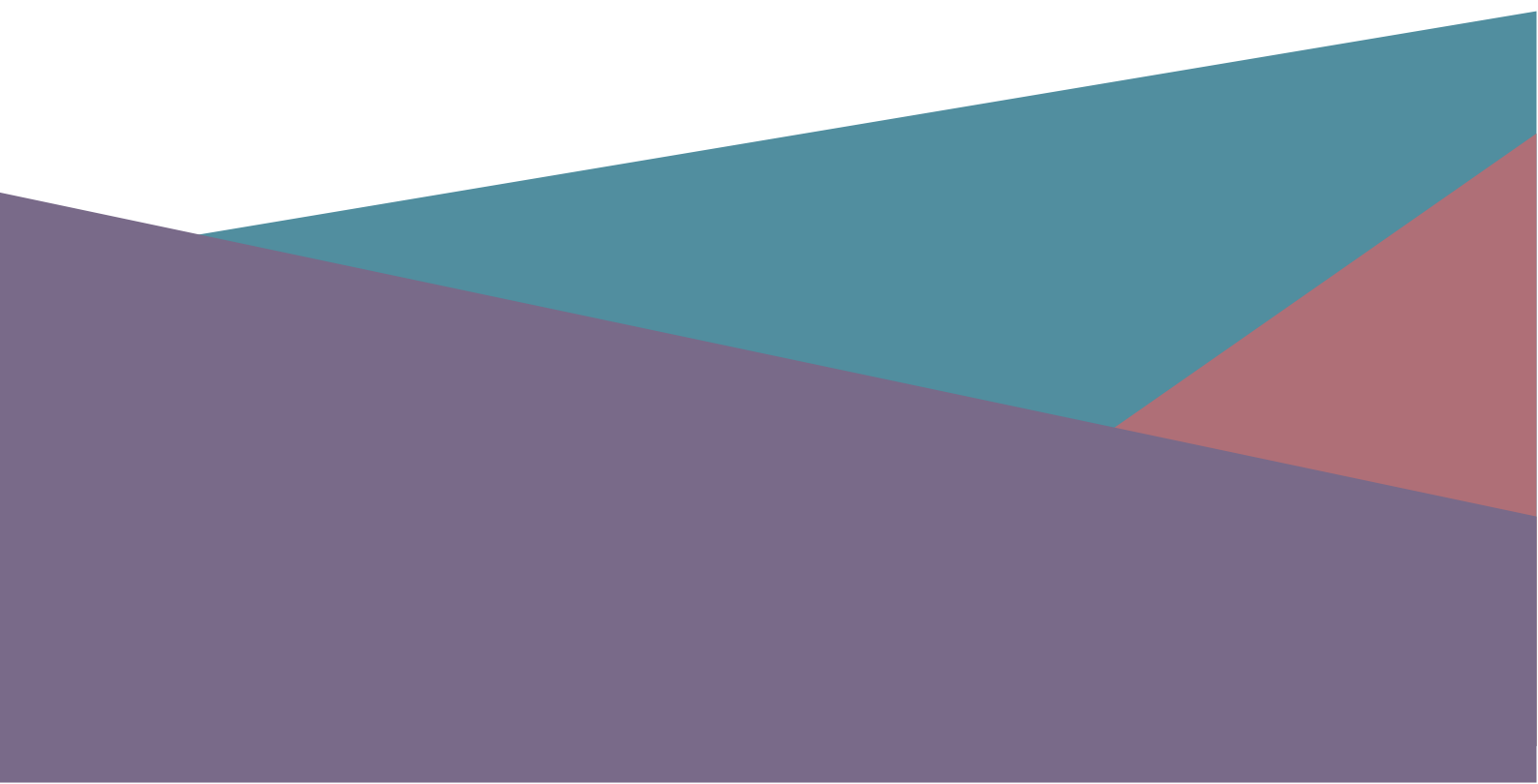


SELF- ASSESSMENT REPORT INTERMEDIATE EVALUATION 2023 OF THE ETH DOMAIN

Adopted by the ETH Board at the meeting of 7/8 December 2022



Self-Assessment Report | Intermediate Evaluation 2023 of the ETH Domain
| Adopted by the ETH Board at the meeting of 7/8 December 2022

ETH zürich

EPFL

PAUL SCHERRER INSTITUT
PSI



Swiss Federal Institute
for Forest, Snow and
Landscape Research WSL



Empa

Materials Science and Technology

eawag
aquatic research ooo

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Foreword by the President of the ETH Board

Dear readers

The ETH Domain has been experiencing difficult times and continues to face major challenges today. The coronavirus pandemic hit the ETH Domain hard. By March 16, 2020, the two Federal Institutes of Technology and the four research institutes had switched to emergency mode or were operating with very limited capacity. Virtually overnight, all courses had to be moved online, and working from home became the rule for employees. But the crisis also had some positive effects: home-working, virtual lectures and online events are here to stay. They are influencing both the way we work and the future development of our real estate portfolio.

No sooner had the pandemic been brought under control than the next crisis hit the world. The Russian invasion of Ukraine has seriously impacted the ETH Domain – through its effects on our students and employees from Ukraine and Russia, on our research cooperation with these countries and on our ability to access a reliable and affordable energy supply as well as through the biggest surge in inflation for decades.

Despite these challenges, the ETH Domain is fully committed to its mission of delivering excellence for Switzerland and the world. To this end, we will continue to invest heavily in the education of future scientists and engineers, in research areas of strategic importance to Switzerland, in knowledge and technology transfer both to industry and to the public sector, and in research infrastructures of national and international importance.

So that the ETH Domain can maintain the excellence of its services and continue to operate successfully, three factors will be of crucial importance: international openness, autonomy, and stable and reliable funding.

Unfortunately, two of these success factors are now at risk. First, Switzerland's lack of association to Horizon Europe impairs the competitiveness of Swiss Education, Research and Innovation (ERI) actors and is gradually eroding their international networks. Second, the ETH Board is deeply concerned about the federal government's dire financial outlook. From 2024 onwards, funding deficits of several billion Swiss francs per year are looming. Cuts in the ERI sector could inflict dramatic long-term damage on the ETH Domain institutions, so it is vital that they be averted – because, as Benjamin Franklin famously said, “an investment in knowledge pays the best interest”.

On behalf of the ETH Board, I would like to thank the Expert Committee for its in-depth examination of the ETH Domain and its institutions. We look forward to a productive exchange, stimulating discussions and the Committee's valued recommendations.



Prof. Michael O. Hengartner, President of the ETH Board

Introduction

Evaluation Mandate

The ETH Domain comprises the two Federal Institutes of Technology, ETH Zurich and EPFL, and the four research institutes PSI, WSL, Empa and Eawag. The ETH Board is the strategic governing and supervisory body of the ETH Domain. The ETH Domain belongs to the Swiss Confederation and is affiliated to the Federal Department of Economic Affairs, Education and Research (EAER). In accordance with the Confederation's corporate governance guidelines, the Federal Council (Swiss government) governs the ETH Domain through strategic objectives, which it establishes for four years at a time in alignment with the funding framework approved by the Swiss Parliament. The achievement of the strategic objectives is assessed annually by the Federal Council, with Parliament being informed of the results. In addition, in the middle of each financing period, the EAER commissions an intermediate evaluation of the ETH Domain with the primary focus on systemic and strategic issues.

The Federal Council mandates a group of national and international experts from academia and the economy to perform the Intermediate Evaluation 2023 of the ETH Domain. This Expert Committee is invited to primarily take a forward-looking approach and formulate recommendations for managing future challenges, in addition to providing a critical assessment of the achievements. The mandate includes seven Terms of Reference (ToR), focussing on specific aspects of the ETH Domain's core tasks – education, research, and knowledge and technology transfer (ToR A.1-A.3) – and the ETH Domain's positioning in relation to future challenges (ToR B.1-B.4). Furthermore, the mandate includes a review of the implementation of the recommendations and measures that emerged from the previous intermediate evaluation conducted in 2019 and a bibliometric study of the ETH Domain institutions.

