 17 in Appendix C
NB: 25 best-ranked member and associated countries.

Overall, Switzerland's comparatively high success rate shows that the slight drop in the percentage of project participations cannot be explained by Swiss project proposals being of poor quality. Instead it suggests that only better-than-average and experienced FP researchers in Switzerland were not put off by the result of the 9 February 2014 vote and discouraged from submitting projects, or that notably they could count on their EU partners for collaborations.

4.7 Internationalisation of Swiss research in Horizon 2020 context

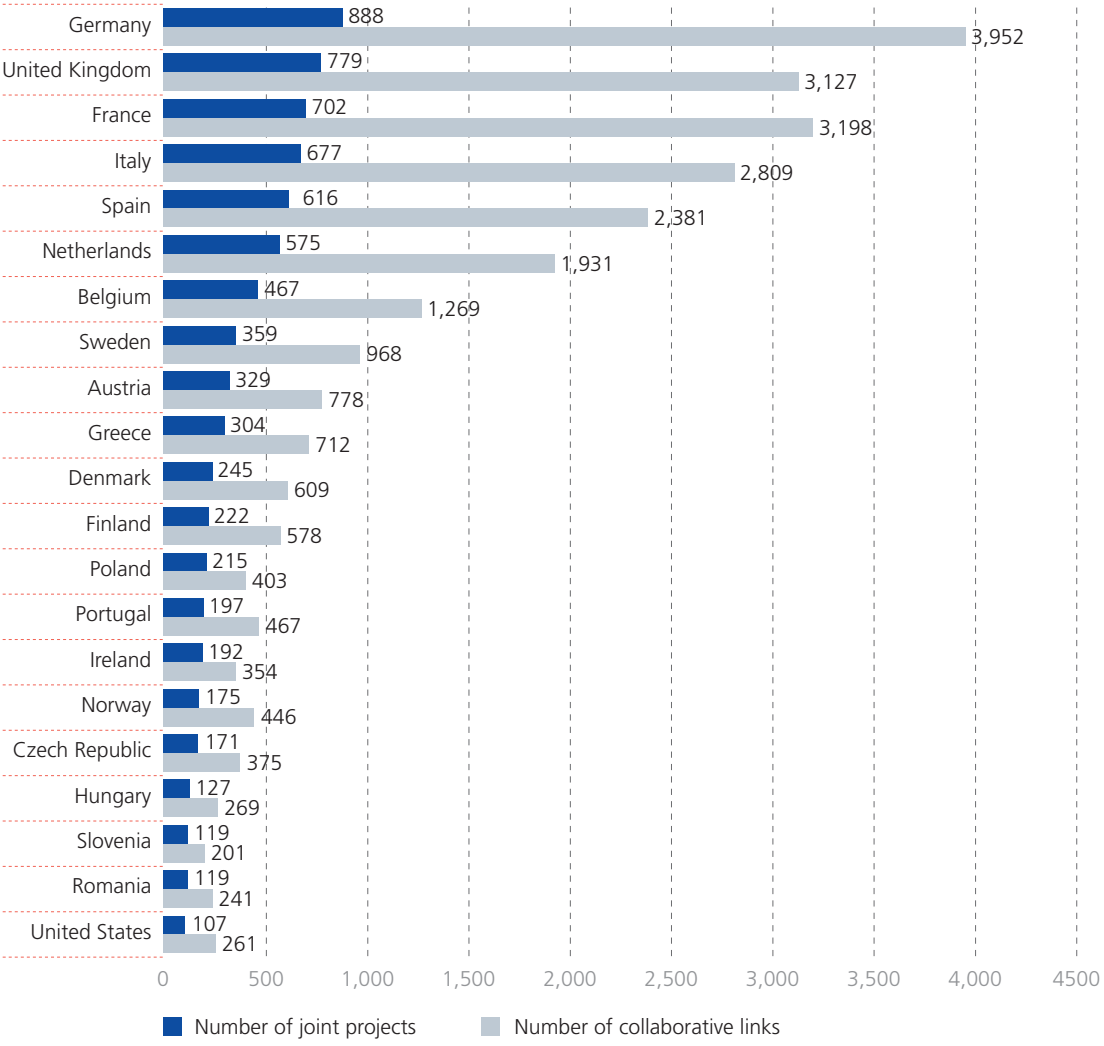
One major objective of the EU framework programmes is to promote cross-border cooperation, networking and mobility among scientists and innovators, in order to contribute to the further development of the European Research and Innovation Area. Besides the competition for funding, having the opportunity to become involved in international networks is also one of the main reasons for researchers themselves to take part in calls and projects in Horizon 2020, and in the FPs in general. This section looks at the countries with which Swiss research institutions interact the most in Horizon 2020, and at the main mobility flows resulting from individual funding instruments under the Marie Skłodowska-Curie Actions and the European Research Council.

4.7.1 Collaborations with other countries under Horizon 2020

Figure 30 shows the number of joint projects between Switzerland and other countries, i.e. the number of projects in which at least one partner from Switzerland and one partner from the other country is involved. It also shows the number of collaborative links between Switzerland and other countries. This corresponds to the number of pairwise combinations and therefore all potential collaborations between partners from Switzerland and another country.[21] This differs from the first indicator in that it illustrates how many partners from each country are involved in joint projects.

21 Calculation: For each project, the number of Swiss partners is multiplied by the number of partners from the other country. The number of collaborative links reflects the sum of these products across all joint projects.

Figure 30: Number of joint projects and collaborative links of partners from Switzerland and other countries in Horizon 2020



Sources: European Commission, SERI, cf. Table 18 in Appendix C
NB: Only countries which have at least 100 joint projects with Switzerland are shown. Collaborations within Switzerland are not shown in the figures.

According to Figure 30, in Horizon 2020 Swiss researchers most frequently work with partners from Germany. Partners from Switzerland and Germany are jointly involved in 888 projects and have 3,952 collaborative links. In second place is the UK, which conducts 779 joint projects with Switzerland in Horizon 2020 so far. Then comes France, which has fewer joint projects but slightly more collaborative links with Switzerland than the UK.

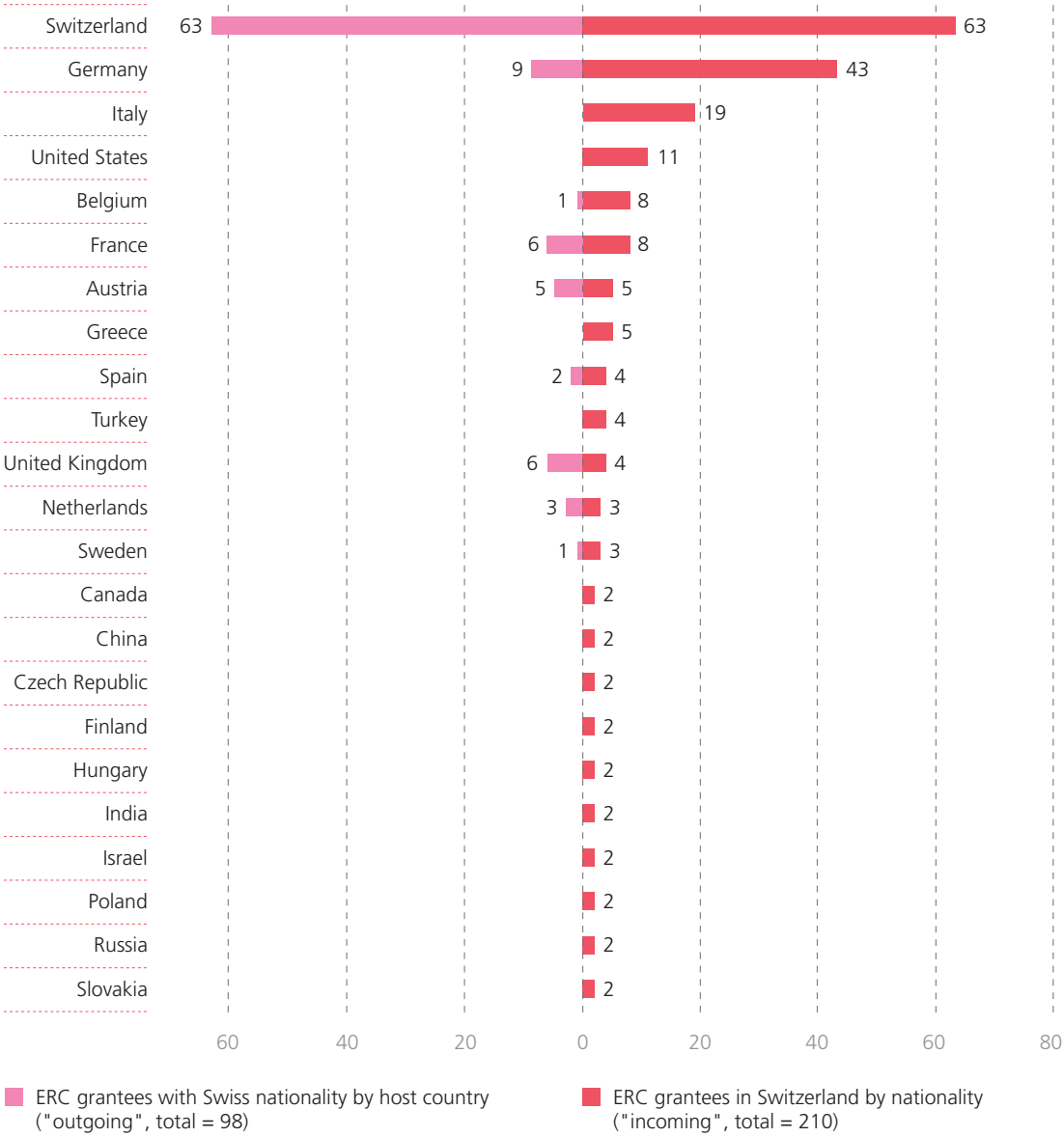
Overall, there are close similarities between the order of countries in Figure 30 and the country rankings for the general number of project participations (cf. Figure 22). The only clear difference is that Israel does not appear in the list of collaborations. This is because Israel's ranking among the 25 countries with the most project participations is to a large extent due to the fact that the country receives a considerable number of individual grants from the European Research Council.

4.7.2 Mobility of researchers to and from Switzerland

Marie Skłodowska-Curie Actions (MSCA) and European Research Council (ERC) grants are aimed at promoting cross-border mobility among researchers, in particular among young academics, and at attracting top people to Europe. Both of these sub-programmes therefore focus on monobeneficiary schemes, unlike collaborative projects, which dominate in most Horizon 2020 programme areas. The European Commission database, on which this report is based, contains details of the nationality of the grantees in these single projects. This gives us data on where the MSCA and ERC grantees conducting projects at a Swiss institution originate from. It also allows us to see in which countries grantees with a Swiss nationality conduct their projects. Whereas the former indicates incoming mobility into Switzerland, the latter indicates the outgoing mobility among Swiss nationals to other countries. However, it should be added that this is a somewhat simplified interpretation of the ERC figures, as the latter do not tell us whether the researchers concerned actually move countries as a result of the ERC grant received or whether they were already living in the foreign country. On the other hand, funding received under an MSCA almost always results in a transfer to another country.[22]

22 Applicants may not have spent more than 12 months in the host country within the three years prior to their application. The mobility requirement does not apply to the RISE (International and inter-sectoral cooperation through the Research and Innovation Staff Exchanges) instrument.

Figure 31: ERC grantees in Switzerland by nationality (incoming) vs. ERC grantees with Swiss nationality by host country (outgoing)

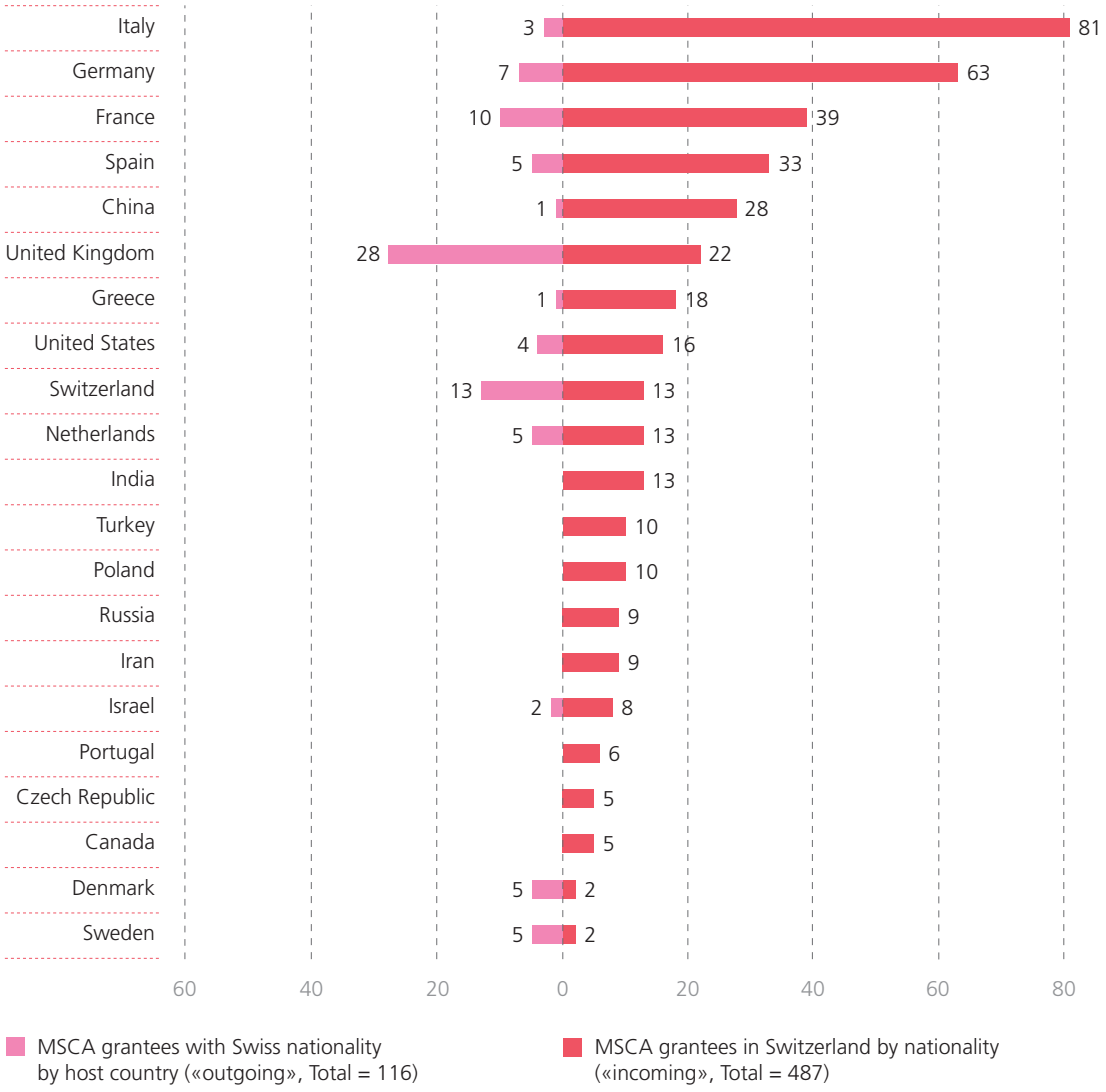


Sources: European Commission, SERI, cf. Table 19 in Appendix C
NB: Only countries from which at least two ERC grantees originate or in which at least two Swiss ERC grantees are living are shown. The analysis includes all ERC funding schemes.

As the bars on the right-hand side of Figure 31 show, 63 or 30% of the 210 ERC grantees recorded in the EU database as of 6 March 2018 and engaged at a Swiss institution have Swiss nationality. The overwhelming majority of ERC grantees in Switzerland therefore are not Swiss. Germany accounts for the largest group (43 grantees), followed by Italy (19) and the USA (11). In fifth place are Belgium and France with eight grantees each doing research in Switzerland. The left-hand side of the figure shows which countries ERC grantees with Swiss nationality are resident in. It should be noted here that projects funded by the ERC must be conducted in an EU member state or in a country associated to Horizon 2020.[23] Most Swiss grantees, i.e. the 63 mentioned above, remain in Switzerland. These persons make up around 64% of the 98 ERC grantees with Swiss nationality in Horizon 2020. Of the Swiss ERC researchers abroad, most are in Germany (nine grantees), France and the UK (six each), and Austria (five).

23 This depends on whether a country was associated at the time of the ERC call deadline.

Figure 32: MSCA grantees in Switzerland by nationality (incoming) vs. MSCA grantees with Swiss nationality by host country (outgoing)



Sources: European Commission, SERI, cf. Table 20 in Appendix C
NB: Only countries from which at least five MSCA grantees originate or in which at least five Swiss MSCA grantees are living are shown. The data applies to all MSCA funding schemes apart from "Researchers' Night". A total of 116 grantees with Swiss nationality is given, although the actual number of persons is 98; 17 grantees are conducting research in several countries, and so appear several times in the data.

The picture for the MSCA grantees is somewhat different. The largest number of grantees working in Switzerland (right-hand column in Figure 32) come from Italy: 81 out of 487 persons, or 16.6% of all MSCA grantees in Switzerland. The second-largest group is from Germany (63 / 12.9%), followed by France, Spain and China. It can be seen that the list contains far more third countries – that is to say, countries which are neither EU member states nor associated to Horizon 2020 – than the list of ERC grantees. For example, India, Russia, Iran and Canada all appear in Figure 32, in addition to China. This highlights the fact that the MSCA attract a very international clientele and are very important in recruiting young academics. Switzerland also figures in the list, with 13 people. These must be researchers with Swiss nationality who have either returned to Switzerland from abroad with their MSCA grant or who receive funding under the RISE instrument, which does not require grantees to change their country of abode.