Self-Assessment Report

The ETH Board prepared the Self-Assessment Report in close collaboration with the ETH Domain institutions. It is structured along the Terms of Reference given in the mandate and makes reference to – and draws on – existing documents (e.g. Strategic Plan 2025–2028 and Annual Reports of the ETH Board for the ETH Domain). The relevant information is presented in a concise form complemented by the self-reflected assessments by and considerations of the ETH Board. The Self-Assessment Report is intended to support the members of the Expert Committee as a working tool in the fulfilment of their evaluation task. It comprises the following chapters.

- Introduction
- Retrospective: State of implementation of the experts' recommendations from the 2019 Intermediate Evaluation
- Terms of Reference A: Specific aspects of the core tasks education, research and knowledge and technology transfer
 - Assessment by and considerations of the ETH Board
 - Evidence, Facts & Figures substantiating the considerations of the ETH Board for each of the ToR A.1-A.3
- Terms of Reference B: Positioning of the ETH Domain in relation to future challenges
 - Assessment by and considerations of the ETH Board

- Evidence, Facts & Figures substantiating the considerations of the ETH Board for each of the ToR B.1-B.4
- Bibliometric study
 - Summary of the reports on the bibliometric performance of the ETH Domain and the institutions

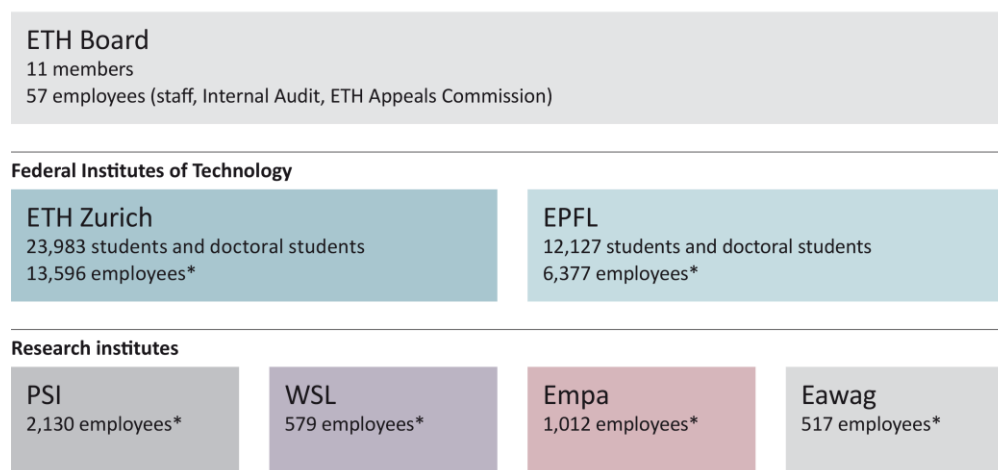
The **Strategic Plan 2025–2028 of the ETH Board for the ETH Domain**¹, published in 2022, ideally complements the Self-Assessment Report by providing the outlook for the next period.

The **Annual Reports** of the ETH Board for the ETH Domain provide detailed information on the achievement of the Federal Council's Strategic Objectives for the ETH Domain. The 2022 Annual Report will be made available to the Expert Committee shortly before their on-site visit.

The ETH Domain in brief

The ETH Domain comprises the two Federal Institutes of Technology, ETH Zurich and EPFL, and the four research institutes PSI, WSL, Empa and Eawag. The ETH Board is the strategic governing and supervisory body of the ETH Domain (cf. figure 1). The locations of the ETH Domain institutions in Switzerland are presented in figure 2 (cf. chapter B.1.2 for further information about the national and international locations). The ETH Domain fulfils the mandate conferred on it by the ETH Act, based on its vision, mission and guiding principles, and through continuous investments into its unique strengths².

Figure 1: The ETH Domain

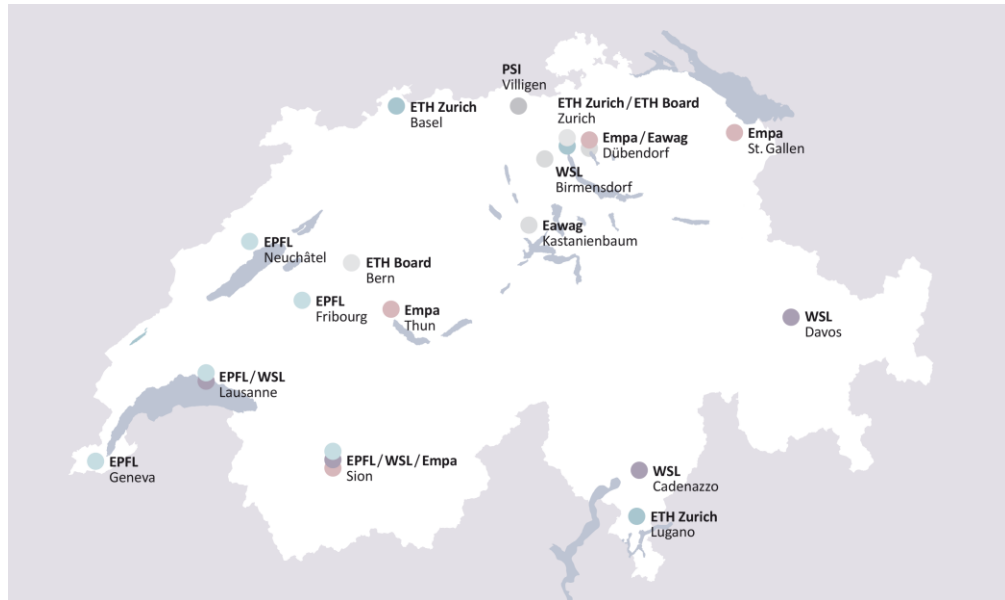


* Employment contracts including doctoral students, as of 31 December 2021

¹ [Strategic Plan 2025-2028 of the ETH Board for the ETH Domain](#)

² [Strategic Plan 2025-2028 of the ETH Board for the ETH Domain](#), pages 11-14

Figure 2: The ETH Domain's locations in Switzerland



Vision

The ETH Domain strengthens Switzerland's prosperity and competitiveness and contributes to the sustainable development of society through excellence in research and education as well as in scientific knowledge and technology transfer.

Mission

The ETH Domain serves society through the pursuit and dissemination of knowledge and the beneficial application of science. The ETH Domain institutions share responsibility for education and research, and for knowledge and technology transfer. They anticipate and contribute to solving the most pressing national and global challenges through pioneering fundamental and applied research and by maintaining a continuous dialogue with society. Their research activities are supported by a portfolio of large-scale research infrastructures and platforms that offer unique resources for research communities in Switzerland and abroad. They also provide science-based services for the benefit of Swiss society. As degree-granting universities of science and technology, ETH Zurich and EPFL play a leading role with a distinctive profile in Switzerland's educational system. In line with their thematic mandates, the research institutes PSI, WSL, Empa and Eawag provide specialised world-class research and education as well as continuity of expertise for the benefit of Switzerland in particular. Together with ETH Zurich and EPFL, they promote and curate the implementation of their insights and discoveries by the public and private sectors.