The same 13 persons are also shown on the left-hand side of Figure 32, where the bars illustrate the number of MSCA grantees with Swiss nationality by host country. Here it can be seen that the UK is the most popular destination for Swiss MSCA grantees. Twenty-eight researchers, or almost a quarter of all MSCA grantees with Swiss nationality, are conducting their project in a British institution. In second place is Switzerland with the 13 persons mentioned above, followed by France with ten researchers from Switzerland and Germany with seven. Far fewer Swiss MSCA grantees go to countries outside of Europe than foreign researchers are attracted to come and work in Switzerland. It can also be seen that the ratio between incoming and outgoing MSCA grantees is far less balanced than among ERC grantees. Around five times the number of researchers from abroad come to Switzerland on an MSCA grant than the number of Swiss MSCA grantees going abroad. One possible reason for this is that the Swiss National Science Foundation also offers grants which allow young academics to conduct research abroad at different stages of their career.

4.8 Financial aspects

4.8.1 Financial return

Since gaining associated status in the FPs in 2004, Switzerland has shown a positive financial return. This means that Swiss participations in a completed FP led to more money flowing into the country in the form of funding than the Confederation has paid in mandatory contributions to the EU.

For example, in FP6 (2003–2006) Switzerland paid mandatory contributions[24] of CHF 775.3 million compared to the CHF 794.5 million in funding received by Swiss institutions. This resulted in a net inflow in funding of CHF 19.2 million. In FP7, a total of CHF 2,495.6 million in European funding was awarded to Swiss participants (around three times the amount awarded in FP6). At the same time, the Confederation paid a total of CHF 2,263.1 million to the EU for Switzerland's association to FP7. This means a net gain for Switzerland of CHF 232.5 million, a rate of return of 1.1. While the financial accounts in the report from 2015 provided just provisional figures for Swiss participation in FP7, these amounts reflect the final accounts for Swiss participation in FP7.

No complete data is available for Horizon 2020, the ongoing eighth framework programme. It is therefore too early to make a financial assessment at this time. Switzerland's partial association between 2014 and 2016 also makes it more difficult to calculate the financial return. As explained in Section 4.2, Swiss participations in Horizon 2020 are funded from different sources (EU and Swiss Confederation). Depending on the programme area in question and on when project agreements were concluded, funding comes either from the European Commission (58.1%) or directly from the Confederation (41.9%).

As an associated country, Switzerland pays mandatory contributions to the framework programme budget. These are based on the ratio of Switzerland's gross domestic product (GDP) to the sum of the GDPs of all EU member states. In Horizon 2020, however, Switzerland has only paid the full mandatory contribution since the beginning of 2017. While it was a partially associated country, it only contributed to the budgets of calls in those areas of the programme to which it was associated and in which Swiss participations were funded by the EC. Switzerland's mandatory contributions in Horizon 2020 to the end of 2017 amounted

24 Mandatory contributions go towards covering the call budgets and the costs of evaluating and administering the programme.

to CHF 724 million (not including Euratom and ITER). According to the latest official EC data (as of 6 March 2018), the same period saw EU research grants amounting to CHF 654 million committed in favour of Swiss institutions. This means that Switzerland's mandatory contributions to the EU are CHF 70 million higher than the research funds awarded by the EU to project participants in Switzerland. This corresponds to an absolute rate of financial return of 0.9. The definitive rate of return and any net inflow or outflow cannot be calculated until the end of the programme generation, since not all funding allocated to Switzerland on the basis of calls issued between 2014 and 2017 appears in the database. As mentioned above, this is because several months elapse between the expiry of a deadline for submitting projects and the actual conclusion of grant agreements. It is therefore not yet possible to compare Switzerland's mandatory contributions to the EU with the EU's research contributions in favour of Swiss research institutions.

4.8.2 Financial impact of Swiss partial association to Horizon 2020 up to the end of 2016

Owing to Switzerland's partial association, in addition to the mandatory contributions made to the EU, the Confederation allocates resources to directly fund Swiss participations in collaborative projects under calls launched between 2014 and 2016 which are not funded by the EU. In the context of this project-by-project participation or direct funding, SERI has committed a total of CHF 478.1 million since the beginning of 2014 (as of 6 March 2018, cf. Table 21 in the Appendix). Because the research projects in question normally run for several years, the committed contributions are paid out in three instalments. The Confederation will continue paying out direct payments to Swiss researchers on a project-by-project basis until at least 2024.

As shown in Section 4.6.3, Swiss research and innovation actors have so far received 3.5% of all funding committed under Horizon 2020, compared to 4.3% in FP7. This lower figure reflects Switzerland's partial association in the first few years of Horizon 2020. Assuming that the 3.5% funding rate will be maintained until the end of Horizon 2020, an estimated CHF 3.21 billion in EU project funding will go to researchers in Switzerland over the entire duration of the programme (calculated on the basis of the total Horizon 2020 package budget of around CHF 91.8 billion). If Switzerland were able to secure the same share of funding over the whole Horizon 2020 period as under its predecessor FP7, Swiss research institutions would receive around CHF 3.95 billion by the end of 2020. This projected difference amounts to CHF 734 million over the whole seven-year period.

The loss of funding for research and innovation in Switzerland can also be seen from the government's annual budgets for the years 2014 to 2020 for Swiss participation in the Horizon 2020 package (including the whole of Euratom and ITER), budgets that were subsequently not applied. As already mentioned, in the case of full association from 2014, Switzerland would have paid an annual mandatory contribution to the Horizon 2020 budget. All project funding and administration would then have been conducted exclusively by the European Union. However, because Switzerland only had partial association from September 2014 to the end of 2016, during which time transitional measures were applied, it paid both mandatory contributions to the Horizon 2020 budget (for programme areas in which it was associated) and subsidies to Swiss research institutions in the form of direct funding for their project participation in Horizon 2020 (in programme areas in which it had third country status). Table 4.8.2 shows the annually budgeted figures and expenditure for the entire duration of Horizon 2020 (projections as of 2018).

Table 4.8.2: Confederation's annual budgets and expenditure for the Horizon 2020 package: full association vs. third country/partial association (in CHF m)

	2014	2015	2016	2017	2018	2019	2020	As of 2021	Total
A. Budgetary credits for mandatory contributions and support measures for full association according to budget in 2013 EU dispatch	526	541	551	577	596	623	650		4,064
B. Mandatory contributions, payments for project funding and national support measures	85	246	270	557	630 [b]	656 [b]	661 [b]	44 [c]	3,169
C. Various transfers, e.g. to the SNSF to implement the ERC substitute measures (Temporary Backup Schemes) in 2014									95
Result (A – B – C)									800

Source: SERI
NB: a) Cf. page 2051 of the Dispatch of 27 February 2013 on Funding Swiss Participation in the European Union Framework Programmes in the field of Research and Innovation 2014–2020 (BBl 2013 1987). b) Estimates according to SERI budgeting, March 2018; may be adapted following Parliament's decision on the 2019 budget. c) Estimates of further payments for direct project funding after 2020 according to SERI budgeting, March 2018.

As the last line of Table 4.8.2 shows, the Confederation will spend an estimated CHF 800 million less on the Horizon 2020 package than the Federal Council and the Swiss parliament budgeted for full association in 2013. Since a cost ceiling was set, these funds may not be used in other areas of research and innovation in Switzerland. The figures illustrate that partial association resulted in a clear reduction in federal funding for EU framework programmes between 2014 and 2020.

There are several reasons for this considerable under-spending. The main reason is that Switzerland, as a partially associated country, was associated in only one third of the programme, and thus paid only a third of the mandatory contributions it would otherwise have paid to the EU. Since partial association only came into effect on 15 September 2014 and the Swiss contribution was calculated pro rata temporis, the mandatory contribution for 2014 was considerably smaller than budgeted. Furthermore, in the areas in which Switzerland was not partially associated and had to fund its researchers itself (around two thirds of the programme), there were far fewer Swiss project participations than would most likely have been the case had Switzerland been fully associated (cf. explanations in previous section). Finally, the CHF-EUR exchange rate, at least until now, has meant that Switzerland has been able to buy the euros it owes in mandatory contributions more cheaply than was budgeted in 2013. These three factors (lower mandatory contributions as a result of partial association, fewer Swiss participations, exchange rate) explain the under-spending overall. The exact role played by each factor cannot be calculated definitively. However, the combination of (i) fewer payments to the EU and (ii) fewer participations in the areas in which the Confederation funds Swiss project participants itself may explain to a large extent why the Confederation spent less than budgeted on Switzerland's participation in the Horizon 2020 package.

4.8.3 Competitiveness indicator

The competitiveness indicator (CI) also gives an indication of the financial balance of Swiss participation in the EU research programmes, in addition to the other explanations given in this section. The CI is a theoretical value providing information about the ability of researchers in a country to bid for and obtain funding in a competitive process. Technically, the competitiveness indicator is the ratio between a country's gross domestic product (GDP) (as a percentage of the GDPs of all countries in Europe) and the total amount of funding the country receives under an FP (as a percentage of the total funding paid to all countries in Europe).[25] A value above 100 indicates that a country has received a larger share of funding than its contributions to the FP

25 As Eurostat figures were used for the GDPs, only those countries which provide Eurostat with data are considered in the calculation. Purchasing power parity was applied to the GDPs.

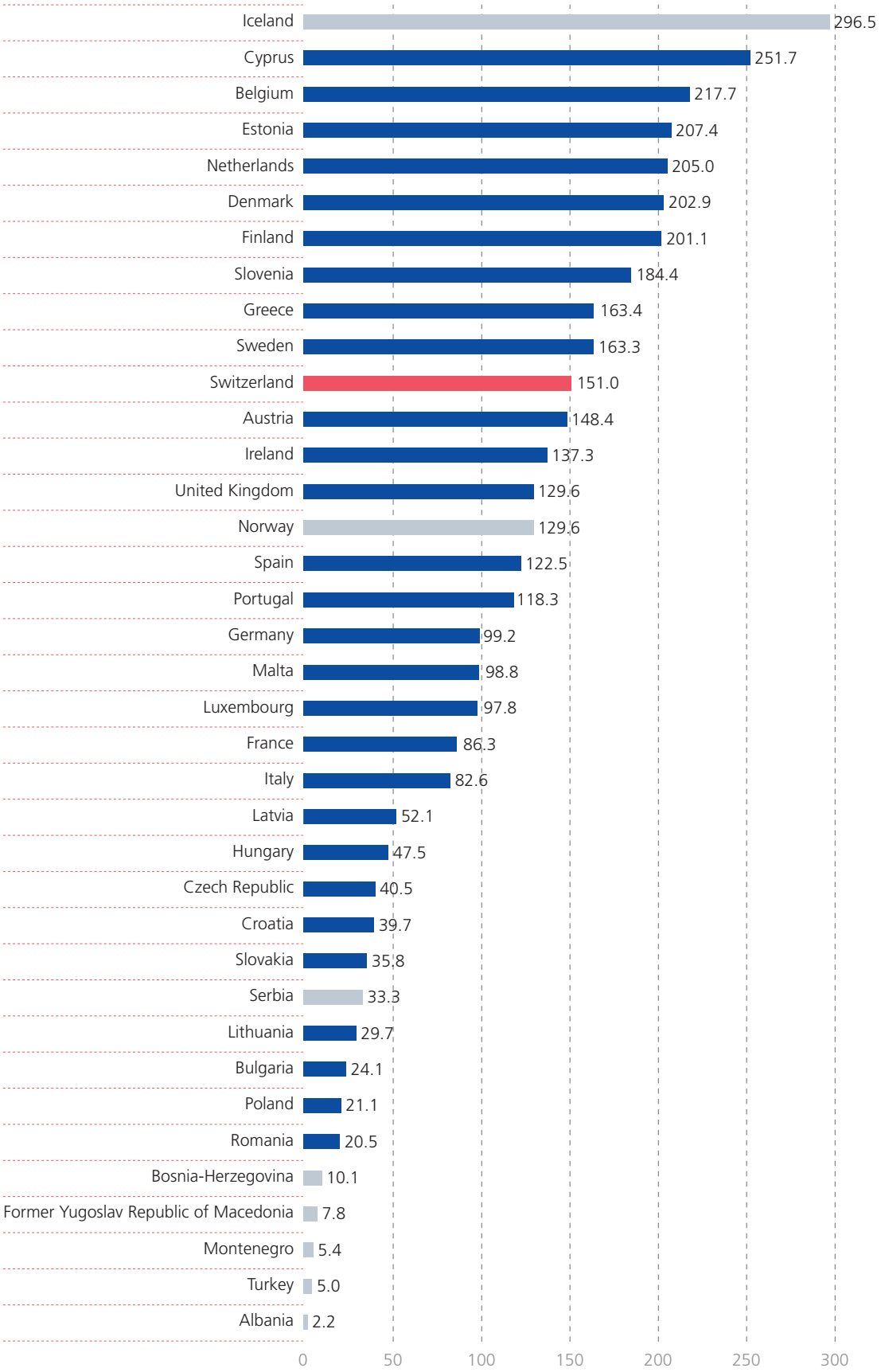
budget, which are calculated on the basis of GDP.[26] This then indicates that the country has above-average success in the competition for European research funding.

Under FP6, Swiss institutions received 3.06% of all EU funding, while Switzerland contributed 2.68% of the budget. This results in a CI of 114. Under FP7, according to the most recently available data (11 November 2015), the share of funding paid to Swiss participants was 4.34% of the total. During this period, Swiss GDP was 2.22% of all European GDPs. This results in a CI value of 196 for FP7. In other words, Swiss participants were able to secure 1.96 times as much funding as Switzerland would have received if funding was awarded in direct proportion to the contributions made by the individual countries to FP7. On the other hand, this result does not mean that for each Swiss franc paid in mandatory contributions to FP7, CHF 1.96 in funding flowed back into Switzerland. It merely indicates that Swiss researchers are very good at competing for European funding. In FP6 and FP7, Switzerland thus benefited from the primarily competitive funding distribution system of the framework programmes.

In Horizon 2020, the eight framework programme, Switzerland's CI currently stands at 151, placing it eleventh in the country rankings.

26 This applies to the associated countries in particular. EU member states make their contributions to the FPs via their general contributions to the EU budget, rather than separately. However, the general contributions are calculated on the basis of GDP, so the calculation method applied here is plausible, if somewhat simplified and theoretical.

Figure 33: Competitiveness indicator by country in Horizon 2020 (2014–2016)

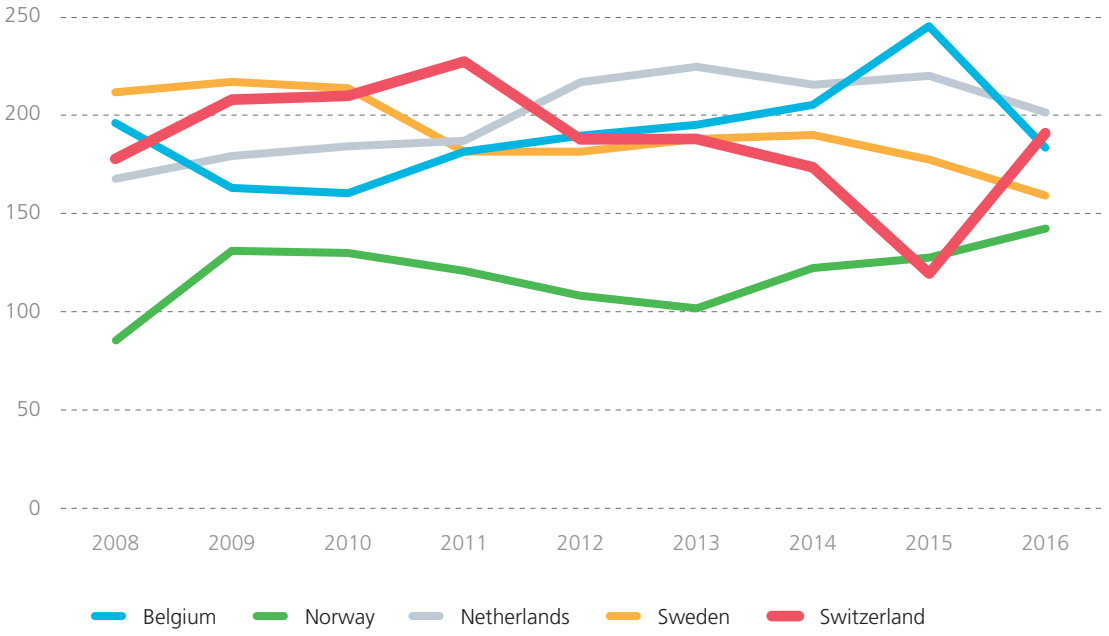


Sources: European Commission (eCORDA, Eurostat), SERI, cf. Table 22 in Appendix C
NB: As no GDP figures are yet available in Eurostat for 2017, the analysis uses those from 2014 to 2016.

4.8.4 Evolution of the competitiveness indicator

Figure 34 shows CI development since 2008[27] for Switzerland and four other West European countries comparable in terms of size, economic capacity, and science and innovation capacity. Over a ten-year period it can be seen that Switzerland generally obtains a good result, with an average value of 200. However, it is also clear that Switzerland's position compared to that of other countries has declined since 2012, and especially with the transition from FP7 to Horizon 2020. Whereas Switzerland was one of the top three countries shown in Figure 34 up until 2012, in 2015 it was in last place, with a CI value of 120. This is explained by the decline in Swiss participations following the vote of 9 February 2014 on the mass immigration initiative, and Switzerland's subsequent non-association to Horizon 2020. As already explained in other sections of this report, in 2014 there was great uncertainty concerning the conditions of participation in Horizon 2020 for Swiss researchers. Once partial association was established and the Swiss interim measures implemented, this situation was defused and normalised, the effects of which were not felt until later, in 2016. It can already be assumed that Switzerland's CI value at the end of Horizon 2020 will also be in the region of 200.

Figure 34: Competitiveness indicator for selected countries over time (FP7 and Horizon 2020)

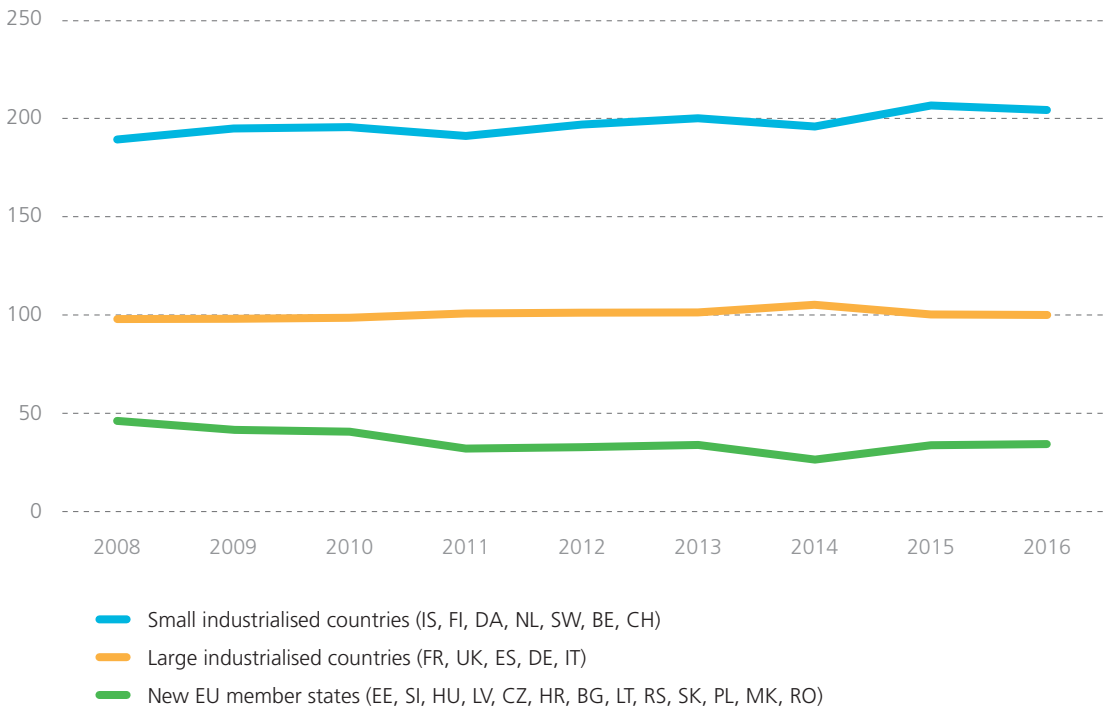


Sources: European Commission, SERI, cf. Table 22 in Appendix C

27 The values for 2007 were not included as they are not representative. In the first year of a framework programme, few projects are approved and thus few funding committed. The differences between the countries can appear very large in relative terms and give a distorted picture. For example, in 2007 France received an over-proportional amount in funding (CI = 563%), and the other countries an under-proportionate amount. The figures for 2014 and 2015 contain data from both FP7 and Horizon 2020 for projects which began in these two years.

Figure 35 compares three country types: small industrialised countries, large industrialised countries and new EU member states. It can be seen that small industrialised countries have an average CI value of 200, with a slight upward trend over time. The large European countries all lie on average at almost exactly 100, a value which varies very little over time. The new EU member states have by far the lowest CI values (with exceptions, such as Estonia and Slovenia). Starting at an average CI value of 50 in 2008, there is, moreover, a downward trend in the following years.

Figure 35: Competitiveness indicator by country type over time (FP7 and Horizon 2020)



Sources: European Commission, SERI, cf. Table 22 in Appendix C
NB: For a definition of the country abbrevations, see Table 16 in Appendix C

4.9 Conclusions

The available data show that, since the launch of Horizon 2020, Switzerland's participation in the framework programmes has regressed for the first time. The clearest indicators of this are the decline in Switzerland's share of all participations from 3.2% in FP7 to 2.4% to date in Horizon 2020, the marked decline in Swiss coordinations from 3.9% to 2.6% and the reduction in funding awarded to Swiss research institutions from 4.3% in FP7 to 3.5% of all funding committed so far under Horizon 2020. On the other hand, the thematic and institutional distribution of Switzerland's participation is very similar to that seen in FP7, with the ETH Domain playing a slightly larger role.

It should be noted that the success rate of project proposals with Swiss participation is still outstanding in comparison with that of other European countries. This means that Swiss research is among the most competitive in Europe. The decrease in Swiss participations in Horizon 2020 can therefore not be explained by a decline in quality of research applications.

The vote of 9 February 2014 on the mass immigration initiative and the subsequent non-ratification of the Croatia Protocol had a negative effect on the number of the Swiss project proposals submitted and hence on Swiss participation in the FPs. Three factors contributed to this situation:

1) First, because Switzerland's association to Horizon 2020 was suspended, Swiss research institutions and their members were completely excluded from a number of project calls in the months following the referendum. In particular, the exclusion the ERC programme and some MSCA instruments in spring 2014 greatly reduced the number of Swiss participations and coordinations in particular.

2) Some parts of the framework programme remained inaccessible for Switzerland even once the Swiss interim measures had been put in place and Switzerland became partially associated on 15 September 2014. This was particularly the case with the "Innovation in SMEs", "Access to Risk Finance" and "Fast Track to Innovation Pilot" instruments.

3) The months that followed the acceptance of the mass immigration initiative were marked by a high level of uncertainty over Swiss partners' eligibility to participate in various programme areas of Horizon 2020. It is therefore possible that Swiss research institutions may have given up on participating in certain projects or including Swiss partners was seen as a risk by foreign partners, making Swiss institutions less attractive. Researchers in Switzerland were indeed actively excluded from project consortia or were not re-invited to join previously existing networks.

5 Initiatives under Articles 185 and 187 TFEU

5.1 Initiatives under Article 185 TFEU

The framework programmes help to strengthen public-to-public partnerships (P2P). These are partnerships between the EU member states, the countries associated to the FPs and the European Union under Article 185 of the Treaty on the Functioning of the European Union (TFEU). Their aim is to promote the development and implementation of joint research and innovation programmes and activities. Countries participating in such initiatives provide some of the project funding themselves, and the rest is co-funded by the EU via the FP budget.

In Horizon 2020, Switzerland is involved in four research and innovation programmes under Art. 185 TFEU:

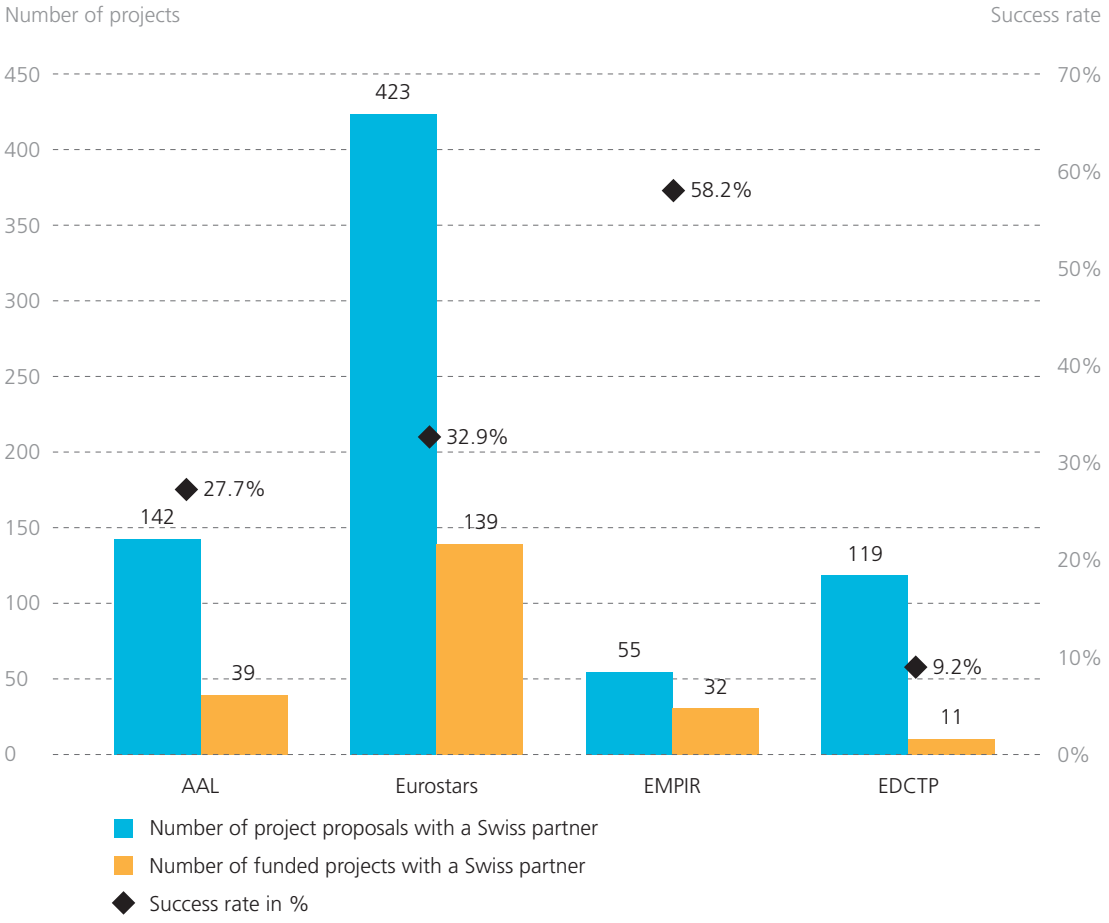
1) AAL (Active and Assisted Living), a programme that contributes to meeting the challenges of an ageing society and exploiting the resulting economic opportunities;
2) Eurostars, a programme for market-oriented cross-border R&D cooperation for research-performing SMEs;
3) EDCTP (European & Developing Countries Clinical Trials Partnership), a collaborative research venture for new vaccines and medicines for the prevention and treatment of HIV/AIDS, malaria and tuberculosis;
4) EMPIR (European Metrology Programme for Innovation and Research), a programme designed to optimise the research activities of European metrology institutes.

As these initiatives have a different legal basis to Horizon 2020 (Art. 185 TFEU), during the period of partial association Switzerland was still able to take part in these four partnerships as a full and equal member. However, it did not receive co-funding from the EU, as this would have come from the Horizon 2020 budget. Switzerland made up for this missing EU funding with interim measures (substitute funding), as it did for joint projects in most areas of Horizon 2020.

Since 2014 a total of 221 projects with Swiss partners have been launched in the four initiatives mentioned, funded via the Horizon 2020 budget, Swiss substitute funding and the national ERI budgets (2013–16; 2017–20) (cf. Figure 36). The Swiss project proposals in three of the four initiatives achieved relatively high success rates (between 27% and 58%).[28] Only in the EDCTP was the 9% success rate below average compared to that of other project proposals in Horizon 2020.

28 Overall success rate in Horizon 2020: 13.6%; Swiss success rate: 15.9% (cf. Table 10 in the Appendix).

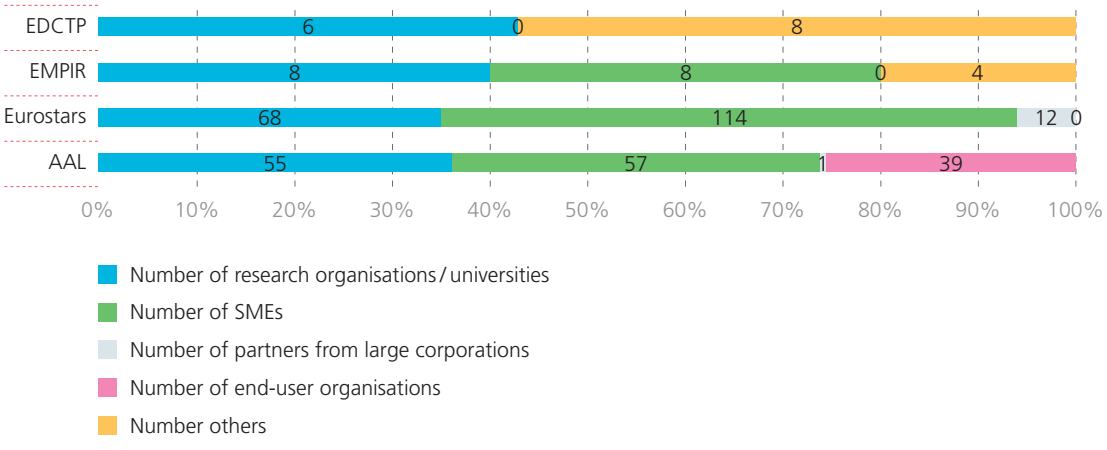
Figure 36: Swiss project proposals, funded projects and success rates in Horizon 2020



Sources: European Commission, relevant organisations and SERI, cf. Table 23 in Appendix C

While Eurostars, AAL and EMPIR mobilise industry actors (between 40% and 65% of participations), EDCTP focuses mainly on the participations of public research bodies and foundations (cf. Figure 37).

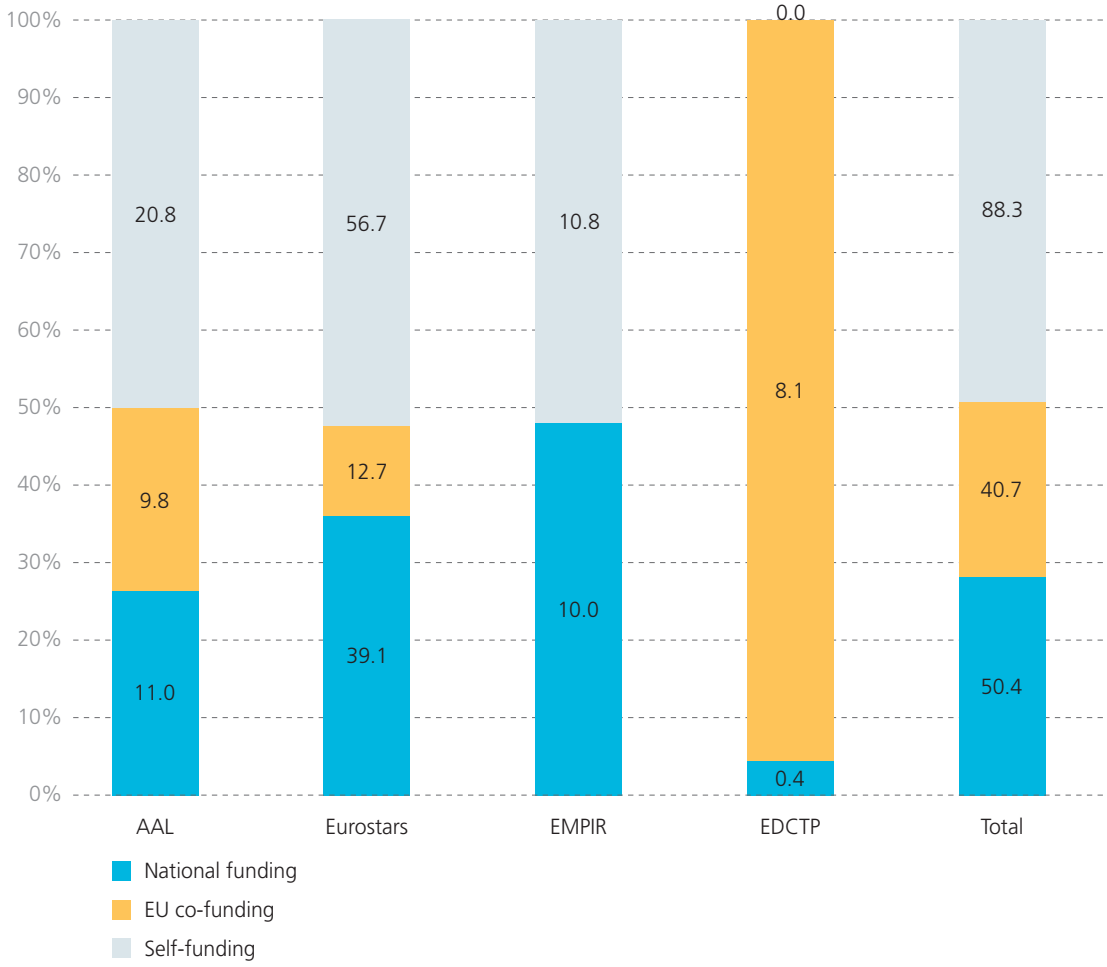
Figure 37: Number of Swiss project participations by category of participants



Sources: European Commission, relevant organisations and SERI, cf. Table 23 in Appendix C

Total project costs for all four initiatives amount to around CHF 179 million. Around CHF 50 million come from the ERI budget and CHF 41 million from Swiss substitute funding (2014–2016) or the EU (2017–2018). All other project costs (CHF 88 million) are met by the project participants themselves (cf. Figure 38).

Figure 38: Co-financing percentages (EU/Switzerland / self-funding) for Swiss participations (in CHF m)



Sources: European Commission, relevant organisations and SERI, cf. Table 23 in Appendix C

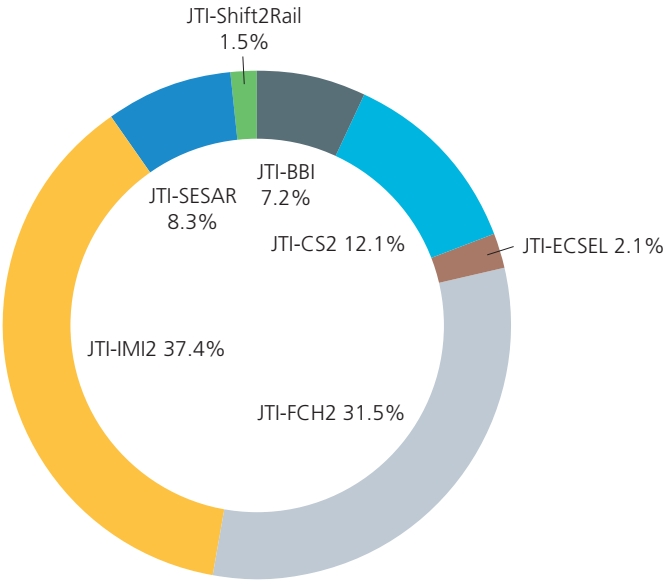
5.2 Initiatives under Article 187 TFEU

The Joint Technology Initiatives (JTIs) are joint undertakings (JUs) by the European Union and European industry implemented under Article 187 TFEU. They were introduced in FP7 as public-private partnerships (PPPs) as a new funding instrument for the coordination of European research, and are co-financed from the FP budget and by the participating industry. These initiatives strengthen the development of strategically important technology areas in Europe. The JTIs under Horizon 2020 are: 1) Clean Sky (CS) (aviation), 2) the Innovative Medicines Initiative (IMI) (drug research), 3) Fuel Cells and Hydrogen (FCH), 4) Electronic Components and Systems for European Leadership (ECSEL) (micro- and nanoelectronics and electronic systems),[29] 5) Bio-Based Industries (BBI) (to develop bio-based products from waste), 6) Shift2Rail (improved trains and infrastructure), 7) Single European Sky ATM Research (SESAR) (innovative aviation management systems).