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Introduction

As part of the evaluation mandate of the 2023 Intermediate Evaluation, the ETH Board reports on the extent to which the recommendations made by the expert committee in the 2019 Intermediate Evaluation were implemented. The ETH Board and the ETH Domain institutions were eager to learn from the 2019 Intermediate Evaluation how the experts assessed the ETH Domain's standing and role in the Swiss higher education and research system and how they viewed its further development to maintain international competitiveness while also serving Switzerland's needs³. The ETH Board greatly appreciated the forward-looking re-commendations and responded to them in a clustered manner with statements organised into six strategic action fields (strategy and structure; cooperation and collaboration within and beyond the ETH Domain; education for the next generation; leadership and culture; stable financial framework; communication and impact). The ETH Board also decided on specific measures to respond to each of the twenty-two recommendations separately. Accordingly, the 2019 response of the ETH Board to the recommendations of the expert committee was structured into two sections: (i) Response to the recommendations in six strategic action fields, and (ii) Measures in response to each of the recommendations. This document was adopted by the ETH Board at its meeting of 25/26 September 2019 and communicated to the Federal Department of Economic Affairs, Education and Research and the State Secretariat for Research, Education and Innovation⁴.

The ETH Board and the ETH Domain institutions jointly pursue the implementation of the measures and carefully monitor the progress of implementation, also taking into account newly arising challenges. This chapter presents the state of implementation of the measures defined in response to the experts' recommendations of the 2019 Intermediate Evaluation. As the measures generally contribute to equipping the ETH Domain for tackling future challenges, they are thus also interlinked with the Terms of Reference of the 2023 Intermediate Evaluation. In order to keep the present chapter concise, only a limited number of examples is provided to illustrate the state of implementation. If required and wherever appropriate, reference is made to further information contained in other chapters of the Self-Assessment Report or other documents.

Of the twenty-two individual recommendations, most are being implemented. In three cases (recommendations #13, #14 and #22) the ETH Board only partially agreed with the recommendations of the Expert Committee, which is why the measures as defined in the ETH Board's response⁴ are also considered to be only partially implemented. As for another three cases (recommendations #10, #17 and #20), the strategic focus, the framework conditions or the timeline has changed since the formulation of the measures and thus they are only partially implemented so far. An explanation is given next to the corresponding recommendations. Further details can be found in the response of the ETH Board to the recommendations of the Expert Committee of 2019⁴.

³ [Intermediate Evaluation of the ETH Domain 2019: Report of the Expert Committee](#)

⁴ [2019 Intermediate Evaluation: Response of the ETH Board to the Recommendations of the Expert Committee](#)

State of implementation of the experts' recommendations from the 2019 Intermediate Evaluation

#1: Quality of Teaching

Beyond the efforts made so far, and in consideration of the achievements that it acknowledges, the Expert Committee strongly encourages that further steps be taken to measure and improve the quality of teaching at ETHZ and EPFL.

Recommendation implemented

This topic is addressed in detail in chapter A.1.

Ensuring that the quality of teaching is maintained or improved requires assessment. Quality management of teaching has thus been developed further, making full use of digital technologies in the evaluation of courses and examinations, of institutional accreditation procedures and of graduate surveys. Results flow into curricula development. Some of the criteria used to assess education quality are reported in chapter A.1.

At ETH Zurich, educational developers (Lehrspezialisten) were key in the sudden transition from face-to-face to online teaching during the coronavirus pandemic. The future learning initiative reveals new evidence about teaching practices to be considered, such as computer-assisted virtual simulations in medical education. At EPFL the development of numerical means is supported by the Digital Resources for Instruction and Learning (DRIL) fund as well as other approaches and tools (MOOCs, Jupyter notebooks, tutorials, etc.).

Both ETH Zurich and EPFL carry out alumni surveys to receive feedback on teaching quality and labour market requirements. At ETH Zurich, surveys carried out in coordination with the Federal Statistical Office include feedback on teaching quality focusing on multidisciplinary competencies (ETH Talent) and on the alignment within curricula. At EPFL, the Career Center conducts an annual alumni survey, documenting the entry of the new graduates into the jobs market and assessing student satisfaction. The results of surveys performed at ETH Zurich and EPFL are summarised in the Facts & Figures section of chapter A.1.

The compulsory institutional accreditations of ETH Zurich and EPFL according to the Higher Education Act (HEdA) are an important element of quality assurance (cf. chapter B.4).

At ETH Zurich, the evaluation of teaching by students is a three-level procedure involving semester feedback, evaluation of course units and evaluation of written examinations. ETH Zurich has also developed a tool for quantifying teaching activities at the level of professorships to ensure greater transparency and better use of teaching resources. At EPFL, all courses are evaluated every semester. Subsequently, the curricula are evaluated by former students – Bachelor's courses by Master students and Master's courses by alumni. Internships in industry are also evaluated. All these feedbacks are discussed every year by the Associate Vice President for Education, the deans and the section directors.

Maintaining the quality of education is a priority for the ETH Board. The ETH Board together with the institutions of the ETH Domain is currently developing a strategy aimed at safeguarding the quality of education (cf. chapter A.1).

#2: Continuing Education

The Expert Committee anticipates a substantial increase in the demand for continuing education; ETHZ and EPFL should further their efforts in providing continuing education of high quality.

Recommendation implemented

The ETH Domain offers a wide range of practice-oriented continuing education courses, many of them combining technology with management and social sciences. Digital skills and digital transformation have received special attention in the development of new courses.

The ETH Zurich School for Continuing Education has greatly expanded its continuing education courses. It now offers more than 60 courses (Certificate of Advanced Studies CAS, Diploma of Advanced Studies DAS and Master of Advanced Studies MAS) along with continuing education courses and e-learning offerings. The formats have become more diverse and new target groups have been addressed (e.g. MAS digital Clinical Research designed for physicians and healthcare or clinical research professionals). One additional educational developer (Lehrspezialist) has been appointed in the field of continuing education.

From 2021 onwards new joint continuing education courses at ETH Zurich include the MAS in Urban and Territorial Design from ETH Zurich and EPFL, the MAS in International Governance and Law at ETH Zurich and the University of Zurich and the Executive MBA offered by ETH Zurich together with the University of St.Gallen. The continuing education programme in the medical field has been expanded with the new CAS in Digital Health as part of the new MAS in Digital Clinical Research. The curriculum extends beyond the traditional scope of clinical research to include new, innovative and digital approaches.

EPFL offers around 12 degree programmes and 27 short programmes in continuing education and more than 150 Massive Open Online Courses (MOOCs). In 2021 and 2022 a number of new programmes in different thematic fields, including a CAS in Circular Value Networks expanded the offerings. In 2022 the CAS “Enseignement de la science informatique au niveau secondaire” (teaching of computer science at secondary school level) was introduced for training secondary school teachers wishing to become involved in teaching Computer Science to pupils. In 2021, the EPFL Extension School awarded Certificates of Open Studies (COS) in machine learning, communication and visualization and in web application development. EPFL also founded the lifelong learning (L³) unit in 2021, to ensure the scaling of the school’s continuing education offering in a holistic and agile portfolio that meets the growing needs of the economy and society.

The platform Swiss MOOC Service has been founded by EPFL and ETH Zurich and includes collaboration with the research institutes. Eawag has delivered several MOOCs as well, first in collaboration with EPFL, later at ETH Zurich and now in its own studio in the new FLUX building.

The research institutes of the ETH Domain offer a diverse range of continuing education courses. The project “Academy4Four” (cf. chapter B.1.1) even aims to combine education and training as a joint venture of the four research institutes. The Empa Academy began offering continuing education courses online in 2021. At Eawag, between 8-10 new practice-oriented courses (PEAK) are given each year. These courses are aimed at experts from business, administration and engineering as well as environmental offices. Similarly, WSL and the Ecotox Centre of Eawag and EPFL are providing specialised courses.

#3: Teaching New Skills

Innovation in course offerings should be continued, in order to combine basic science and engineering courses with computational skills.

Recommendation implemented

ETH Zurich and EPFL are vigorously pursuing their efforts to promote the digital skills of their graduates and of the future STEM (science, technology, engineering and mathematics)⁵ labour force, and to apply computational thinking across all disciplines.

ETH Zurich is expanding computational competencies as its third pillar of cross-disciplinary competencies (next to mathematics and basic science). Teaching and learning of computational competencies are integrated as a common feature through all curricula and are not restricted to offering individual courses in programming. A new doctoral school in the field of material sciences with a focus on networking and acquirement of interdisciplinary competencies (planned for up to 700 doctoral students) has been established. The Student Project House is another initiative to build a thriving creative community across disciplines including computational thinking.

At EPFL, all first year students attend a mandatory course in computational thinking, and many courses on the subject follow in the curriculum. In particular, there are numerous programming courses as well as courses in machine learning. Based on its translational research approach, the EPFL Centre for Learning Sciences LEARN conducted various projects on innovative teaching in collaboration. To improve the development of transversal skills, a new optional course has been offered within the curriculum to train teaching assistants in charge of project-based courses in how to teach transversal skills. In 2022, the third 'discovery learning lab' (DLL) has been opened offering workshops where students and teachers have access to all the equipment required to realise disciplinary and interdisciplinary projects to complement their coursework.

#4: Research and Research Infrastructures

The Expert Committee expects substantial translational impact from multidisciplinary research; it therefore encourages the ETH Domain to maintain and further develop its effort in this type of research, including internationally competitive research infrastructures and technology platforms.

Recommendation implemented

The research infrastructures and the strategic focus areas (SFAs) bundle activities and take advantage of the various competencies of the ETH Domain institutions to promote inter- and multidisciplinary research. Openly accessible research infrastructures, platforms and centres provide the basis for multidisciplinary research.

In the period 2021–2024 the SFAs Personalized Health and Related Technologies (PHRT), Data Science through the Swiss Data Science Center (SDSC), and Advanced Manufacturing are continuing their activities from the previous period. An additional hub of the Swiss Data Science Center was established at PSI in 2021, dedicated to data of large research infrastructures and platforms. The SFA PHRT has been developed further and now contains an imaging platform in addition to the established proteomics and genomics technology platforms. About 50% of the 2021–2024 funding for the SFA Advanced Manufacturing is dedicated to building up additional capacities and to establish platforms to develop new manufacturing technologies.

⁵ Including computer and communication sciences, in analogy to the German term MINT (Mathematik, Informatik, Naturwissenschaften, Technik).

Other examples for multidisciplinary networks and platforms involving the ETH Domain are the Energy Science Center at ETH Zurich, the Center for Climate Systems Modelling at ETH Zurich, the Agrovet Strickhof teaching and research platform of ETH Zurich, University and Canton Zurich, the Surgeon Enhancing Technologies (SURGENT) project of the University of Zurich, ETH Zurich and the Zurich-based University Hospitals, and the LÉXPLORE platform of EPFL, Eawag and other partners.

In terms of research infrastructures, for the period 2021–2024 strategic priority is given to the Blue Brain Project (BBP) at EPFL, the substantial upgrade of the supercomputing infrastructure HPCN-24 at the Swiss National Supercomputing Centre (CSCS) of ETH Zurich, the substantial upgrade of the Swiss Light Source (SLS 2.0) at PSI, and the realisation of the Catalysis Hub at ETH Zurich and EPFL.

Since 2019, Empa has further developed and expanded its research and technology transfer platforms (RTTPs) NEST, *ehub* and *move* in the construction, energy and mobility sectors, respectively. In a next step, lessons learned from the RTTPs are expanded to the scale of the campus in Dübendorf. A digital twin of the campus has been developed as the basis for devising a roadmap for a carbon-neutral campus.

For the period 2025–2028, the ETH Board has identified five Strategic Areas of particular societal importance where the institutions of the ETH Domain are well positioned to have a strong impact (cf. chapter B.2). The Joint Initiatives for two of the Strategic Areas “Energy, Climate and Environmental Sustainability” and “Engagement and Dialogue with Society” have already been launched in 2022 in order to respond promptly to urgent challenges.

For information regarding the research infrastructures of the ETH Domain prioritised for the period 2025–2028 cf. chapter B.2.

#5: Communication

Communication remains of utmost importance, in particular with the general public; efforts should be continued to convince the general public of the societal value of investments in science.

Recommendation implemented

The ETH Board recognises the importance of communication with the general public and the need to engage more proactively with stakeholders that support the ETH Domain, i.e. the federal government as well as the parliamentary chambers and committees.

This became especially apparent during the coronavirus pandemic. The ETH Domain researchers – together with researchers from other institutions – played a key role in keeping the public and authorities informed with the most up-to-date scientific information concerning COVID-19 and its impact, and in supporting evidence-based decision-making.

The Swiss National COVID-19 Science Task Force, which was operational between March 2020 and March 2022, resulted in the most prominent collective communication effort from Swiss researchers during the coronavirus pandemic. The ETH Domain played an important role in its creation, its operation and its communication activities. After the task force was disbanded, a final report was published that reflects on the various aspects of crisis communication. It is important to use the

experience gained for enhancing the interaction between science, politics and society in the future. Among other things, this should help politicians and scientists to develop a greater mutual understanding and to define responsibilities and roles more clearly. There is a need for them to cooperate more closely, not only in emergency situations but also in between the crises (see also “politicians and scientists talk to each other”⁶ and the final report of the task force⁷). In November 2022, a new scientific Advisory Panel COVID-19 was established to continue the cooperation on COVID-19 between the scientific community and the public authorities.⁸

In order to promote communication with the interested public (e.g. Education, Research and Innovation (ERI) actors, politics), the ETH Board launched the news portal Sciena in 2020⁹. The portal centralises information coming from the ETH Domain and helps to highlight the impact of the ETH Domain on society and the economy.

Most of the communication about specific research results and activities is done by the institutions of the ETH Domain themselves. Examples are platforms for public engagement such as “ETH Meets You”, “Scientifica – Zürcher Wissenschaftstage” or the newly started “wissen2go” hybrid event series at Empa and dedicated events such as the Energy Briefing Event on Net Zero in June 2022. Another example is the PSI visitor center, welcoming some 10,000 visitors per year, which has been upgraded with a modern interactive exhibition in 2022. Platforms are constantly being developed and new ones established (for example, the ETH Global Lecture Series that was established during the coronavirus pandemic or the Digital Einstein). Dedicated communication via classical media, via electronic communication (web, social media, video, etc.), via personnel communication (events, tours, etc.) and through social media is of the essence.

The WSL communication strategy 2021–2024 specifically addresses communication with the broader public and public relations as a strategic element. At ETH Zurich two support positions (Public Affairs and Senior Policy Engagement Manager) were created to coordinate and manage contacts with the parliament, public authorities, and political parties at the federal, cantonal and local level. Similarly, EPFL has an advisor for institutional relations. The institutions of the ETH Domain also contribute to platforms and networks run by other organisations such as the World Economic Forum, the Geneva Science and Diplomacy Anticipator (GESDA) or Sustainable Switzerland. The activities linked to engagement and dialogue with society have also been prioritised by the ETH Board in its Strategic Plan 2025–2028 for the ETH Domain through a dedicated Strategic Area and a first call for Joint Initiatives in spring 2022 (cf. chapter B.2).

The ETH Domain institutions pursue open science and are participating in the Swiss National Open Research Data (ORD) Strategy and the action plan of swiss-

⁶ [Annual Report of the ETH Board for the ETH Domain 2021](#), pages 12-14

⁷ [Final report of the Swiss National COVID-19 Science Task Force](#)

⁸ [Media release Federal Office of Public Health](#)

⁹ [Sciena](#)

universities for the period 2021–2028 (cf. recommendation #12). Ease of access to scientific content will also benefit the communication of research results and the impact on the public.

#6: Fostering Innovation

The ETH Domain should continue to drive world-class innovation. The policies and practices to foster the creation and growth of start-ups¹⁰ require further consideration.