Swiss research and innovation actors took part in calls for research and innovation projects in all these initiatives. They have so far received funding worth around CHF 53 million for their participation in the JTIs (cf. Figure 39). The Swiss Confederation has contributed to ECSEL from its own national budget since March 2018.

29 Besides the EU and industry, interested EU member states and associated states may take part in ECSEL as a JU member by contributing additional national funds. Switzerland has been a full member of ECSEL since 9 March 2018.

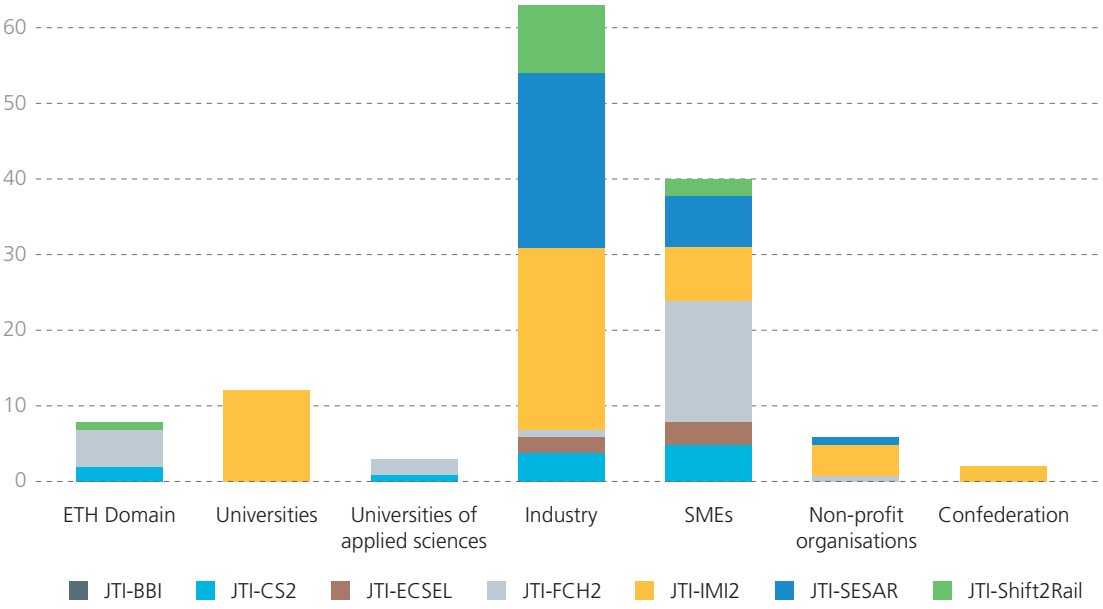
Figure 39: Funding for Swiss participants in JUs under Horizon 2020 (in CHF m)



Sources: European Commission and SERI, cf. Table 24 in Appendix C

SME and industry participation averaged 78% for Switzerland[30] (cf. Figure 40).

Figure 40: Number of Swiss participations in the JTIs or JUs since 2014

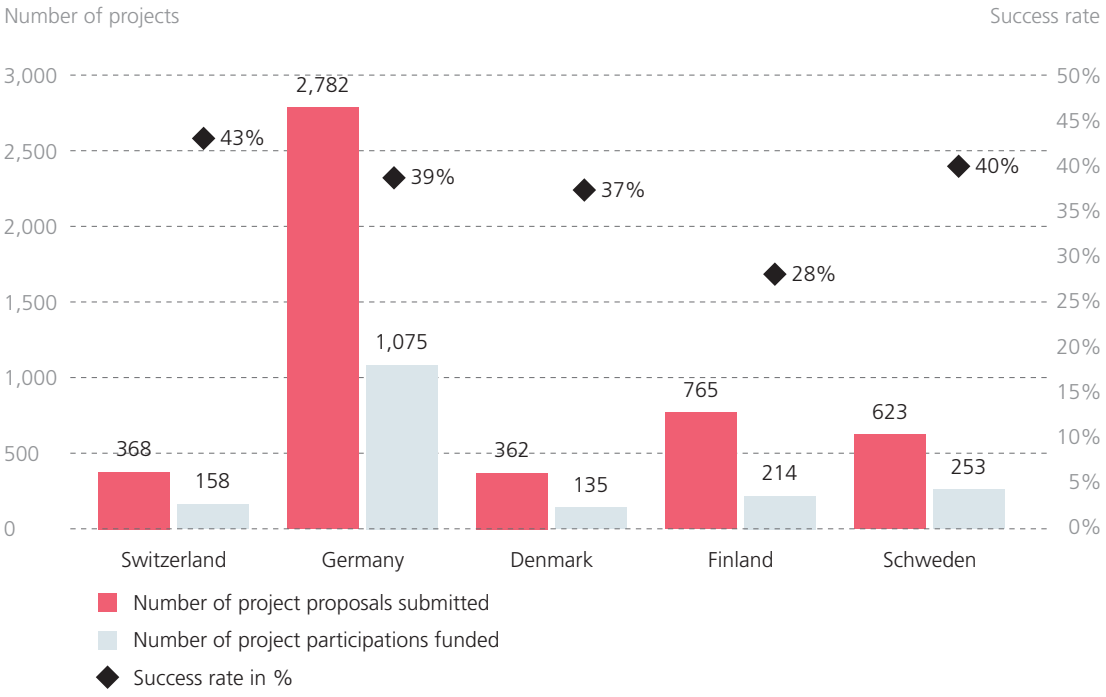


Sources: European Commission and SERI, cf. Table 24 in Appendix C

In an international comparison, Swiss participants achieved a very good success rate in all seven initiatives combined during the reporting period from 2014 to 2018 (cf. Figure 41).

30 Communication from the Commission [COM(2013) 494], page 5: "Public-private partnerships in Horizon 2020: a powerful tool to deliver on innovation and growth in Europe".

Figure 41: Project proposals, funded projects and success rates: Switzerland compared to the leading countries on the 2017 Innovation Union Scoreboard.



Sources: European Commission and SERI

6 Swiss participation in the Euratom research programmes

6.1 Overview

The European Atomic Energy Community, also known as Euratom, is one of the three historical communities of the EU. It was established in 1957 to coordinate the investments and policies of its member states in the field of nuclear energy for peaceful and civilian use. Euratom is managed by the same institutions as the EU, i.e. by the European Commission (EC), the EU Council and the European Parliament. All EU member states are also automatically members of Euratom. However, the activities performed by Euratom depend on specific provisions of the Treaty which established this community.

Euratom's research programmes complement the EU framework programmes for research and innovation (FPs) in the field of nuclear energy and cover two main areas:

- Nuclear fission: the nuclear reaction used to generate the nuclear power available today.
- Nuclear fusion: a nuclear reaction with promising properties; its use to generate energy is still at the experimental stage.

The Euratom programmes are run along the same lines as the FPs. Some of these programmes comprise a joint fund used to finance research activities in the member states and associated countries. Others are used to fund the nuclear activities of the Joint Research Centre of the European Commission, mainly in the field of nuclear fission, as well as joint research infrastructures in the field of nuclear fusion.

As a country which has been involved in nuclear fusion for many years and that has invested heavily in this research area, Switzerland has been associated to the fusion part of Euratom's research programmes since 1978 via an open-ended cooperation agreement. Switzerland has participated in all of the FPs as an associated country since 2004, and its association to the Euratom research programmes dealing with fusion is integrated in this context. Switzerland has also been able to take part in Euratom's nuclear fission research activities as an associated country since 2004.

In 2014 Switzerland signed an agreement with the EU regulating its participation for the time period between 2014 and 2020 in the Euratom research programmes, in Horizon 2020, and in the activities of the EU's joint undertaking for ITER and the development of fusion energy ("Fusion for Energy"). Under this agreement, Switzerland can take part in the Euratom research programmes as an associated country from 2014 to 2018. The agreement can be renewed automatically and extended to the Euratom research programmes in 2019 and 2020, as soon as these have been approved by the relevant European authorities.

Switzerland's association to the Euratom research programmes brings numerous advantages. Firstly, it enables Swiss researchers to be involved in European research networks in nuclear fission and fusion. The work on nuclear fission carried out in these networks is of interest to Switzerland in particular with regard to the safety of nuclear power stations, radioactive waste treatment, radiation protection and medical applications of nuclear technology. The association also enables Switzerland to continue its long-standing efforts in nuclear fusion research in an appropriate framework and to contribute its skills in this field at international level.

Finally, thanks to the excellence of their work Swiss institutions receive a proportion of the funds available from the Joint Euratom Fund. This amount is much larger than Switzerland's mandatory contributions to the Fund.

Switzerland's involvement in the Euratom research programmes is fully in line with Switzerland's new energy strategy approved in 2017, and with the recommendations of the Federal Energy Research Commission (CORE) in its federal energy research concept for 2017 to 2020. Under this concept, Switzerland will continue to conduct research into the safety and operation of existing nuclear facilities and into the treatment of nuclear waste so that it maintains the specialist knowledge required to make judicious decisions on these matters. The concept also recommends that Switzerland continues its research into nuclear fusion to the extent that it can be financed as part of multilateral research cooperation.

6.2 Nuclear fusion in the Euratom research programmes

6.2.1 Context

The second International Conference on the Peaceful Use of Nuclear Energy took place in Geneva in 1958, and declassified fusion research. Three years later, with the establishment of the Research Centre for Plasma Physics (now called the Swiss Plasma Center, an institute of EPF Lausanne), Switzerland secured itself a place within the group of pioneering nations in this field of research. Switzerland has had a cooperation agreement with Euratom since 1978 and so is fully involved in the European fusion research programme, contributing its first-class specific competencies and obtaining international recognition. It was also actively involved in the development and operation of the tokamak Joint European Torus (JET), the largest test facility for the development of nuclear fusion reactors of this type. JET has been in operation in the United Kingdom since 1983 and is still used by the European fusion research community for highly complex experiments.

Switzerland's association to the European fusion research programme has enabled it to continue to develop its activities substantially in this area of research. It has, for example, built advanced infrastructure on its own territory, in particular the Variable Configuration Tokamak ("Tokamak à configuration variable", TCV) at the Swiss Plasma Center, which was commissioned in 1992 and is one of the three most important facilities of its kind in Europe after JET. Switzerland also plays a crucial role in nurturing young scientists working in nuclear fusion. Thanks to its privileged position, the Swiss Plasma Center – a national laboratory fully integrated into the EPF Lausanne campus – is regarded as a model in the training of new generations of scientists, not just in Europe but worldwide.

More detailed information on fusion research in Switzerland can be found in the annual reports on this subject, which are coordinated by SERI.[31]

6.2.2 Euratom fusion research programme

The working plan for the fusion research programme is based on the Roadmap to the realisation of fusion energy,[32] which sets out a research plan and describes the main stages in creating the first nuclear power station feeding power generated by nuclear fusion into the power grid. It is hoped to achieve this vision by 2050. The EUROfusion consortium, which brings together the main research institutions and laboratories active in nuclear fusion in Europe, is responsible for the actual research activities that this involves. Euratom meets 55% of the costs of EUROfusion's activities which are eligible for funding.

The European Commission has also earmarked EUR 250.0 million to operate the JET tokamak between 2014 and 2018. The UK, the host country of the JET tokamak, foots the rest of the bill.

6.2.3 Switzerland's participation between 2014 and 2017

Between 2014 and 2017, Switzerland paid a total of EUR 20 million to the EU for its participation in the joint European fusion research programme. The amount paid is calculated using a special formula for fusion research set in the association agreement of December 2014. This takes account of the programme budget and of the GDP of the EU member states and Switzerland. This ratio was taken from the 1978 cooperation agreement on Switzerland's association in the European fusion research programmes and is slightly more advantageous for Switzerland than the one used to calculate the country's contributions to Horizon 2020.

Of the EUR 20.0 million paid to the EU, 1.3 million went to cover the European Commission's costs for administering the research programme. EUR 7.3 million is the Swiss contribution towards the operation of JET. The JET budget is used to meet the operating costs arising from the use of the tokamak, and is not redistributed to the participants in the fusion research programme. As is the case with experiments conducted in the LHC particle accelerator in CERN, in JET a single experiment is conducted as part of a work programme defined

31 Cf. https://www.sbfi.admin.ch/dam/sbfi/de/dokumente/2017/09/iter-16.pdf (29.08.2018; available only in French)

32 https://www.euro-fusion.org/wpcms/wp-content/uploads/2013/01/JG12.356-web.pdf (29.08.2018)

by EUROfusion. Swiss researchers can take part in these experiments, gain knowledge and actively participate in the analysis of the results. These are the main benefits for fusion research in Switzerland which, however, cannot be directly quantified. Switzerland's contribution to the actual research programme, i.e. to the joint fund, is EUR 11.4 million.

This investment in the joint fund generated a financial return of EUR 18.5 million in financial support for fusion research projects in Switzerland.[33] This amount, which Swiss institutions received for their part in the fusion research programme, is 1.62 times the amount contributed by Switzerland.

Interim figures: Distribution of Switzerland's contribution to the European fusion research programme between 2007 and 2013 (in EUR m)

Budget category	Total amount budgeted in programme	Swiss contribution	Swiss return
Research programme	314.8	11.4	18.5
JET operation	201.3	7.3	Not quantifiable
Euratom administration costs	40.1	1.3	0.0

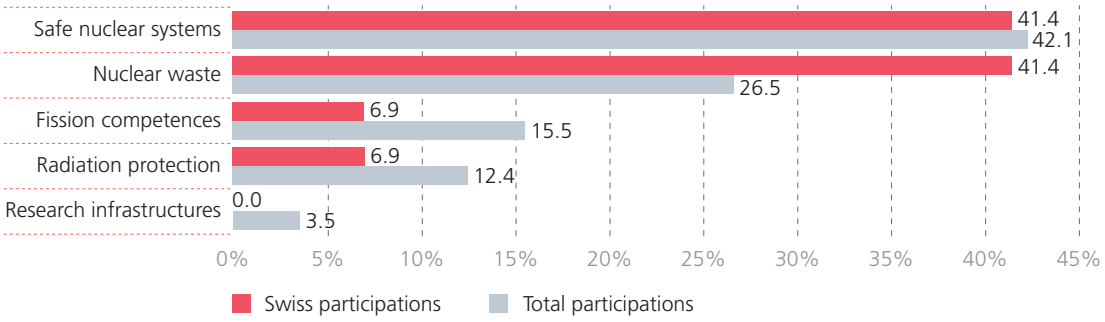
Sources: Swiss Plasma Center, SERI

6.3 Nuclear fission in the Euratom research programmes

Researchers' participation in fission research takes the same form as in the 'classic' framework programmes, with calls for the submission of proposals and evaluations, and the same rules and requirements. All information in the tables and charts in the previous sections therefore include nuclear fission projects.

Under Horizon 2020, Switzerland had 28 participations in the area of fission so far, with committed funding of CHF 9.2 million.

Figure 42: Share of participations in the nuclear fission research programme of Horizon 2020 by activity



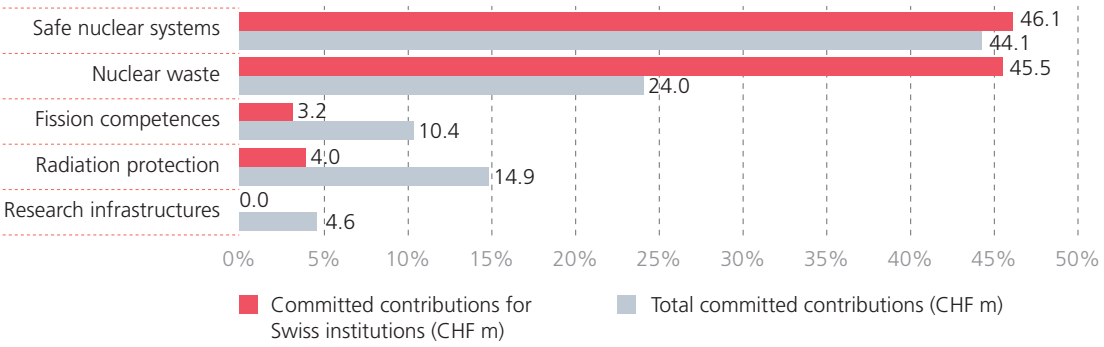
Sources: European Commission, SERI, cf. Table 25 in Appendix C

The activities in the fission programme focus on the safety of nuclear systems and radioactive waste, which together account for over 82% of participations and over 90% of committed funding. The first of these areas covers the safety of current and future systems, in particular those of the fourth generation. The latter will be able to generate more energy than today's reactors, will generate less highly reactive waste with a shorter half-life and have a higher degree of intrinsic safety. In the new reactors, part of the waste which is so problematic today can be 're-burnt' in a process known as transmutation.

33 This amount is based on the final figures for the years 2014 to 2016 and the Swiss institutions' planned figures for 2017.

With the current state of knowledge, however, it is still necessary to put some types of waste in temporary storage. For this reason the fission programme concentrates a lot of its resources on finding a solution for these types of waste (45% of the funding for Switzerland and 24% for the programme overall).