Recommendation implemented

This topic is addressed in detail in chapter A.3.

The ETH Domain institutions are actively promoting innovation via intense collaboration with SMEs and industry, via a strong involvement in the different locations of Switzerland Innovation (the Swiss national network of innovation parks), via its commitment to Technoparks and business incubators as well as via the creation of spin-offs. The institutions of the ETH Domain support the exchange of best practices within and outside the ETH Domain (e.g. through the swiTT network, incl. mutual visits to their respective offices, regular meetings of the TTO heads within the ETH Domain). The ETH Domain Institutions are exploring partnership programmes for Venture Capital (VC) funds.

Such an initiative was conceived between the universities of the IDEA League (Founding Partner Universities were TU Delft, RWTH Aachen, Politecnico di Milano, and ETH Zurich). The goal was to build up a CHF 350m venture capital fund in order to finance the pre-seed, seed and growth phases of spin-offs from the partner universities. The ETH Board supported ETH Zurich's participation in this initiative and its financial involvement in creating the necessary management firm. Despite intensive search for investors, no anchor investor for an initial injection of CHF 100m could be found. Thus the Founding Partner Universities finally decided to dissolve the management firm. The ETH Board was informed accordingly on 21/22 September 2022.

Empa is an important partner to the newly established Switzerland Innovation Park Ost in St. Gallen. ETH Zurich is engaged in the Switzerland Innovation Park Zurich. Switzerland Innovation Park Network West EPFL comprises a network of six parks in Western Switzerland covering all innovation areas. PSI actively supports the realisation of Switzerland Innovation Park Innovaare, including the attraction of new firms to the site. In the TTO activities WSL is collaborating closely with Empa, and is benefiting from its expertise.

The Swiss m4m Center (additive manufacturing center for medical applications) and ANAXAM (technology transfer center for advanced manufacturing) were established as a result of the Advanced Manufacturing Technology Transfer Centers AM-TTC, a public-private partnership initiative of the federal action plan for digitalisation to promote innovation. The business incubator of Empa and Eawag (glaTec) supports spin-offs and high-tech start-ups by providing space, coaching, funding (loan or convertible loan) and access to research groups, experts and investors.

Specific sample activities to foster innovation (non-exhaustive list) are

- ETH Zurich collaboration with capital funds Wingman, Übermorgen Ventures and Venture Incubator Partners (VIP).

¹⁰ The term "start-ups" is used in the sense of "spin-offs" of the ETH Domain.

- Increased promotion and presence of VCs at key EPFL events including EPFL Startup Champions Seed Night and Student Entrepreneur Program Closing Ceremony.
- Empa has started an Entrepreneur Fellowship-Program to support young entrepreneurs coming from a scientific career at Empa and an Entrepreneurship course.
- The PSI Founder Fellowship (PSIFF) programme provides both ideation support and preparatory support (business understanding, pitch training, etc.) as well as ongoing support during the programme itself.

#7: Attracting Women to STEM Disciplines

The ETH Domain should develop a teaching and research program to inspire more women to choose careers in STEM disciplines.

Recommendation implemented

Developing teaching and research programmes to inspire more women will help to increase the proportion of women in the ETH Domain. Linking science and engineering to societal needs in a meaningful way in course content and study projects has been shown to increase the interest and engagement of women students.

The Education Outreach Department of EPFL conducts various activities to attract a broader range of students, e.g. through i) its pre-university weeks (example: the “Nature, in code¹¹” week, shows how coding can be applied to biology and genetics and attracts every year 50 - 70% female participants), ii) its orientation tools to reach less traditional audiences and facilitate the study choice process, or iii) its thematic conferences¹² (sustainable development, music, energy, health, biomedical technologies) to get beyond silo thinking and promote cross-disciplinary approaches. These activities help to break down barriers, demonstrate the societal relevance of science and engineering and inspire women to choose these disciplines. Also, the Education Outreach Department of EPFL works hand in hand with teachers at baccalaureate schools¹³ (Gymnasien / gymnases) and cantonal authorities to create awareness of this holistic approach to addressing societal challenges.

Another very important aspect is the outreach to young girls to encourage them to study STEM subjects. ETH Zurich and EPFL have been especially active in the latter and the list of initiatives for reaching out to schools and pupils (and especially girls) is long. Some examples are given below.

ETH Zurich reaches out proactively to schools with initiatives like “ETH unterwegs” or the “Maturandeninformationstage”. The Youth Academy of ETH Zurich has been supporting the interests of successful pupils in STEM subjects since 2021. The Department of Mathematics at ETH Zurich, Kangaroo Switzerland and the local section of 500 Women Scientists Zurich organise the “Kangaroo goes Science” event for girls. In addition, ETH Zurich organises special seminars in cooperation with individual departments to draw the attention of lecturers at all levels to differences in the average learning behaviour of female and male students. Gender is taken

¹¹ [Nature, in code](#)

¹² [Journées thématiques](#)

¹³ upper secondary level school

into consideration as a criterion for the assessment of research projects and in departmental evaluations (content-related consideration of gender aspects as well as consideration of gender aspects in the composition of teams).

With the programme “Les sciences ça m’intéresse!”, which takes account of the gender dimension and is active in 13 cantons, EPFL aims to stimulate young pupils’ interest in STEM studies. Within this general programme, EPFL has developed a specific programme exclusively dedicated to girls aged 7 to 16. This includes workshops, semester-long classes, camps, mentoring and an introduction to role models for different age groups, plus information and awareness actions for parents and teachers.

#8: Collaborations with other Higher-Education Institutions
Institutions in the ETH Domain should focus on creating value for Switzerland. This should be achieved by identifying competencies in other Swiss higher-education institutions, and by developing a strategy that takes advantage of the combined strengths.

Recommendation implemented

Partnerships in specific fields of technology seek to make use of complementary expertise aimed at integrating and synthesising know-how so as to directly facilitate translation and implementation of new technologies and approaches generated by the ETH Domain. Examples include different consortia in the context of the “SWiss Energy research for the Energy Transition” (SWEET) programme of the Swiss Federal Office of Energy, and the Swiss Polar Institute (which is maintained by EPFL, ETH Zurich, WSL and the universities of Bern, Lausanne und Zurich).

ETH Zurich is engaged in 10 National Centres of Competence in Research (NCCR) either as leading house or co-leading house. In the context of its competence centers, ETH Zurich is collaborating with universities of Basel and Zurich (Citizen Science, Clinical Imaging Technologies, Plant Science Center) as well as Empa, WSL and MeteoSchweiz (Center for Climate Systems Modelling).

EPFL is engaged in the Joint Initiative BeLearn together with higher education institutions in the canton of Bern (University of Bern, University of Teacher Education Bern, University of Applied Sciences Bern as well as the Swiss Federal University for Vocational Education and Training).

Continuing education is an area in which complementarities and synergies are actively exploited with other universities (e.g. between EPFL and ETH Zurich, EPFL and University of Lausanne or University of Geneva). Joint professorships are another way of sharing specialist expertise in the form of lectures, seminars and training courses that are closely linked to research and practice. PSI, WSL, Empa and Eawag have a total of 40 joint professors with cantonal universities and universities of applied sciences beside those with ETH Zurich and EPFL (86) and international Universities (32) (cf. chapter B.1.1, figure 13).

Empa collaborates with several universities (e.g. University of St. Gallen, HSG) and universities of applied sciences (e.g. Bern University of Applied Sciences, Eastern Switzerland University of Applied Sciences, University of Applied Sciences and Arts Northwestern Switzerland) in the implementation of their CAS courses. It is also engaged in the Research Alliance Advanced Manufacturing of the Swiss Academy of Engineering Sciences (SATW). The aim of this joint initiative is to foster collaboration between all Swiss research organisations that are active in advanced manufacturing.

#9: Collaborations in the Healthcare Field

The ETH Domain, in collaboration with the medical faculties of the universities and with industry, should focus on research and education that will infuse multidisciplinary, digital and technological competencies, necessary to sustain and improve health outcomes for Switzerland and the world.

Recommendation implemented

Considering economic and societal needs in healthcare, the ETH Domain institutions pursue close cooperation with medical faculties, hospitals and industry based on their specific strengths in healthcare-related sciences, as well as in related technologies, in order to advance translational research.

ETH Zurich is part of Universitäre Medizin Zürich (UMZH) as well as The LOOP Zurich and the Bioinformatic Platform, Hochschulmedizin Zürich (HMZ), Tumor Profiler Center, Botnar Research Center for Child Health (BRCC) with the Universities of Zurich and Basel.

Good practice examples in the field of teaching include the successful introduction and consolidation of the Bachelor in Human Medicine by ETH Zurich, which combines medical and technical-scientific aspects of human health. The Bachelor programme is coordinated with the cantonal partner universities (University of Zurich, University Basel and Università della Svizzera italiana USI) that offer the respective Master programmes. As of 2022, ETH Zurich, together with the University of Zurich, offers a Master's course in brain research. The programme combines biology, neuroscience and clinical methods. Teaching partnerships at ETH Zurich have consolidated existing collaborations with university hospitals, hospitals at cantonal level, private hospitals, universities of applied sciences (Zurich University of Applied Sciences, Bern University of Applied Sciences) and associations (currently 10 partnerships).

Further examples of collaboration in this area with a focus on digitalisation include the Swiss Medical E-Learning initiative and the Digital Trial Intervention Platform, a new technology platform for clinical trials launched in 2021 by ETH Zurich with Kantonsspital Baden and the Wellcome Trust.

Together with EPFL, le Centre Hospitalier Universitaire Vaudois (CHUV) and the Defitech Foundation are continuing the activities of the "Defitech Center for interventional neurotherapies - Neurorestore". The "Passerelle" programme of the University of Lausanne allows holders of a Bachelor's degree in biology, life sciences or equivalent to gain access to the Master's programme in medicine. This applies also to holders of a Bachelor's degree in Life Sciences Engineering at EPFL. Similarly, the University of Geneva offers a 'Passerelle Bio-Ingénierie – Médecine' for EPFL students with a Master's, or exceptionally, a Bachelor's degree to enrol in the programme with the possibility of subsequently entering the Master's programme in human medicine.

EPFL also offers a CAS on the Management of Biotech, Medtech & Pharma Ventures, which gives managers the knowledge and tools they need in the therapeutic development process. EPFL is active in the Health 2030 initiative, which hosts the Genome Center. This has played a central role in sequencing and monitoring Covid variants. The Swiss Cancer Center Léman is an alliance between EPFL, the Universities of Lausanne and Geneva and the University Hospitals of Lausanne (CHUV) and Geneva (HUG) in partnership with Ludwig Cancer Research and supported by the ISREC Foundation.

Examples in the field at PSI include the collaboration between the Center for Proton Therapy, the only facility in ETH Domain that treats patients, and hospitals. PSI has been involved in specific healthcare studies, together with Kantonsspital Aarau, the hospital at Bad Berka (Germany) and the Center for Radiopharmaceutical Sciences (PSI, ETH Zurich, University Hospital Zurich).

At Empa St. Gallen, Switzerland Innovation Park Ost has been established with a focus on health technologies. There are collaborations between Empa and Kantonsspital St.Gallen, Inselspital Bern, University Hospital Zurich, Kantonsspital Winterthur, VetSuisse and Straumann.

#10: Structure of the
ETH Domain

The effort initiated by the ETH Board to rethink the structure of the ETH Domain, currently with two large technical universities and four research institutes of varying size, is fully supported. The aim of this effort should be to enable flexibility and agility and to allow the evolution of the Domain in order to address the needs of the future.

Recommendation partially implemented

The ETH Board agrees with the recommendation to rethink the structure of the ETH Domain to promote flexibility and agility and to allow the Domain to evolve in such a way that it can address the needs of the future. In 2019, the ETH Board intended to integrate the research institutes WSL and Eawag into a transdisciplinary centre of excellence for environment and sustainability (cf. the measures in response to the recommendation¹⁴). Following the mandatory ETH Domain internal consultation, the ETH Board decided at its meeting of 13/14 May 2020 to suspend this approach and explore further options for strengthening environmental and sustainability-related activities. While the institutions agreed to strengthen the area of environment and sustainability, the majority of the institutions expressed reservations about the creation of a new institute. The process is ongoing and this recommendation could thus only be partially implemented so far. Please see chapter B.1.1 regarding the work on the ETH Domain's structure, organisation and governance and the initiative ENRICH by the four research institutes. Regarding the enhanced cooperation within the ETH Domain, please refer to recommendation #11.

#11: Cooperation within the
ETH Domain

Cooperation between the ETHZ and EPFL should be emphasized. Budget mechanisms should be considered that encourage multidisciplinary institutional cooperation within the Domain.

Recommendation implemented

The six institutions have reinforced cooperation within the ETH Domain, driven by added value in research and teaching and by the benefits that accrue from synergies in research infrastructure use and in administration. The Joint Initiatives in the Strategic Areas 2025–2028 provide a specific incentive in this respect. The first 3-year Joint Initiatives were approved by the ETH Board at its Meeting of 13/14 July 2022 in two out of five Strategic Areas of the Strategic Plan 2025–2028: (i) six Joint Initiatives in “Energy, Climate and Environmental Sustainability” and (ii) four Joint Initiatives in “Engagement and Dialogue with Society”.

The complementarities and the close collaboration are also reflected in the joint professors of the research institutes with ETH Zurich (63) and EPFL (23), (cf. chapter B.1.1, figure 13). The four research institutes (4 RI) seek to further strengthen this complementarity through the bottom-up initiative ENRICH, which was launched at the beginning of 2021 (cf. chapter B.1.1). The collaboration of the six

¹⁴ [2019 Intermediate Evaluation: Response of the ETH Board to the Recommendations of the Expert Committee](#), pages 23-24

institutions with each other also leads to many scientific co-publications. While all the co-publications within the ETH Domain exhibit a Mean Normalised Citation Score (MNCS) higher than the world average (i.e. MNCS >1), co-publications between ETH Zurich and EPFL show the highest impact (MNCS 2.02) (cf. chapter C: Bibliometric Study, figure 24 and recommendation #20 in this chapter).

Many of the collaborations mentioned under *#8 Collaborations with other Higher-Education Institutions* include involvement of multiple ETH Domain institutions.

Specific cooperations between ETH Zurich and EPFL include the consolidated joint master's programme Cyber Security (started in 2019) and MAS courses at ETH Zurich and EPFL in urban and territorial design (started in 2020). The initiative "Engineering Humanitarian Action" is exemplary for the collaboration of both Federal Institutes and harnesses their expertise to benefit humanitarian programmes. It focuses on the areas of energy and environment, data sciences and digital technologies, as well as personalised health and related technologies.

The newly launched ETH Zurich - EPFL Joint Doctoral Programme in the Learning Sciences is educating a new generation of dual-discipline scientists who will bring together knowledge and methods from multiple disciplines such as psychology, education, computer science and data science. This doctoral programme is directed towards students from any field of science or engineering who are highly motivated to address the educational challenges arising from the digitalisation of society.

The Blue Green Biodiversity initiative focusing on biodiversity at the interface of aquatic and terrestrial ecosystems is an example of a newly established collaboration between Eawag and WSL. The goal of the initiative, launched in 2020, is to strengthen interdisciplinary biodiversity research within WSL and Eawag, but also within the whole ETH Domain and beyond.

#12: Institutional Coordination under the HEdA

The ETH Domain should seek an active participation in the context of the Higher Education Act (HEdA/HFKG/LEHE) and contribute to the coordination and development of the entire Swiss system of higher education.