Figure 43: Distribution of contributions awarded under the nuclear fission research programme of Horizon 2020 by activity



Sources: European Commission, SERI, cf. Table 25 in Appendix C

The radiation protection sub-programme addresses a broad range of research topics beyond energy-related technologies. It includes, for instance, also radiation sources for medicine and the development of safety standards for the use of nuclear technologies in general.

Finally, Euratom puts a special emphasis on the training of the next generation of researchers and ingeneers in nuclear technologies. Supporting training in these areas is key to ensure that enough highly qualified specialists are available in Europe.

The Joint Research Centre (JRC), as internal science and knowledge service of the European Commission, also conducts substantial research activities in the nuclear domain. No statistical data is available in the database provided by the EU regarding these activities, however. Switzerland benefits from the JRC's research insofar as it has access to the related publications and scientific expertise. In addition, Switzerland's involvement means that its researchers can take part in the activities of the JRC.

7 Swiss participation in ITER

7.1 Context

If the use of nuclear fusion becomes widespread, it should be possible to generate enormous amounts of energy and to protect the environment at the same time. Nuclear fusion produces practically no CO_2 emissions and creates no long-lived radioactive waste. The material activated during use of a nuclear fusion plant should be entirely recovered a few decades after the plant is decommissioned and declared to be no longer radioactive. A fusion reactor or tokamak also has a high degree of intrinsic safety and there is no danger of a core meltdown. Finally, the fuel required is available in large quantities and distributed all over our planet. However, these advantages have to be balanced against one major challenge: building a plant in which nuclear fusion can be used on an industrial scale.

The aim of the European fusion research programme, in which Switzerland has been involved since 1978, is to create the extreme conditions required to trigger and maintain this type of reaction. This is why the programme has focused since its beginning on developing nuclear fusion as an energy source. This strategy has been systematically pursued by the programme participants for nearly 40 years, particularly from 1979 onwards, with the construction and successful operation of the JET tokamak in the UK. This fusion reactor – the most powerful tokamak in operation to date – is used to test how the nuclear reaction works. In 1997, a record power amplification factor Q of 0.65 was achieved (Q is the ratio between the power generated by the fusion reaction and the reactor's output of external heat applied to the plasma).

The great progress made subsequently paved the way for the construction of the International Thermonuclear Experimental Reactor ITER in 2007. This facility in Cadarache (France) is the main centre of international research activities into nuclear fusion, whose aim is to display the energy efficiency of fusion by achieving a Q-value of 10, i.e. to generate 500 MW of energy from a mere 50 MW fed in as heat. To achieve this aim, a tokamak must be built which is not only very large (23,000 tonnes in weight, 30 metres high and made up of a million components), but which also has very unique characteristics, such as the coils that create a magnetic field, which comprise 100,000 km of superconducting wire and are cooled to a temperature of –270 °C.

The construction of this extraordinary facility is the responsibility of the ITER Organization, an international group comprising the European Union, the USA, China, South Korea, Japan, India and Russia. The EU, on whose territory the facility is being constructed, is responsible for the lion's share (six parts out of eleven), including the extremely complex building that will house the tokamak.

The construction of ITER, an extremely demanding technological and industrial challenge, was delayed considerably early on and is generating huge additional costs. Against this background, in 2015 ITER's current Director-General, Bernard Bigot, undertook a substantial revision of the operational and budget planning of the ITER project. The current hope is to have ITER operational by 2025 and to conduct major nuclear experiments in around 2035.

7.2 Swiss participation in ITER

As the construction of ITER is currently the most important project in the field of nuclear fusion, it only makes sense for a country to conduct research in this area if it can participate in ITER in the short or medium term. Switzerland's participation in ITER is very important because it ensures the competitiveness of Swiss nuclear fusion research and of its own centre of excellence, the Swiss Plasma Center at EPF Lausanne. The construction of ITER is also a unique opportunity for Swiss research institutions and high-tech companies to contribute and develop their skills in the largest international scientific cooperation project ever undertaken.

Thanks to its long-standing association with the European fusion research programme, Switzerland was involved in the ITER project under the auspices of the EU from the outset. It has the same rights in this project as any EU member state and is represented by the EU in ITER's project management. In 2007, Switzerland also recognised the international treaty on which the ITER project is based and approved the statutes of Fusion for Energy in correspondence with the EU. Accordingly, Switzerland is also a member of the joint European undertaking tasked with the preparation and provision of the European contribution to ITER.

Financial aspects of Switzerland's participation in ITER

Switzerland contributed a total of EUR 170.2 million to the ITER project up to the end of 2017: EUR 168.5 million in contributions to the EU and EUR 1.8 million in direct membership fees to Fusion for Energy. EUR 11.0 million of the total amount cover a share of the administration costs of the ITER project met by the EC and Fusion for Energy. The remaining EUR 159.2 million go directly towards the construction of ITER.[34]

Because ITER is still under construction, the benefits Switzerland receives in return for its financial contributions mainly consist in contracts concluded with Swiss companies or research institutions for the planning, development or supply of components or services. Because ITER construction contracts are awarded on a competitive basis, the European participants have no guarantee that their investments in ITER will pay off. However, in comparison with that of other European countries of comparable size, Switzerland's industrial return is very good and the country benefits from the strategic nature of the tasks assigned to Swiss companies and institutions. For example, all of ITER's superconducting components are tested at the Swiss Plasma Center site at the Paul Scherrer Institute in Switzerland, which hosts the only facility in the world where such tests can be conducted. And local industry also benefits: for example, the Swiss companies VAT, which developed and manufactures the 'absolute valves' used in ITER, and Linde, a company involved in cyrotechniques and commissioned to deliver the cooling systems.

From the start of the project up to 31 December 2017, contracts worth a total of EUR 134.7 million were concluded with Swiss companies and research institutions by organisations involved in the ITER project. This means an industrial return coefficient for Switzerland of 0.84, a substantial contribution to the construction of a research facility outside its own national territory. Moreover, having stood at 0.63 at the end of 2014, the coefficient is on the rise.

Distribution of Switzerland's contribution to the construction of ITER between 2007 and 2017 (in EUR m)

Budget entries	Total EU contribution between 2007 and 2017	Swiss contribution	Financial return for Switzerland
Construction of ITER	4,922.6	159.2	134.7
Administration costs of the European Commission and Fusion for Energy	364.7	11.0	0.0

Source: SERI

34 A small proportion of the EUR 159.2 million also goes towards covering the ITER Organization's administration costs. A precise amount cannot be given.

Appendix A: Methodological explanations

The data relating to the framework programmes presented in this report come from records which the European Commission regularly transmits to SERI. This data on Swiss project participations are subsequently reviewed by SERI, corrected where necessary and supplemented by additional information.

Unless stated otherwise, the data on Horizon 2020 used in sections 4 and 5.2 are those provided by the European Commission on 6 March 2018. Most data is taken from the database of concluded grant agreements, although that used for analysing success rates is based on the project proposals once they have been evaluated at the end of a call. The number of evaluated project proposals is compared with the number of projects selected to receive funding. This number does not necessarily correspond to the actual number of grant agreements concluded following a call, as depending on the budget available further projects from the reserve list may receive funding or some agreements may not be implemented.

Some projects or calls for proposals are managed by organisations other than the European Commission. In these cases, contributions are initially paid to the organisation in question, which then forwards them to the researchers. The European Commission database then does not contain any data on the final funding recipient or on the amount of funding paid. This is the case in particular with projects funded via ERA-NETs, by the European Institute for Innovation and Technology (EIT) and by initiatives under Art. 185 of the Treaty on the Functioning of the European Union (TFEU). At European level, it is therefore impossible to say who ultimately is awarded funding and of what amount. In the present report, Swiss participation in initiatives under Art. 185 and 187 TFEU is discussed separately (cf. Section 5).

Unless stated otherwise, all funding mentioned in the report relates to committed funds and not to funds actually disbursed to the recipient research institutions. The European Commission disburses the contractually committed funds in euros in several instalments over the term of the project. Swiss researchers convert these sums into Swiss francs to pay research costs (salaries, equipment). The actual payments paid to researchers therefore depend on the exchange rate.

In this report, the contributions received are stated in Swiss francs. The total amount committed for a Swiss participation in euros was converted into Swiss francs at the average monthly exchange rate at the start of the project. If the starting date of the project was not available in the database, the date on which the contract was signed was taken. This does not apply to the sections about the Euratom fusion research programme and about ITER because the data on return available in these cases do not allow for a reliable conversion into Swiss francs.

The results published in this report with regard to Swiss participations exclude those by international organisations based in Switzerland.[35] There are two reasons for this: first, it is difficult to attribute researchers attached to international organisations who submit a European project to a specific country. Second, research conducted by an international organisation does not necessarily take place in the country in which the organisation is based. The associated funding is therefore frequently not used in the country in question.

35 These include in particular CERN, the UN, and UN-affiliated institutions.

Appendix B: Abbreviations

AAL	Active and Assisted Living
BBI	Bio-based Industries
BFH	Bern University of Applied Sciences
ERI	Education, research and innovation
CERN	European Laboratory for Particle Physics.
CI	Competitiveness indicator
CIP	Competitiveness and Innovation Framework Programme (actual name COSME - Programme for the Competitiveness of enterprises and SMEs)
COSME	Competitiveness of Enterprises and Small and Medium-sized Enterprises, ehemals CIP
COST	European Cooperation in Science and Technology
CS	Clean Sky
Eawag	Swiss Federal Institute of Aquatic Science and Technology
EC	European Commission
ECSEL	Electronic Components and Systems for European Leadership
EDCTP	European & Developing Countries Clinical Trials Partnership
EFSI	European Fund for Strategic Investments
EIB	European Investment Bank
EIC	European Innovation Council
EIT	European Institute of Innovation and Technology
Empa	Swiss Federal Laboratories for Materials Science and Technology
EMPIR	European Metrology Programme for Resarch and Innovation
ERA	European Research Area
ERA-NET+	ERA PLUS Network (European Research Area Network Plus) of the EU (since the FP7, ERA PLUS complements ERA)
ERC	European Research Council
ESA	European Space Agency
ETH	ETH Domain: Switzerland's two federal institutes of technology (i.e. the EPF in Lausanne and the ETH in Zurich) and their associated research institutes: Research Institute for Material Science and Technology (Empa), Swiss Federal Institute for Forest, Snow and Landscape Research (WSL), Swiss Federal Institute of Aquatic Science and Technology (Eawag) and Paul Scherrer Institute (PSI)
ETP	European Technology Platforms
EU	European Union
Euratom	European Atomic Energy Community (which funds its own Framework Programme for research)
FCH	Fuel Cells and Hydrogen
FET	Future and Emerging Technologies – programme area within Pillar I of Horizon 2020
FHNW	University of Applied Sciences of Northwestern Switzerland
FHO	University of Applied Sciences of Eastern Switzerland
FP	EU Framework Programme for Research and Innovation
GDP	Gross Domestic Product
GERD	Gross Domestic Expenditure on Research and Development
H2020	Horizon 2020 (8th Framework Programme)
HES-SO	University of Applied Sciences and Arts of Western Switzerland
HSLU	Lucerne University of Applied Sciences and Arts

ICT	Information and communication technology
IHEID	Graduate Institute for International Studies and Development in Geneva
IMI	Innovative Medicines Initiative
INFRA	European Research Infrastructures (including e-Infrastructures)
IP	Integrated Projects
ITER	International Thermonuclear Experimental Reactor
JET	Joint European Torus
JPI	Joint Programming Initiatives
JRC	Joint Research Centre of the European Commission
JTI	Joint Technology Initiatives
JU	Joint Undertakings
KIC	Knowledge and Innovation Communities
MSCA	Marie Skłodowska-Curie actions
NPO	Non-profit organisation (most often a research institution that is funded by a foundation)
OECD	Organisation for economic cooperation and development
P2P	Public-to-Public Partnerships
PPP	Public-Private-Partnerships
PSI	Paul Scherrer Institute
QT	Quantum technology
SERI	State Secretariat for Education and Research und Innovation
SESAR	Single European Sky ATM Research
SMEs	Small and medium-sized enterprises (< 250 employees, < 50 millions € turnover or 43 millions € balance sheet total)
SNSF	Swiss National Science Foundation
SSH	Social Sciences and Humanities
SUPSI	University of Applied Sciences and Arts of Southern Switzerland
TFEU	Treaty on the Functioning of the European Union
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNIBAS	University of Basle
UNIBE	University of Bern
UNIFR	University of Fribourg
UNIGE	University of Geneva
UNIL	University of Lausanne
UNINE	University of Neuchâtel
UNISG	University of St. Gallen
USI	Università della Svizzera italiana
UZH	University of Zurich
WSL	Swiss Federal Institute for Forest, Snow and Landscape Research
ZFH	Zurich University of Applied Sciences

See also Appendix C, Table 7 and 11, for abbreviations of specific H2020 programmes and research priorities

See Appendix C, Table 16, for a list of country abbreviations

Appendix C: Tables

Table 1: Annual budgets of the European Research Framework Programmes (in EUR million, at current prices)

	FP 1	FP 2	FP 3	FP 4	FP 5	FP 6	FP 7*	FP 8 H2020**	Total
1984	593.0								**593.0**
1985	735.0								**735.0**
1986	874.0								**874.0**
1987	701.8	188.1							**889.9**
1988	260.8	810.6							**1,071.4**
1989	101.1	1,241.3							**1,342.4**
1990	4.9	1,596.9							**1,601.8**
1991		1,270.7	296.0						**1,566.7**
1992		230.9	2,160.5						**2,391.4**
1993		14.8	2,079.5						**2,094.3**
1994		3.9	2,014.7						**2,018.6**
1995		0.2	1.0	2,982.5					**2,983.7**
1996				3,153.5					**3,153.5**
1997				3,485.6					**3,485.6**
1998				3,499.3					**3,499.3**
1999					3,337.5				**3,337.5**
2000					3,607.4				**3,607.4**
2001					3,870.8				**3,870.8**
2002					4,038.0				**4,038.0**
2003						4,029.3			**4,029.3**
2004						4,784.5			**4,784.5**
2005						5,047.8			**5,047.8**
2006						5,251.5			**5,251.5**
2007							5,082.0		**5,082.0**
2008							5,579.1		**5,579.1**
2009							6,119.1		**6,119.1**
2010							6,932.7		**6,932.7**
2011							7,968.1		**7,968.1**
2012							8,926.0		**8,926.0**
2013							9,914.0		**9,914.0**
2014								10,037.7	**10,037.7**
2015								10,754.0	**10,754.0**
2016								10,862.0	**10,862.0**
2017								11,552.4	**11,552.4**
2018								12,177.9	**12,177.9**
2019								12,957.5	**12,957.5**
2020								13,990.9	**13,990.9**
Total	**3,270.6**	**5,357.4**	**6,551.7**	**13,120.9**	**14,853.7**	**19,113.0**	**50,521.0**	**82,332.4**	**195,120.7**

Source: European Commission (COM(2004) 533, 786/2004/EC, COM(2005) 119 final, SEC(2014) 357 final)

* Excl. EURATOM ** Incl. EURATOM Fusion and ITER

Table 2: Evolution of priorities of the European Research Framework Programmes (in EUR m)

Priorität	**FP 1**	**FP 2**	**FP 3**	**FP 4**	**FP 5**	**FP 6**	**FP 7**	**FP 8 H2020**
Energy and Euratom	408.8	294.7	349.4	590.4	594.1	573.4	649.6	8,306.2
Info. and Telecom. Technol. (ICT)	204.4	562.5	829.9	918.5	891.2	1,051.2	1,226.9	7,711.0
Industry and Material	89.9	214.3	327.6	524.8	594.1	382.3	505.2	5,961.0
Environment	57.2	80.4	196.6	295.2	371.3	238.9	288.7	3,081.9
Life sciences	40.9	93.8	218.4	426.4	594.1	860.1	1,082.6	11,326.0
Mobiliy, Grants, Education	16.4	53.6	196.6	196.8	259.9	477.8	649.6	6,163.8
International cooperation		26.8	43.7	131.2	111.4	95.6		816.7
Innovation and SME		13.4	21.8	98.4	111.4	238.9	216.5	6,171.5
Transport and aerospace				65.6	74.3	191.1	721.7	6,342.5
Socio-economics				32.8	37.1	95.6	144.3	3,467.1
Fundamental research						143.3	1,010.4	18,283.4
Others					74.3	430.0	721.7	1,903.1
Total	**3,270.6**	**5,357.4**	**8,735.6**	**13,120.9**	**14,853.7**	**19,113.0**	**50,521.0**	**79,534.2**
Average annual budget (EUR million)	817.7	1,339.4	2,183.9	3,280.2	3,713.4	4,778.3	7,217.3	11,362.0
International Thermonuclear Experimental Reactor (ITER)							3,147.0	2,915.0

Sources: European Commission, SERI

Table 3: New Swiss participations in European FPs since 1992 (by project start)

	FP 3	FP 4	FP 5	FP 6	FP 7	FP 8 H2020	Total
1992	69						**69**
1993	147						**147**
1994	194						**194**
1995	80	100					**180**
1996	9	391					**400**
1997	2	261					**263**
1998		411					**411**
1999		117	1				**118**
2000		7	494				**501**
2001		2	470				**472**
2002			468				**468**
2003			176	159			**335**
2004			4	499			**503**
2005				487			**487**
2006				571			**571**
2007				200	10		**210**
2008					605		**606**
2009					560		**560**
2010					688		**689**
2011					658		**654**
2012					691		**683**
2013					761		**745**
2014					311	15	**326**
2015					39	467	**506**
2016						637	**637**
2017						619	**619**
2018						202	**202**
2019						2	**2**
Total	**501**	**1,289**	**1,613**	**1,916**	**4,323**	**1,942**	**11,558**

Sources: European Commission, SERI

Table 4: New Swiss coordinations in European FPs, as of 2003 (by project start)