Recommendation implemented

The Higher Education Act (HEdA) sets out, among other things, the basic principles for the coordination in the higher education sector in Switzerland (HEdA, article 1). The ETH Domain institutions have continued to participate in shaping the governance of high-cost areas of the Swiss higher education system in order to ensure optimal conditions for research and large-scale research infrastructures.

As the four ETH Domain research institutes are not among the institutions subject to the HEdA, they are often not directly informed or consulted on science-policy issues and are exempt from receiving project-tied contributions ("project-gebundene Beiträge"/"Contributions liées à des projets") from the Confederation, unlike ETH Zurich and EPFL. Therefore, the ETH Board decided that, as of 2021, it would reserve a maximum of CHF 2m p.a. to co-finance the research institutes' participation in coordination projects of swissuniversities according to the HEdA. The research institutes have indeed participated in such projects and made use of such funding.

The ETH Domain joined swissuniversities, the Swiss Academy of Arts and Sciences and the SNSF in approving the Swiss National Open Research Data (ORD) Strategy and action plan of swissuniversities for the period 2021–2028. This foresees close collaboration, coordination and sharing – notably of existing and new research data services and infrastructure – between the ETH Domain, swissuniversities, the SNSF and cantonal universities. The presidents of ETH Zurich and EPFL are members of the new ORD Strategy Council that aims to drive this coordination at the strategic, national level.

The measures of the ETH Domain to foster and improve ORD practices and the corresponding measures of the project-tied contributions Open Science of swissuniversities will be coordinated under the umbrella of a single national funding scheme for ORD practices.

The President of ETH Zurich is a Vice-President of the Chamber of Universities and has been a member of the Board of swissuniversities since 2020. The President of EPFL is a member of the Chamber of Universities.

#13: Cooperation with Cantons

a. The ETH Domain should develop a strategic framework for regional cooperation and not mainly act opportunistically. This strategy must imply a strong coordination.

b. While some cantons see value in diffusion of the ETH Domain through decentralised sites, other models of cooperation should be considered in order to retain critical mass in the main sites of the Domain.

Recommendation partially implemented

This topic is addressed in detail in chapter B.1.2.

The ETH Board only partially agreed with the recommendation, as it felt that an overarching strategy for cooperation has to allow for different cooperation models due to the historical circumstances of their creation as well as specific regional needs and opportunities. The ETH Domain elaborated such a strategy that takes these aspects into account. Further information on the “Strategy for ETH Domain institutions’ associated locations, working with cantonal or international partners” adopted by the ETH Board at its meeting of 18/19 May 2022 is given in chapter B.1.2.

In addition to the locations covered under the newly developed strategy, cooperation with cantons takes place in various ways without any formal structure.

One specific example is the Centre for Learning Sciences (LEARN) with EPFL. In 2020, the LEARN Center and the Education Outreach Department of EPFL continued their work on incorporating digital education into schools in the canton of Vaud. The LEARN Center is responsible for developing digital education focus areas in 12 pilot schools; in 2021, EPFL brought a further 17 pilot schools into this initiative. A total of 1,500 teachers had been trained by end-2021 (compared to 600 at end-2020).

Examples of cantonal cooperation by ETH Zurich include collaborations with the cantons of Aargau (Kantonsspital Baden under the Digital Trial Intervention Platform, Quantum Computing Hub at PSI), Basel (BRCC, Tumor Profiler, PH Alliance, NMR Facility, GMP), Ticino (Bachelor/Master in Human Medicine) and Graubünden (Climate Change, Extremes and Natural Hazards in Alpine Regions Research Centre CERC at WSL, Center for Climate Systems Modeling at ETH Zurich).

Examples at Empa include scientific collaboration with the cantons of St. Gallen (Kantonsspital, University St.Gallen, HSG and Switzerland Innovation Park OST),

Thurgau (Thurgauer Technologieforum), Zurich (cantonal hospitals and University Hospital Zurich) and Bern (University of Bern and University of Applied Sciences Bern).

#14: Autonomy of the Institutions

To take full advantage of autonomy, review governance to ensure that the principle of subsidiarity is followed wherever possible, in order to empower the responsible functions to fulfil their role.

Recommendation partially implemented

The ETH Board supports the principle of subsidiarity as laid down in the ETH Act and highlights the importance of properly balanced autonomy and accountability. The Board does not agree with the recommendation to transfer responsibility for the appointment of professors from the ETH Board to the Presidents of ETH Zurich and EPFL. The reasons behind this decision are set forth in the Response of the ETH Board to the Recommendations of the Expert Committee¹⁵ and led to the partial implementation of the recommendation.

The membership of the presidents of ETH Zurich and EPFL and the representation of the research institutes as well as of the school assemblies of ETH Zurich and EPFL (so-called "institutional members") in the 11-member ETH Board may not fully comply with the federal government's corporate governance requirements, according to which the bodies of independent units must be independent of each other in terms of personnel. However, experience has shown that the presence of the four institutional members at the meetings of the ETH Board is indispensable for the proper functioning of the ETH Board and the ETH Domain. Therefore, as part of the revision of the ETH Act in 2021, care was taken to ensure that the four institutional members of the ETH Board continue to attend all meetings of the ETH Board but no longer have voting rights in the allocation of funds and in election proposals for the top management positions of the ETH Domain institutions. In addition, the presidents of the schools and the representative of the research institutes on the ETH Board do not participate in decisions on supervisory matters or on matters relating to financial supervision. This means that no meeting documents are sent to them and that they leave the meeting room while business is being dealt with at ETH Board level. Cf. message on the amendment of the ETH Act¹⁶.

¹⁵ [2019 Intermediate Evaluation: Response of the ETH Board to the Recommendations of the Expert Committee](#), pages 26-27

¹⁶ [Botschaft zur Änderung des ETH-Gesetzes](#) (German)/ [Message concernant la modification de la loi sur les epf](#) (French)

#15: Leadership and Human Resources Management

The current efforts to develop leadership skills at all levels and to ensure adequate human resources management within the ETH Domain should be encouraged. The measures proposed for this transition by the management of the institutions should have the full support of the ETH Board.

Recommendation implemented

This topic is addressed in detail in chapter B.3.

Good leadership and management in the ETH Domain are of prime importance, as human resources are the key factor for the ETH Domain's successful future development.

Pursuant to the Strategic Plan 2021–2024 and the 2019 Intermediate Evaluation, the Federal Council has determined in the Strategic Objectives for the Domain that the ETH Board should have its personnel management and development evaluated externally (in accordance with subsections 9.1–9.6. of the Strategic Objectives). This evaluation is ongoing; preliminary results are expected during 2023 and the final report will be available in 2025.

ETH Zurich has expanded the Executive Board from five to seven members and has introduced a new management structure, including two new vice presidencies, one for Personnel Development and Leadership and one for Knowledge Transfer and Corporate Relations. It has created new administrative units "Consulting for Professors" as well as "Development and Leadership" which, among other tasks, will support professors in their personal and leadership development. The Vice Presidency for Personnel Development and Leadership launched the "Lifelong Learning Hub (L3H)" project to develop new social and leadership competencies and establish a lifelong learning mind-set at ETH Zurich on all levels.

EPFL has adjusted the structure of its Executive Board. The newly created Vice Presidency for Responsible Transformation handles cross-campus issues such as diversity and sustainability. Responsibility for teaching and research has been combined in a new Vice Presidency for Academic Affairs, based on the provost model widely used at international universities. Responsibility for operations, human resources and information systems has been combined in a Vice Presidency for Operations. Among the initiatives led by the Vice Presidency for Responsible Transformation, a campaign took place in 2021–2022 to promote a culture of respect. In this context, a new online course was developed that includes clear indications for team leaders with regard to their specific role.