	FP 6	FP 7	FP 8 H2020	Total
2003	2			**2**
2004	8			**8**
2005	68			**68**
2006	67			**67**
2007	40	2		**42**
2008	1	84		**85**
2009		113		**113**
2010		151		**151**
2011		146		**146**
2012		166		**166**
2013		164		**164**
2014		134	1	**135**
2015		21	32	**53**
2016			153	**153**
2017			182	**182**
2018			52	**52**
2019			2	**2**
Total	**186**	**981**	**422**	**1,589**

Sources: European Commission, SERI

Table 5: Contributions committed to Swiss institutions since the 3rd European Framework Programme for Research since 1992 (CHF m)

	FP 3	FP 4	FP 5	FP 6	FP 7	FP 8 H2020	Total
1992	43.9						**43.9**
1993	38.3						**38.3**
1994	36.6						**36.6**
1995	7.8	63.3					**71.1**
1996	0.1	112.5					**112.6**
1997	0.3	65.6					**65.9**
1998		100.8					**100.8**
1999		17.8	0.01				**17.8**
2000		1.0	160.7				**161.7**
2001		0.1	148.0				**148.1**
2002			121.8				**121.8**
2003			38.6	69.9			**108.5**
2004			0.7	193.6			**194.3**
2005				205.7			**205.7**
2006				242.4			**242.4**
2007				84.3	4.5		**88.8**
2008					325.0		**325.0**
2009					321.8		**321.8**
2010					413.2		**413.2**
2011					340.1		**340.1**
2012					375.4		**375.4**
2013					448.0		**448.0**
2014					244.4	9.3	**253.7**
2015					23.4	251.5	**274.9**
2016						425.5	**425.5**
2017						85.0	**385.0**
2018						69.3	**69.3**
2019						0.5	**0.5**
Total	**127.0**	**361.1**	**469.8**	**795.9**	**2,495.9**	**1,141.1**	**5,390.8**

Sources: European Commission, SERI

Table 6: Funding for Swiss participants in the European FPs by type of institution since 1992 (CHF m and %)

Year	Framework Programme	ETH Domain		Universities		Universities of applied sciences		Industry		SMEs	
		CHF m	%	CHF m	%	CHF m	%	CHF m	%	CHF m	%
1992	**3**	14.3	32.6	5.4	12.3	0.0	0.0	23.2	52.8	1.0	2.3
1993	**3**	14.8	38.6	9.7	25.3	0.5	1.3	8.5	22.2	3.2	8.4
1994	**3**	15.2	41.5	11.7	32.0	1.2	3.3	4.3	11.7	2.6	7.1
1995	**4**	25.7	36.1	9.8	13.8	0.7	1.0	29.7	41.8	4.2	5.9
1996	**4**	36.7	32.6	32.2	28.6	0.0	0.0	21.9	19.4	14.0	12.4
1997	**4**	21.6	32.8	16.6	25.2	0.4	0.6	8.8	13.4	14.4	21.9
1998	**4**	33.7	33.4	22.5	22.3	2.9	2.9	13.7	13.6	15.4	15.3
1999	**5**	5.2	29.2	3.5	19.7	0.6	3.4	2.1	11.8	4.6	25.8
2000	**5**	60.0	37.1	43.4	26.8	1.8	1.1	16.1	10.0	28.1	17.4
2001	**5**	51.3	34.6	35.3	23.8	2.6	1.8	14.5	9.8	26.9	18.2
2002	**5**	36.8	30.2	34.8	28.6	3.0	2.5	18.2	14.9	17.1	14.0
2003	**6**	40.0	36.9	18.6	17.1	2.6	2.4	22.6	20.8	13.3	12.3
2004	**6**	69.9	36.1	56.8	29.4	4.6	2.4	18.8	9.7	23.3	12.0
2005	**6**	67.3	32.7	59.9	29.1	4.7	2.3	26.2	12.7	29.0	14.1
2006	**6**	81.8	33.7	70.1	28.9	4.2	1.7	26.0	10.7	32.9	13.6
2007	**7**	25.4	28.6	26.4	29.7	2.5	2.8	6.0	6.8	17.5	19.7
2008	**7**	129.3	39.8	83.4	25.6	8.2	2.5	40.0	12.3	42.0	12.9
2009	**7**	138.7	43.1	100.2	31.1	8.3	2.6	16.8	5.2	32.8	10.2
2010	**7**	147.9	35.8	111.9	27.1	11.3	2.7	45.9	11.1	57.0	13.8
2011	**7**	141.5	41.6	89.2	26.2	10.6	3.1	33.1	9.7	34.5	10.2
2012	**7**	142.5	38.0	104.2	27.8	18.5	4.9	27.5	7.3	65.4	17.4
2013	**7**	174.4	38.9	103.3	23.1	17.1	3.8	48.1	10.7	70.2	15.7
2014	**8**	97.8	38.6	106.2	41.9	6.4	2.5	7.4	2.9	20.3	8.0
2015	**8**	111.4	40.5	57.5	20.9	14.5	5.3	37.3	13.6	31.6	11.5
2016	**8**	150.6	35.4	119.5	28.1	20.6	4.8	40.1	40.1	50.2	11.8
2017	**8**	136.0	35.3	116.3	30.2	11.4	3.0	29.9	29.9	53.4	13.9
2018	**8**	21.2	30.6	9.3	13.4	2.5	3.7	11.9	11.9	18.5	26.7
2019	**8**	0.0		0.5	100.0	0.0		0.0		0.0	
Total		**1,991.0**	**36.9**	**1,458.3**	**27.1**	**161.7**	**3.0**	**598.6**	**11.1**	**723.4**	**13.4**

Sources: European Commission, SERI

NPOs		Confederation		Cantones and communes		Others		Total	
CHF m	%	CHF m	%	CHF m	%	CHF m	%	CHF m	%
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**43.9**	100
0.9	2.3	0.5	1.3	0.1	0.3	0.1	0.3	**38.3**	100
1.0	2.7	0.1	0.3	0.4	1.1	0.1	0.3	**36.6**	100
0.7	1.0	0.1	0.1	0.0	0.0	0.2	0.3	**71.1**	100
6.3	5.6	0.6	0.5	0.8	0.7	0.1	0.1	**112.6**	100
2.1	3.2	2.0	3.0	0.0	0.0	0.0	0.0	**65.9**	100
9.7	9.6	2.4	2.4	0.5	0.5	0.0	0.0	**100.8**	100
1.1	6.2	0.6	3.4	0.1	0.6	0.0	0.0	**17.8**	100
7.9	4.9	1.5	0.9	2.8	1.7	0.1	0.1	**161.7**	100
13.4	9.0	3.1	2.1	0.9	0.6	0.1	0.1	**148.1**	100
7.9	6.5	2.2	1.8	1.0	0.8	0.8	0.7	**121.8**	100
10.8	10.0	0.4	0.4	0.0	0.0	0.2	0.2	**108.5**	100
15.3	7.9	3.8	2.0	0.9	0.5	0.0	0.0	**193.4**	100
14.0	6.8	2.1	1.0	2.5	1.2	0.0	0.0	**205.7**	100
23.4	9.7	2.8	1.2	1.2	0.5	0.0	0.0	**242.4**	100
5.0	5.6	2.1	2.4	3.9	4.4	0.0	0.0	**88.8**	100
18.8	5.8	0.9	0.3	2.3	0.7	0.1	0.0	**325.0**	100
19.9	6.2	3.5	1.1	1.6	0.5	0.0	0.0	**321.8**	100
33.9	8.2	5.1	1.2	0.4	0.1	0.0	0.0	**413.2**	100
26.0	7.7	2.6	0.8	2.0	0.6	0.6	0.2	**340.1**	100
13.2	3.5	3.3	0.9	0.7	0.2	0.0	0.0	**375.4**	100
28.1	6.3	5.0	1.1	1.4	0.3	0.4	0.1	**448.0**	100
13.4	5.3	1.3	0.5	0.8	0.3	0.0	0.0	**253.7**	100
20.5	7.5	2.1	0.8	0.0	0.0	0.0	0.0	**275.0**	100
35.2	8.3	5.2	1.2	4.0	0.9	0.0	0.0	**425.5**	100
30.0	7.8	7.2	1.9	0.7	0.2	0.0	0.0	**384.8**	100
4.8	6.9	1.0	1.5	0.0	0.0	0.0	0.0	**69.3**	100
0.0		0.0		0.0		0.0		**0.5**	100
363.4	**6.7**	**61.6**	**1.1**	**28.9**	**0.5**	**2.9**	**0.1**	**5,389.8**	**100**

Table 7: List and budgets of research programmes and priorities for the 8th European framework programme for research (Horizon 2020) (EUR m)

Specific programme	Priority / programme	Abbreviation	Budget (EUR m)	%	%
I. Excellent Science	European Research Council	ERC	13,095.0	17.0	16.1
	Future and emerging technologies	FET	2,696.0	3.5	3.3
	Marie Skłodowska-Curie actions	MSCA	6,162.0	8.0	7.6
	European research infrastructures (incl. e-infrastructures)	INFRA	2,488.0	3.2	3.1
Total Excellent Science			**24,441.0**	**31.7**	**30.0**
II. Industrial Leadership	Leadership in enabling and industrial technologies	LEIT	13,557.0	17.6	16.6
	Access to risk finance	RISKFINANCE	2,842.3	3.7	3.5
	Innovation in SMEs	SME	616.2	0.8	0.8
Total Industrial Leadership			**17,015.5**	**22.1**	**20.9**
III. Societal Challenges	Health	HEALTH	7,471.8	9.7	9.2
	Food, agriculture and aquatic research	FOOD	3,851.4	5.0	4.7
	Energy	ENERGY	5,931.2	7.7	7.3
	Transport	TRANSPORT	6,339.4	8.2	7.8
	Climate and environment	ENV	3,081.1	4.0	3.8
	Inclusive societies	SOCIETY	1,309.5	1.7	1.6
	Secure societies	SECURITY	1,694.6	2.2	2.1
Total Societal Challenges			**29,679.0**	**38.5**	**36.4**
Spreading excellence and widening participation			**816.0**	**1.1**	**1.0**
Science with and for society			**462.0**	**0.6**	**0.6**
European Institute of Innovation and Technology (EIT)			**2,711.0**	**3.5**	**3.3**
Joint Research Centre (without nuclear domain)			**1,903.0**	**2.5**	**2.3**
Total Horizon 2020			**77,027.5**	**100.0**	**94.0**
Euratom programme (2014–2020)	Fission, safety and protection against radiation, fusion research	Fission+Fusion	2,373.0		2.0
ITER		ITER	2,915.0		3.6
Total Euratom programme + ITER			**5,288.0**		**5.5**
Total Horizon 2020 package			**82,315.5**		**100.0**

Source: SEC(2014) 357 final, STATEMENT OF ESTIMATES OF THE COMMISSION FOR 2015, (Preparation of the 2015 Draft Budget), Document II, Financial programming 2016, 2020, (Provisional figures), 11.6.2014

Table 8: Number of Swiss participations, coordinations and amount of the contributions secured by type of institution under Horizon 2020 (CHF m)

Type of institution	Number of participations	%	Of which number of coordinations	%	Secured contributions (CHF m)	%
EPF Lausanne	215	39.6	97	51.6	181.2	17.0
ETH Zurich	218	40.1	80	42.6	172.2	18.3
Eawag	13	2.4	2	1.1	5.6	0.6
Empa	43	7.9	3	1.6	24.1	3.6
PSI	45	8.3	4	2.1	27.1	2.7
WSL	9	1.7	2	1.1	2.9	0.3
Total ETH domain	**543**	**28.0**	**188**	44.5	**413.1**	**36.2**
University of Basel	51	13.0	15	10.8	33.6	11.4
University of Bern	71	18.1	29	20.9	50.5	17.1
University of Fribourg	16	4.1	10	7.2	12.8	4.3
University of Geneva	84	21.4	16	11.5	47.5	16.1
University of Lausanne	50	12.8	18	12.9	50.8	17.2
University of Neuchâtel	13	3.3	2	1.4	6.6	2.2
University of St. Gallen	7	1.8	0	0.0	2.5	0.8
Università della Svizzera italiana	8	2.0	4	2.9	9.4	3.2
University of Zurich	88	22.4	42	30.2	77.4	26.2
Graduate Institute of Internat. and Dev. Studies	4	1.0	3	2.2	4.6	1.6
Total universities	**392**	**20.2**	**139**	32.9	**295.5**	**25.9**
BFH	5	5.8	1	25.0	1.4	2.8
ZFH	15	17.4	1	25.0	9.0	18.0
FHNW	14	16.3	0	0.0	8.1	16.2
FHO	3	3.5	0	0.0	2.7	5.4
SUPSI	26	30.2	1	25.0	16.5	32.9
HSLU	4	4.7	0	0.0	1.6	3.2
HES-SO	18	20.9	1	25.0	10.0	20.0
FH-Kalaidos	1	1.2	0	0.0	0.8	1.6
Total universities of applied sciences	**86**	**4.4**	4	0.9	**50**	**4.4**
Confederation	43	2.2	2	0.5	15.5	1.4
Cantons and communes	13	0.7	0	0.0	4.9	0.4
Non-profit organisations	169	8.7	29	6.9	89.5	7.8
Industry	283	14.6	10	2.4	118.9	10.4
Small- and medium-sized enterprises	413	21.3	50	11.8	153.7	13.5
Total	**1,942**	**100**	**422**	**100**	**1,141.1**	**100**

Sources: European Commission. SERI

Table 9: Annual funding (paid or simulated. in CHF m) received by Swiss universities from European research framework programmes

	EPFL	ETHZ	UNIBAS	UNIBE	UNIFR	UNIGE	UNIL	UNINE	UNISG	USI	UZH	IHEID	Total
2014	2.8	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.4	0.0	**4.1**
2015	15.0	24.9	3.3	5.8	0.1	3.0	3.8	0.5	0.5	0.3	6.3	0.0	**63.6**
2016	42.3	29.5	10.8	8.3	2.6	11.8	11.8	1.1	0.4	1.5	13.6	0.0	**133.7**
2017	43.6	43.4	3.8	13.8	3.3	10.6	12.3	2.0	0.8	3.1	21.7	2.3	**160.6**
2018	27.0	23.6	4.8	5.7	2.0	6.6	6.9	0.9	0.6	1.2	10.2	0.1	**89.7**
2019	18.5	21.4	4.8	8.4	1.3	8.3	7.3	1.1	0.1	0.1	9.6	0.5	**81.3**
2020	15.5	14.6	1.7	2.8	1.4	2.4	1.8	0.4	0.0	2.1	5.4	0.9	**48.9**
2021	9.5	7.6	3.5	2.4	1.0	3.4	3.3	0.1	0.1	0.1	5.0	0.0	**36.1**
2022	6.5	7.2	0.8	3.2	1.0	1.6	2.3	0.5	0.0	1.0	5.1	0.9	**30.0**
2023	0.5	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.1	0.0	**0.9**
Total	**181.2**	**172.2**	**33.6**	**50.5**	**12.8**	**47.5**	**50.8**	**6.6**	**2.5**	**9.4**	**77.3**	**4.6**	**648.9**

Sources: European Commission. SERI
NB: The University of Lucerne and the universities of applied sciences are not shown here. as they receive very little annual funding. The amount of funding paid out under previous FPs was estimated by taking the funding amount secured when contracts were signed and distributing this evenly over the duration of the project.

Table 10: Eligible and approved proposals and success rates by type of institution in Horizon 2020

Type of institution	Proposals approved for funding	%	Eligible proposals	%	Success rate %
EPF Lausanne	225	11.5	1,315	10.6	17.1
ETH Zurich	224	11.4	1,243	10.1	18.0
Eawag	12	0.6	76	0.6	15.8
Empa	38	1.9	226	1.8	16.8
PSI	44	2.2	238	1.9	18.5
WSL	12	0.6	63	0.5	19.0
Total ETH domain	**555**	**28.2**	**3,161**	**25.6**	**17.6**
University of Basel	50	2.5	336	2.7	14.9
University of Bern	67	3.4	380	3.1	17.6
University of Fribourg	15	0.8	143	1.2	10.5
University of Geneva	84	4.3	660	5.3	12.7
University of Lausanne	55	2.8	383	3.1	14.4
University of Neuchâtel	11	0.6	69	0.6	15.9
University of St. Gallen	6	0.3	49	0.4	12.2
Università della Svizzera italiana	8	0.4	91	0.7	8.8
University of Zurich	90	4.6	734	5.9	12.3
Graduate Institute of Internat. and Dev. Studies	4	0.2	29	0.2	13.8
Total universities	**390**	**19.8**	**2,874**	**23.3**	**13.6**
BFH	6	0.3	49	0.4	12.2
ZFH	12	0.6	159	1.3	7.5
FH-Kalaidos	1	0.1	2	0.0	50.0
FHNW	16	0.8	110	0.9	14.5
FHO	3	0.2	33	0.3	9.1
SUPSI	26	1.3	167	1.4	15.6
HSLU	3	0.2	30	0.2	10.0
HES-SO	15	0.8	208	1.7	7.2
Total universities of applied sciences	**82**	**4.2**	**758**	**6.1**	**10.8**
Industry	277	14.1	1,202	9.7	23.0
Small- and medium-sized enterprises	389	19.8	1,794	14.5	21.7
Non-profit organisations	170	8.7	688	5.6	24.7
Confederation	45	2.3	152	1.2	29.6
Cantons and communes	16	0.8	57	0.5	28.1
Others	0	0.0	11	0.1	0.0
Missing	41	2.1	1,662	13.4	2.5
Total	**1,965**	**100**	**12,359**	**100**	**15.9**

Sources: European Commission. SERI
NB: only eligible proposals are included (excl. inadmissible. withdrawn. duplicates. not specified); the success rates are according to the number of proposals in the category "mainlist" in relation to all eligible proposals.

Table 11: Participations and committed contributions by research programme and priority in Horizon 2020

Programme / priorities	Abbreviation	Number of Swiss participations	
Excellent Science		**799**	**41.1%**
European Research Council	ERC	210	10.8%
Future and emerging technologies	FET	78	4.0%
Marie Skłodowska-Curie actions	MSCA	424	21.8%
European research infrastructures (incl. e-infrastructures)	INFRA	87	4.5%
Industrial Leadership	**LEIT**	**452**	**23.3%**
Industrial Leadership – cross-theme	P2-OTHER	0	0.0%
Information and Communication Technologies	ICT	250	12.9%
Nanotechnologies, Photonics, Advanced Materials, Advanced Manufacturing and Processing, and Biotechnology	NMBP	157	8.1%
Space	SPACE	38	2.0%
Access to risk finance	RISKFINANCE	1	0.1%
Innovation in SMEs	SME	6	0.3%
Societal Challenges	**SC**	**642**	**33.1%**
Health	HEALTH	174	9.0%
Food, agriculture and aquatic research	FOOD	84	4.3%
Energy	ENERGY	151	7.8%
Transport	TRANSPORT	109	5.6%
Climate and environment	ENV	68	3.5%
Inclusive societies	SOCIETY	24	1.2%
Secure societies	SECURITY	32	1.6%
Spreading excellence and widening participation	**SEAWP**	**8**	**0.4%**
Science with and for society	**SWAFS**	**10**	**0.5%**
Euratom programme (2014–2020)	**EURATOM**	**31**	**1.6%**
Others H2020	CROSST	0	0.0%
Total		**1,942**	**100%**

Sources: European Commission, SERI

Total participations		Committed contributions for Swiss institutions (CHF m)		Total committed contributions (CHF m)	
25,903	**32.2%**	**575.8**	**50.5%**	**11,281.8**	**34.9%**
3,949	4.9%	372.5	32.6%	5,730.8	17.7%
1,604	2.0%	64.1	5.6%	867.1	2.7%
16,495	20.5%	103.9	9.1%	3,380.9	10.4%
3,855	4.8%	35.4	3.1%	1,303.0	4.0%
18,657	**23.2%**	**243.1**	**21.3%**	**7,120.1**	**22.0%**
1	0.0%	0.0	0.0%	0.0	0.0%
9,815	12.2%	140.4	12.3%	4,015.0	12.4%
5,408	6.7%	90.5	7.9%	2,389.4	7.4%
1,803	2.2%	11.4	1.0%	577.9	1.8%
45	0.1%	0.1	0.0%	9.4	0.0%
1,585	2.0%	0.6	0.1%	128.3	0.4%
32,874	**40.8%**	**302.5**	**26.5%**	**12,349.2**	**38.2%**
5,861	7.3%	97.7	8.6%	2,917.1	9.0%
5,026	6.2%	27.0	2.4%	1,624.8	5.0%
6,628	8.2%	86.3	7.6%	2,719.6	8.4%
6,971	8.7%	41.3	3.6%	2,492.4	7.7%
4,459	5.5%	26.0	2.3%	1,431.6	4.4%
1,984	2.5%	9.3	0.8%	508.5	1.6%
1,945	2.4%	14.9	1.3%	655.1	2.0%
697	**0.9%**	**1.4**	**0.1%**	**452.6**	**1.4%**
769	**1.0%**	**2.5**	**0.2%**	**172.6**	**0.5%**
1,105	**1.4%**	**15.7**	**1.4%**	**764.8**	**2.4%**
509	0.6%	0.0	0.0%	216.4	0.7%
80,514	**100%**	**1,141.1**	**1.0**	**32,357.4**	**100%**

Table 12: Activity and success indices for Swiss project proposals in Horizon 2020 by research programme and research priority

Programme / priority		Number of Swiss proposals	Proportion of Swiss proposals by priority (%)
ERC	European Research Council	883	7.1
FET	Future and emerging technologies	1,054	8.5
MSCA	Marie Skłodowska-Curie actions	3,970	32.1
INFRA	European research infrastructures (incl. e-infrastructures)	205	1.7
LEIT-CROSST	Industrial Leadership – cross-theme	1	0.0
LEIT-ICT	Information and Communication Technologies	1,487	12.0
LEIT-NMBP	Nanotechnologies, Photonics, Advanced Materials, Advanced Manufacturing and Processing, and Biotechnology	850	6.9
SPACE	Space	168	1.4
RISKFINANCE	Access to risk finance	4	0.0
INNOSUPSME	Innovation in SMEs	34	0.3
SC-CROSST	Societal Challenges – Cross-theme		0.0
HEALTH	Health	1,167	9.4
FOOD	Food, agriculture and aquatic research	453	3.7
ENERGY	Energy	623	5.0
TRANSPORT	Transport	367	3.0
ENV	Climate and environment	280	2.3
SOCIETY	Inclusive societies	273	2.2
SECURITY	Secure societies	296	2.4
WIDESPREAD	Spreading excellence and widening participation	67	0.5
SWAFS	Science with and for society	110	0.9
EURATOM	Euratom programme (2014–2020)	57	0.5
CROSST	Others H2020	10	0.1
Total		**12,359**	**100**

Sources: European Commission, SERI
NB: The figures only include eligible proposals (excl. inadmissible, withdrawn, duplicates, not specified); the success rates reflect the number of proposals in the "mainlist" category relative to the total number of admissible proposals; all countries = incl. Switzerland. The ERC-Calls StG-2014 and CoG ERC-2014 are not included in the results for Switzerland because Switzerland was not eligible to take part in them.

Proportion of proposals by priority, all countries (%)	**Swiss activity index**	Success rates of Swiss proposals (%)	Success rates of proposals, all countries (%)	**Swiss success index**
4.6	**1.57**	21.2	12.7	**1.67**
4.6	**1.83**	10.6	7.5	**1.42**
23.3	**1.38**	11.8	12.4	**0.95**
1.5	**1.14**	33.7	33.5	**1.01**
0.0	**0.40**	0.0	12.1	**0.00**
12.5	**0.96**	16.7	14.0	**1.20**
6.8	**1.01**	15.8	12.3	**1.28**
1.5	**0.90**	19.6	18.5	**1.06**
0.1	**0.54**	25.0	9.5	**2.63**
0.9	**0.30**	11.8	26.9	**0.44**
0.0	**0.00**		0.0	
9.1	**1.04**	15.1	10.9	**1.38**
6.2	**0.59**	21.9	15.7	**1.39**
6.6	**0.76**	23.4	15.5	**1.51**
5.2	**0.58**	29.7	22.8	**1.31**
4.6	**0.49**	23.6	17.1	**1.38**
5.0	**0.45**	7.7	6.6	**1.17**
3.4	**0.70**	13.9	12.2	**1.14**
0.7	**0.77**	11.9	15.3	**0.78**
1.7	**0.51**	11.8	9.8	**1.21**
0.3	**1.35**	49.1	43.4	**1.13**
1.5	**0.05**	0.0	5.2	**0.00**
100	**1.00**	**15.9**	**13.6**	**1.17**

Table 13: Activity and success indices for Swiss project proposals to the European Research Council (ERC) in Horizon 2020 by discipline

Domain	Number of Swiss proposals	Proportion of proposals, Switzerland	Proportion of proposals, all countries	**Swiss activity index**	Success rates of Swiss proposals	Success rates of proposals, all countries	**Swiss success index**
ERC SG-LS	71	8.0%	11.4%	**0.71**	19.7%	10.8%	**1.83**
ERC SG-PE	131	14.8%	16.3%	**0.91**	16.0%	10.1%	**1.59**
ERC SG-SH	55	6.2%	9.1%	**0.69**	10.9%	9.6%	**1.14**
ERC CG-LS	59	6.7%	8.8%	**0.76**	27.1%	15.2%	**1.78**
ERC CG-PE	95	10.8%	13.2%	**0.81**	29.5%	13.7%	**2.16**
ERC CG-SH	34	3.9%	6.4%	**0.60**	14.7%	13.8%	**1.06**
ERC AG-LS	147	16.6%	9.2%	**1.80**	18.4%	11.1%	**1.65**
ERC AG-PE	173	19.6%	12.9%	**1.51**	17.3%	10.1%	**1.72**
ERC AG-SH	50	5.7%	7.0%	**0.81**	16.0%	9.4%	**1.71**
ERC PoC	65	7.4%	5.7%	**1.28**	47.7%	34.1%	**1.40**
ERC Other	3	0.3%	0.4%	**0.93**	33.3%	21.1%	**1.58**
Total	**883**	**100%**	**100%**	**1.00**	**21.2%**	**12.7%**	**1.67**

Sources: European Commission, SERI
NB: The figures only include eligible proposals (excl. inadmissible, withdrawn, duplicates, not specified); the success rates reflect the number of proposals in the "mainlist" category relative to the total number of admissible proposals; all countries = incl. Switzerland.

Table 14: Share of female applicants and grantees in European Research Council projects

ERC	**Proposals**		**Projects**	
	Numbers	Share of women	Numbers	Share of women
All grantees	24,109	26.4%	3,949	24.5%
Grantees in Switzerland	919	19.0%	210	18.2%
Grantees with Swiss nationality	427	20.6%	98	19.4%

Sources: European Commission, SERI

Table 15: Share of female applicants and grantees in Marie Skłodowska-Curie Actions projects

MSCA	**Proposals**		**Projects**	
	Numbers	Share of women	Numbers	Share of women
All grantees	34,015	40.4%	18,886	39.8%
Grantees in Switzerland	4,000	41.7%	487	39.2%
Grantees with Swiss nationality	155	41.9%	98	35.7%

Sources: European Commission, SERI

Table 16: Number of participations and coordinations of projects and contributions secured by country in Horizon 2020

Country		Status	Participations			Coordinations			Commited contributions		
			Number	%	per 1000 researchers	Number	%	per 1000 researchers	CHF m	%	% GERD
AL	Albania	AS	20	0.0	11.6		0.0	0.0	2.3	0.0	1.4
AM	Armenia	AS	21	0.0	5.4	2	0.0	0.5	0.8	0.0	0.3
AT	Austria	MS	2,187	2.7	28.0	413	2.5	5.3	881.6	2.7	1.5
BA	Bosnia-Herzegovina	AS	44	0.1	24.0	5	0.0	2.7	4.4	0.0	1.1
BE	Belgium	MS	3,524	4.4	47.8	571	3.5	7.7	1,501.9	4.6	2.7
BG	Bulgaria	MS	370	0.5	19.1	31	0.2	1.6	63.2	0.2	1.1
CH	Switzerland	AS	1,942	2.4	27.4	422	2.6	6.0	1,141.1	3.5	1.9
CY	Cyprus	MS	370	0.5	174.6	68	0.4	32.1	118.6	0.4	22.1
CZ	Czech Republic	MS	833	1.0	14.7	82	0.5	1.4	208.5	0.6	0.7
DE	Germany	MS	9,685	12.0	16.5	1,813	11.1	3.1	5,184.0	16.0	1.0
DK	Denmark	MS	1,782	2.2	29.7	504	3.1	8.4	797.3	2.5	2.2
EE	Estonia	MS	368	0.5	51.2	89	0.5	12.4	102.2	0.3	4.1
EL	Greece	MS	2,224	2.8	36.6	317	1.9	5.2	725.5	2.2	6.0
ES	Spain	MS	8,237	10.2	38.4	2,024	12.4	9.4	2,913.5	9.0	3.4
FI	Finland	MS	1,559	1.9	28.0	320	2.0	5.7	694.6	2.1	2.4
FO	Faroe Islands	AS	12	0.0	–	2	0.0	–	2.6	0.0	–
FR	France	MS	7,685	9.5	20.8	1,491	9.1	4.0	3,305.5	10.2	1.2
GE	Georgia	AS	26	0.0	2.9		0.0	0.0	2.5	0.0	0.5
HR	Croatia	MS	346	0.4	31.2	24	0.1	2.2	55.9	0.2	1.6
HU	Hungary	MS	690	0.9	18.0	114	0.7	3.0	197.4	0.6	1.3
IE	Ireland	MS	1,288	1.6	38.9	363	2.2	11.0	568.1	1.8	3.6
IL	Israel	AS	893	1.1	–	356	2.2	–	537.3	1.7	0.9
IS	Iceland	AS	176	0.2	47.3	65	0.4	17.5	65.0	0.2	4.3
IT	Italy	MS	7,597	9.4	43.6	1,466	9.0	8.4	2,643.1	8.2	2.0
LT	Lithuania	MS	272	0.3	15.7	46	0.3	2.7	41.0	0.1	1.1
LU	Luxembourg	MS	245	0.3	78.2	34	0.2	10.8	77.8	0.2	2.3
LV	Latvia	MS	237	0.3	30.3	31	0.2	4.0	51.6	0.2	3.8
MD	Moldova (Republic of)	AS	43	0.1	12.8	2	0.0	0.6	4.1	0.0	1.4
ME	Montenegro	AS	17	0.0	9.6	2	0.0	1.1	1.6	0.0	0.9
MK	Former Yugoslav Republic of Macedonia (FYROM)	AS	50	0.1	13.3	4	0.0	1.1	6.4	0.0	1.1
MT	Malta	MS	110	0.1	77.9	17	0.1	12.0	18.9	0.1	3.8
NL	Netherlands	MS	4,984	6.2	44.1	1,111	6.8	9.8	2,451.3	7.6	3.3
NO	Norway	AS	1,259	1.6	24.1	256	1.6	4.9	611.5	1.9	2.2
PL	Poland	MS	1,260	1.6	10.6	171	1.0	1.4	304.3	0.9	0.7
PT	Portugal	MS	1,733	2.2	21.4	306	1.9	3.8	516.3	1.6	3.0
RO	Romania	MS	671	0.8	24.6	40	0.2	1.5	112.0	0.3	1.2
RS	Serbia	AS	255	0.3	15.4	29	0.2	1.7	67.3	0.2	1.8
SE	Sweden	MS	2,420	3.0	22.3	449	2.7	4.1	1,102.2	3.4	1.6
SI	Slovenia	MS	672	0.8	59.4	94	0.6	8.3	186.5	0.6	2.9
SK	Slovakia	MS	340	0.4	13.9	38	0.2	1.6	84.6	0.3	1.0
TN	Tunisia	AS	45	0.1	1.3	1	0.0	0.0	6.0	0.0	0.2
TR	Turkey	AS	516	0.6	2.7	92	0.6	0.5	123.7	0.4	0.2
UA	Ukraine	AS	142	0.2	2.6	12	0.1	0.2	16.3	0.1	0.2
UK	United Kingdom	MS	9,406	11.7	18.9	3,023	18.5	6.1	4,616.6	14.3	2.3
	Others		3,958	4.9	–	38	0.2	–	187.1	0.6	–
	Total		80,514	100	–	16,338	100	–	32,357.4	100	–

Sources: European Commission, Eurostat, OECD, Unesco, SERI
NB: MS = EU member state; AS = associated state. GERD: Gross domestic expenditures on research and development in current PPP, according to last year available (usually 2015).

Table 17: Success rates of project proposals by country in Horizon 2020

Country		Status	Number of proposals evaluated	Number of proposals awarded funding	Success rate	Number of coodinators evaluated	Number of coodinators awarded funding	Success rate
AL	Albania	Associated	307	21	6.8	31		–
AM	Armenia	Associated	147	16	10.9	19	1	5.3
AT	Austria	Member	14,145	2,219	15.7	3,117	448	14.4
BA	Bosnia-Herzegovina	Associated	353	46	13.0	65	5	7.7
BE	Belgium	Member	22,044	3,585	16.3	4,320	624	14.4
BG	Bulgaria	Member	3,868	341	8.8	1,155	33	2.9
CH	Switzerland	Associated	12,359	1,965	15.9	2,745	470	17.1
CY	Cyprus	Member	3,284	356	10.8	752	70	9.3
CZ	Czech Republic	Member	6,132	789	12.9	1,269	83	6.5
DE	Germany	Member	62,875	9,573	15.2	14,056	1,905	13.6
DK	Denmark	Member	13,118	1,826	13.9	4,311	575	13.3
EE	Estonia	Member	2,957	359	12.1	927	94	10.1
EL	Greece	Member	18,910	2,204	11.7	3,739	334	8.9
ES	Spain	Member	62,286	7,958	12.8	20,365	2,209	10.8
FI	Finland	Member	12,383	1,576	12.7	3,894	332	8.5
FO	Faroe Islands	Associated	70	15	21.4	25	3	12.0
FR	France	Member	43,721	6,965	15.9	12,243	1,601	13.1
GE	Georgia	Associated	241	26	10.8	16		–
HR	Croatia	Member	2,954	319	10.8	580	25	4.3
HU	Hungary	Member	7,010	688	9.8	2,403	115	4.8
IE	Ireland	Member	9,361	1,283	13.7	2,966	386	13.0
IL	Israel	Associated	7,562	915	12.1	3,349	368	11.0
IS	Iceland	Associated	1,061	184	17.3	390	66	16.9
IT	Italy	Member	64,485	7,200	11.2	20,245	1,550	7.7
LT	Lithuania	Member	2,389	255	10.7	532	48	9.0
LU	Luxembourg	Member	1,603	231	14.4	281	38	13.5
LV	Latvia	Member	2,017	232	11.5	620	33	5.3
MD	Moldova (Republic of)	Associated	370	40	10.8	88	2	2.3
ME	Montenegro	Associated	172	20	11.6	26	3	11.5
MK	Former Yugoslav Republic of Macedonia (FYROM)	Associated	543	51	9.4	101	4	4.0
MT	Malta	Member	912	110	12.1	183	19	10.4
NL	Netherlands	Member	32,035	4,920	15.4	8,159	1,182	14.5
NO	Norway	Associated	8,855	1,272	14.4	2,644	289	10.9
PL	Poland	Member	11,120	1,235	11.1	3,023	177	5.9
PT	Portugal	Member	13,985	1,630	11.7	3,422	331	9.7
RO	Romania	Member	5,987	648	10.8	1,071	43	4.0
RS	Serbia	Associated	2,370	241	10.2	465	29	6.2
SE	Sweden	Member	16,464	2,391	14.5	4,581	489	10.7
SI	Slovenia	Member	6,339	625	9.9	1,684	98	5.8
SK	Slovakia	Member	2,666	314	11.8	717	38	5.3
TN	Tunisia	Associated	323	53	16.4	10	1	10.0
TR	Turkey	Associated	5,282	513	9.7	2,022	104	5.1
UA	Ukraine	Associated	1,493	125	8.4	326	13	4.0
UK	United Kingdom	Member	66,864	9,402	14.1	22,815	3,226	14.1
	Others		20,527	3,387	16.5	202	36	17.8
	Total	**Total**	**573,949**	**78,124**	**13.6**	**155,954**	**17,500**	**11.2**

Sources: European Commission, SERI

NB: The figures only include eligible proposals (excl. inadmissible, withdrawn, duplicates, not specified); the success rates reflect the number of proposals in the "mainlist" category relative to the total number of eligible proposals.

Table 18: Number of collaborations between partners from Switzerland and other countries in Horizon 2020

Abbreviation	Country	Number of joint projects	Number of collaborative links
DE	Germany	888	3,952
UK	United Kingdom	779	3,127
FR	France	702	3,198
IT	Italy	677	2,809
ES	Spain	616	2,381
NL	Netherlands	575	1,931
BE	Belgium	467	1,269
SE	Sweden	359	968
AT	Austria	329	778
EL	Greece	304	712
DK	Denmark	245	609
FI	Finland	222	578
PL	Poland	215	403
PT	Portugal	197	467
IE	Ireland	192	354
NO	Norway	175	446
CZ	Czech Republic	171	375
HU	Hungary	127	269
SI	Slovenia	119	241
RO	Romania	119	201
US	United States	107	261
IL	Israel	98	202
HR	Croatia	76	137
TR	Turkey	68	105
BG	Bulgaria	65	106
CY	Cyprus	64	103
SK	Slovakia	64	108
EE	Estonia	61	95
LT	Lithuania	60	113
LU	Luxembourg	56	87
LV	Latvia	45	83
RS	Serbia	44	81
IS	Iceland	35	51
UA	Ukraine	20	32
MT	Malta	18	22
MK	Former Yugoslav Republic of Macedonia (FYROM)	12	18
MD	Moldova (Republic of)	11	13
AL	Albania	7	7
TN	Tunisia	6	11
GE	Georgia	5	6
AM	Armenia	5	6
ME	Montenegro	4	4
BA	Bosnia-Herzegovina	2	2
FO	Faroe Islands	1	1
CN	China	33	143
AU	Australia	33	60
CA	Canada	24	34
ZA	South Africa	18	64
RU	Russia	18	25
JP	Japan	17	24
KR	South Korea	13	46
AR	Argentina	13	19
BR	Brazil	11	36
	Others	260	609
	Total	**8,852**	**27,782**

Sources: European Commission, SERI

Table 19: ERC grantees in Switzerland by nationality (incoming) vs. ERC grantees with Swiss nationality by host country (outgoing)

Country	ERC grantees in Switzerland by nationality	ERC grantees with Swiss nationality by host country
Switzerland	63	63
Germany	43	9
Italy	19	
United States	11	
France	8	1
Belgium	8	6
Greece	5	5
Austria	5	
United Kingdom	4	2
Turkey	4	6
Spain	4	
Sweden	3	1
Netherlands	3	3
Slovakia	2	
Russia	2	
Poland	2	
Israel	2	
India	2	
Hungary	2	
Finland	2	
Czech Republic	2	
China	2	
Canada	2	
Romania	1	1
Portugal	1	
South Korea	1	
Egypt	1	
Denmark	1	
Cyprus	1	
Croatia	1	
Bulgaria	1	
Brazil	1	
Ireland		1
Other	1	
Total	**210**	**98**

Sources: European Commission, SERI
NB: The analysis includes all ERC funding schemes

Table 20: MSCA grantees in Switzerland by nationality (incoming) vs. MSCA grantees with Swiss nationality by host country (outgoing)

Country	MSCA grantees in Switzerland by nationality	MSCA grantees with Swiss nationality by host country
Italy	81	3
Germany	63	7
France	39	10
Spain	33	5
China	28	1
United Kingdom	22	28
Greece	18	1
United States	16	4
India	13	
Netherlands	13	5
Switzerland	13	13
Poland	10	
Turkey	10	
Iran	9	
Russia	9	
Israel	8	2
Portugal	6	
Canada	5	
Czech Republic	5	
Austria	4	2
Belgium	4	3
Bulgaria	4	
Colombia	4	
Japan	4	
South Korea	4	
New Zealand	4	1
Hungary	3	
Slovakia	3	
Ukraine	3	
Vietnam	3	
Argentina	2	
Australia	2	3
Bangladesh	2	
Brazil	2	2
Costa Rica	2	
Cyprus	2	1
Finland	2	
Indonesia	2	
Laos	2	
Singapore	2	
Taiwan	2	
Sweden	2	5
Denmark	2	5
Afghanistan	1	
Armenia	1	
Cambodia	1	
Croatia	1	
Egypt	1	
Macedonia	1	
Ireland	1	2
North Korea	1	
Lithuania	1	
Mali	1	
Mauritania	1	
Mexico	1	
Morocco	1	
Norway	1	1
Pakistan	1	
Philippines	1	
Romania	1	
Sri Lanka	1	
Tunisia	1	
Venezuela	1	
International Organisations		1
Others		11
Total	**487**	**116**

Sources: European Commission, SERI
NB: The data applies to all MSCA funding schemes apart from "Researchers' Night". A total of 116 grantees with Swiss nationality is given, although the actual number of persons is 98; 17 grantees are conducting research in several countries, and so appear several times in the data.

Table 21: Participations and committed contributions in Horizon 2020 by funding source

Programme / priorities	Number of Swiss participations with EU funding	Committed funding for Swiss institutions (CHF m) from EU	%	Number of Swiss participations with Swiss funding
Excellent Science	**739**	**548.9**	**82.8**	**60**
ERC	210	372.5	56.2	0
FET	73	61.0	9.2	5
MSCA	397	91.8	13.8	27
INFRA	59	23.6	3.6	28
Industrial Leadership	**145**	**55.8**	**8.4**	**307**
ICT	61	25.3	3.8	189
NMP	65	26.8	4.0	92
SPACE	13	3.1	0.5	25
RISKFINANCE	0	0.0	0.0	1
SME	6	0.6	0.1	0
Societal Challenges	**243**	**46.0**	**6.9**	**399**
HEALTH	68	6.6	1.0	106
FOOD	33	4.7	0.7	51
ENERGY	48	13.2	2.0	103
TRANSPORT	60	9.8	1.5	49
ENV	21	5.2	0.8	47
SOCIETY	3	1.3	0.2	21
SECURITY	10	5.1	0.8	22
Spreading excellence and widening participation	**8**	**1.4**	**0.2**	**0**
Science with and for society	**0**	**0.0**	**0.0**	**10**
Euratom	**19**	**10.9**	**1.6**	**12**
Total	**1,154**	**663.0**	**100.0**	**788**
% contributions		58.1		
% participations	59.4			40.6

Sources: European Commission, SERI
NB: 43 participants do not receive any funding and 3 (in Euratom) receive funding from both the EU and Switzerland. Participants in the second and fifth columns can therefore not be clearly assigned to either funding source.

Committed funding for Swiss institutions (CHF m) from Switzerland	%	Number of Swiss participations total	Total committed contributions for Swiss institutions (CHF m)	%	Average costs per participation (CHF m)
26.9	**5.6**	**799**	**575.8**	**50.5**	**0.72**
0.0	0.0	210	372.5	32.6	1.77
3.1	0.6	78	64.1	5.6	0.82
12.1	2.5	424	103.9	9.1	0.25
11.8	2.5	87	35.4	3.1	0.41
187.3	**39.2**	**452**	**243.1**	**21.3**	**0.54**
115.2	24.1	250	140.4	12.3	0.56
63.7	13.3	157	90.5	7.9	0.58
8.3	1.7	38	11.4	1.0	0.30
0.1	0.0	1	0.1	0.0	0.11
0.0	0.0	6	0.6	0.1	0.11
256.5	**53.7**	**642**	**302.5**	**26.5**	**0.47**
91.1	19.0	174	97.7	8.6	0.56
22.2	4.7	84	27.0	2.4	0.32
73.2	15.3	151	86.3	7.6	0.57
31.4	6.6	109	41.3	3.6	0.38
20.8	4.4	68	26.0	2.3	0.38
8.0	1.7	24	9.3	0.8	0.39
9.8	2.1	32	14.9	1.3	0.47
0.0	**0.0**	**8**	**1.4**	**0.1**	**0.17**
2.5	**0.5**	**10**	**2.5**	**0.2**	**0.25**
4.9	**1.0**	**31**	**15.7**	**1.4**	**0.51**
478.1	**100.0**	**1,942**	**1,141.1**	**100.0**	**0.59**
41.9			100.0		
		100.0			

Table 22: Competitiveness indicator

Country	7th Research Framework Programme					
	2007	2008	2009	2010	2011	2012
Albania	–	4.4	3.7	3.6	6.8	1.6
Belgium	56.1	195.6	163.5	160.4	182.4	189.5
Bosnia-Herzegovina	–	5.6	4.6	4.7	6.5	4.4
Bulgaria	22.2	53.6	67.2	66.9	27.5	38.7
Denmark	68.7	186.0	206.8	201.5	184.1	214.0
Germany	0.6	107.9	94.1	92.9	100.3	93.7
Estonia	53.4	182.2	164.0	162.9	145.4	92.8
Finland	238.5	235.6	234.7	238.0	183.7	167.7
France	562.6	96.1	95.7	96.0	95.4	91.4
Greece	57.9	170.7	136.9	153.9	187.2	165.2
United Kingdom	24.2	114.3	141.9	141.7	127.9	137.0
Ireland	21.7	103.8	116.2	116.0	159.3	155.8
Iceland	41.3	213.3	233.4	260.9	107.7	388.3
Italy	14.3	81.7	79.3	81.3	82.5	78.0
Croatia	7.1	36.0	41.7	44.1	25.8	48.0
Latvia	10.5	56.0	35.8	36.6	34.9	49.1
Lithuania	9.3	29.6	61.5	59.2	27.8	33.1
Luxembourg	19.7	60.4	49.8	49.0	33.2	94.1
Malta	43.2	89.2	81.7	79.7	58.9	68.0
Former Yugoslav Republic of Macedonia (FYROM)	–	35.6	56.4	56.9	23.7	11.3
Montenegro				21.3	54.4	6.3
Netherlands	20.1	167.8	179.3	184.1	187.2	216.3
Norway	22.8	85.3	131.7	129.8	120.9	108.0
Austria	31.4	172.2	135.8	137.7	144.2	145.1
Poland	11.6	30.9	31.7	30.3	24.4	22.3
Portugal	29.9	72.9	75.9	76.7	82.1	93.1
Romania	15.3	27.5	21.4	20.9	18.0	14.3
Sweden	76.8	211.1	216.9	213.9	181.3	181.1
Switzerland	32.0	177.8	208.2	209.7	227.6	187.1
Serbia	0.9	44.1	19.4	19.9	38.3	18.4
Slovakia	11.0	34.2	26.4	25.4	22.5	19.6
Slovenia	45.3	185.0	113.6	116.9	117.7	165.0
Spain	19.6	77.6	73.9	77.9	100.7	110.0
Czech Republic	28.4	51.2	47.7	49.5	38.1	45.0
Turkey	1.0	6.9	8.1	7.4	5.6	7.3
Hungary	49.6	76.4	69.0	69.2	54.3	54.5
Cyprus	48.7	132.0	115.5	119.7	185.7	146.7

Sources: European Commission (Ecorda, Eurostat), SERI

	7th and 8th Research Framework Programme		8th Research Framework Programme	Total 8th Framework Programme
2013	2014	2015	2016	**2014–2016**
3.7	3.9	1.0	3.6	**2.2**
195.2	206.5	246.3	183.3	**217.7**
1.5	7.3	3.3		**10.1**
38.3	17.6	24.5	22.0	**24.1**
227.0	190.0	183.7	220.4	**202.9**
93.7	107.2	92.2	87.1	**99.2**
117.5	201.7	215.1	190.7	**207.4**
153.7	164.2	213.3	186.9	**201.1**
87.3	88.2	91.9	83.0	**86.3**
157.9	109.7	166.9	165.2	**163.4**
143.7	146.0	127.0	132.5	**129.6**
148.3	147.1	123.5	119.3	**137.3**
183.3	154.6	319.5	260.4	**296.5**
73.0	75.8	79.2	83.5	**82.6**
65.5	43.9	43.5	37.3	**39.7**
84.7	90.3	55.1	42.0	**52.1**
47.8	18.0	26.6	32.1	**29.7**
47.4	47.9	106.6	85.3	**97.8**
101.8	66.7	52.4	140.6	**98.8**
17.2	8.7	8.0	7.5	**7.8**
41.5	9.3	3.9		**5.4**
224.1	216.4	221.2	201.7	**205.0**
100.9	123.0	128.1	142.5	**129.6**
140.0	132.7	139.1	157.3	**148.4**
23.0	11.9	20.8	20.1	**21.1**
90.1	87.7	125.3	107.7	**118.3**
14.3	18.2	18.1	21.2	**20.5**
188.6	189.9	177.8	159.3	**163.3**
187.4	173.7	119.2	193.2	**151.0**
34.4	45.9	22.8	43.7	**33.3**
28.7	26.5	17.2	55.1	**35.8**
129.3	89.3	191.4	165.4	**184.4**
117.7	105.9	117.4	126.5	**122.5**
37.2	31.1	38.5	39.6	**40.5**
5.4	6.7	4.0	6.0	**5.0**
52.2	36.5	56.7	42.7	**47.5**
174.6	204.9	292.1	207.1	**251.7**

Table 23: Swiss project proposals, funded projects and success rates for Horizon 2020 (2014–2018) under Article 185 of the Treaty on the Functioning of the European Union (TFEU)

	AAL	Eurostars	EMPIR	EDCTP	Total
Number of project proposals with a Swiss partner	142	423	55	119	**739**
Number of funded projects with a Swiss partner	39	139	32	11	**221**
Success rate in %	**28%**	**33%**	**58%**	**9%**	**30%**
Total national funding (CHF m)	11.0	39.1	0.0	0.4	**50.4**
Total EU co-funding (CHF m)	9.8	12.7	10.0	8.1	**40.7**
Total self-funding (CHF m)	20.8	56.7	10.8	0.0	**88.3**
Total funding (CHF million)	**41.6**	**108.5**	**20.8**	**8.5**	**179.4**
Number of research organisations / universities	55	68	8	6	**137**
Number of SMEs	57	114	8		**179**
Number of partners from large scale enterprise	1	12			**13**
Number of end-user organisations	39				**39**
Number of international organisations / associations					**0**
Number others			4	8	**12**
Number of project partners total	**152**	**194**	**20**	**14**	**380**

Sources: European Commission, METAS. SERI

Table 24: Number of Swiss project partners and EU funding in Horizon 2020 under Article 187 of the Treaty on the Functioning of the European Union (TFEU)

Number of Swiss partners	**JTI-BBI**	**JTI-CS2**	**JTI-EC-SEL**	**JTI-FCH2**	**JTI-IMI2**	**JTI-SES-AR**	**JTI-Shift2 Rail**	**Total**	**%**
ETH Domain	0	2	0	5	0	0	1	8	5.3
Universities	0	0	0	0	12	0	0	12	8.0
Universities of applied sciences	1	1	0	2	0	0	0	4	2.7
Industry	7	4	2	1	24	23	9	70	46.7
SMEs	7	5	3	16	7	7	2	47	31.3
Non-profit organisations	0	0	0	1	4	1	0	6	4.0
Confederation	1	0	0	0	2	0	0	3	2.0
Participation of SMEs in %	43.8	41.7	60.0	64.0	14.3	22.6	16.7	31.3	
Total	**16**	**12**	**5**	**25**	**49**	**31**	**12**	**150**	**100**
EU contributions to Swiss project partners (CHF m)	**JTI-BBI**	**JTI-CS2**	**JTI-EC-SEL**	**JTI-FCH2**	**JTI-IMI2**	**JTI-SES-AR**	**JTI-Shift2 Rail**	**Total**	**%**
ETH Domain	–	0.3	–	2.3	–	–	0.3	2.9	5.4
Universities	–	–	–	–	12.2	–	–	12.2	23.0
Universities of applied sciences	0.9	1.2	–	0.7	–	–	–	2.9	5.5
Industry	1.0	2.3	0.7	0.9	–	4.0	0.3	9.2	17.3
SMEs	1.7	2.6	0.4	12.7	5.2	0.1	0.3	23.0	43.3
Non-profit organisations	–	–	–	0.1	1.8	0.3	–	2.2	4.1
Confederation	0.1	–	–	–	0.6	–	–	0.8	1.5
Contributions for SMEs in %	44.4	40.7	35.6	76.1	26.2	3.3	31.7	43.3	
Total	3.8	6.4	1.1	16.7	19.8	4.4	0.8	53.1	100

Sources: European Commission, SERI

Table 25: Participations and committed funding for the nuclear fission programme in Horizon 2020 by activity

Activity	Number of Swiss participations		Total participations		Committed funding for Swiss institutions (CHF m)		Total committed funding (CHF m)	
Safe nuclear systems	12	41.4%	378	42.1%	4.3	46.1%	89.9	44.1%
Nuclear waste	12	41.4%	238	26.5%	4.2	45.5%	48.9	24.0%
Fission competences	2	6.9%	139	15.5%	0.3	3.2%	21.1	10.4%
Radiation protection	2	6.9%	111	12.4%	0.4	4.0%	30.3	14.9%
Research infrastructures		0.0%	31	3.5%		0.0%	9.4	4.6%
Total	**28**	**100**%	**897**	**100**%	9.2	**100**%	199.6	**100**%

Sources: European Commission, SERI