Based on an initiative by EPFL and PSI, all institutions of the ETH Domain partnered with the International Institute for Management Development (IMD) to design a specific high-level leadership programme to prepare professors and team leaders for senior leadership positions.

For years, Empa has consistently pursued well-structured leadership training. The emphasis in the coming years will be on communication, conflict management and negotiation skills. At Empa new leaders are required to complete the basic course in 'Leadership in Science' (in cooperation with the University of Applied Sciences and Arts Northwestern Switzerland). At Empa, restart support was created to enable scientists to return to scientific work quickly after longer absences (e.g. for health reasons, maternity or paternity leave). In addition to annual personal development planning, Empa offers specific courses to help doctoral students and postdoctoral students plan their careers in industry.

ETH Zurich proactively shares good HR management practices within the ETH Domain. Examples include:

- The 2021 respect campaign and related events;
- the exchange between ETH Domain equal opportunities officers;
- sharing of experiences and practices regarding conflict management with EPFL;
- exchanges regarding leadership courses;
- the revised ‘doctorate ordinance’;
- directives for doctoral students employed at ETH Zurich;
- policy and HR management issues throughout the coronavirus pandemic (e.g. time management, working from another country, return to the office, etc.).

The Education Center at PSI offers a wide range of subject-specific and interdisciplinary (incl. soft-skills) continuing education courses. PSI is continuing the CAS (Certificate of Advanced Studies) course in ‘Leadership in Science’ (see above), which is open to PSI, Empa, WSL and Eawag employees.

WSL continuously invests in the training and development of its unit and group leaders, currently with a new leadership course for group leaders as well as individual coaching and development measures.

Eawag continuously invests in and adapts its range of training and development courses and actively improves its HR practices, e.g. courses for group leaders, equal opportunity and PhD support committee, a respect campaign with related activities, management of the pandemic situation and related support for the employees.

#16: Funding

a. Stable and reliable funding is essential and should be protected from yearly budget cuts. In view of the growing challenges and the transition to a knowledge society, the funding of the ETH Domain should steadily increase.

b. Like some other parts of the federal budget, the ETH expense should be handled as fixed contributions (“gebundene Ausgaben”).

Recommendation implemented

Stable funding from the Swiss Confederation is key for the successful execution of the basic mandate and to fulfil the ETH Domain’s mission of best serving Switzerland. It facilitates the coverage of new and challenging scientific fields, the recruitment of outstanding academic staff, and high-quality, research-based education (cf. chapter A.1).

In the negotiations with the Department of Economic Affairs, Education and Research (EAER) and the Federal Department of Finance (FDF), the ETH Board and its president have consistently advocated an increase in federal funding for the ETH Domain. In addition, they have presented convincing underlying facts and evidence for the annual budget requested by the ETH Domain, which was then approved by the Federal Assembly. So far, the first three annual budget tranches of the ERI period 2021–2024 have grown in line with the approved expenditure ceiling despite the strain placed on federal finances by the coronavirus situation.

In 2022, inflation has risen to an unexpectedly high level due to the geopolitical and economic situation. The inflation assumptions set by the Confederation and applied in the annual budgets will therefore become a challenge. Once the Federal Assembly has approved the budgets, uncommitted expenditures (ungebundene Ausgaben/dépenses non liées) in particular (such as the annual budgets for the ETH Domain) will no longer be adjusted to actual inflation according to the current

inflation adjustment procedure. Real growth will therefore have to be financed from the reserves or will be lower than expected, possibly placing the ETH Domain at a disadvantage compared to other higher education institutions in Switzerland.

#17: Strategic Funds

The reserve funds of the ETH Domain should be used for strategic growth initiatives, and not diverted to the running budget as compensation.

Recommendation partially implemented

Sufficient strategic reserves give the institutions of the ETH Domain the necessary financial flexibility to open up new scientific fields, promote entrepreneurial action and enhance planning security. In a highly regulated environment with multi-year budget periods and without the possibility of external debt financing, reserves can serve as a guarantee for continuous funding and provide strategic room for manoeuvre.

As part of its reserve policy, the ETH Board issued guidelines for the ETH Domain in 2019 that define a range for “reserves without dedication” (formerly: “free reserves”) that are deemed necessary to provide both the strategic freedom to launch initiatives and the financial buffer to absorb fluctuations in revenues. In addition, these guidelines ensure appropriate reporting at institutional level as well as strategic controlling by the ETH Board. The institutions regulate operational reserve management in internal directives and guidelines.

With these measures, an important basis for the strategically targeted use of the reserves had been created. However, the recommendation could only be partially implemented, as the reserve categories and reference figure (new: *other equity*) had been redesigned to accommodate the target-setting in the Federal Council's Strategic Objectives for the ETH Domain for the period 2021–2024.

By the end of 2019, the *other equity* amounted to CHF 1,402m, at the end of 2021 to CHF 1,397m. In 2020, the ETH Domain reduced the figure by CHF 42m, and in 2021 it increased by CHF 37m. While the reserves were reduced by CHF 80m in 2021, mainly to cover operational funding gaps, this was more than offset by an increase in the accumulated surplus of CHF 117m. It is expected that the running budget will have to be partly covered with reserve funds in 2022 to 2024, due to the inflation issue – see recommendation #16. Consequently, the formerly free reserves (reserves without dedication) will most probably settle at a lower level than had originally been determined by the ETH Board. But to ensure that the targets set by the Federal Council can be implemented and achieved by the ETH Domain, pressure to reduce the reserves, i.e. the *other equity*, has increased.

Although reserves are also diverted to the running budget, as opposed to the original recommendation, they are used strategically to a large extent. Thus, the ETH Board and the institutions have initiated and promoted numerous strategic programmes and activities with reserve funds. Among other things, these activities are aimed at finding solutions to current global challenges such as climate change. Their implementation has not yet led to large expenditures, but will result in a reduction of the reserves with internal dedication (2021: CHF 786m) in the coming years. To name just a few of these initiatives:

- Research projects within the framework of the ETH+/Open ETH programme;
- Additional professorships, including at EPFL's new Cryo-EM Centre in collaboration with the University of Lausanne (also called the Dubochet Centre);

- ETH Zurich PSI Quantum Computing Hub;
- WSL's "Climate Change and Extremes Research Center (CERC)" with the Canton of Graubünden;
- Scientific equipment for the new building for the Department of Biosystems in Basel;
- Infrastructure projects at WSL (Davos building), Eawag (Flux building) and Empa (Empa Eawag research campus);
- Future Cities Laboratory (FCL) research programme of the Singapore-ETH Centre.

Furthermore, projects fostering cooperation among ETH Domain institutions were financed from the reserves of the ETH Board, e.g. SynFuels (Synthetic Fuels from Renewable Resources, Empa and PSI) and Blue Green Biodiversity (Eawag and WSL).

#18: International Openness

International openness is essential for global competitiveness. International multilateral cooperation can be complemented, but not replaced, by bilateral research collaborations.

Recommendation implemented

This topic is addressed in detail in chapter A.2.

The ETH Board agreed with the recommendation, the implementation of which is the responsibility of the federal authorities, and sought to support the authorities with their tasks. The ETH Domain's challenges related to the non-association with Horizon Europe and the manifold activities and efforts to sustain the ETH Domain institutions' strong international positioning are described in chapter A.2.

#19: Diversity

The ETH Domain should commit to goals for representation of women and develop evidence-based strategies for recruitment and career development to support achieving these goals.

Recommendation implemented

This topic is addressed in detail in chapter B.3.

The ETH Domain aims to improve the gender balance among its members by increasing the proportion of women in education and research and specifically in leadership positions and decision-making bodies. The Gender Strategy for the period 2021–2024 was adopted at the ETH Board Meeting in March 2021.

Due to the efforts made, the measures taken and the strategies put in place, the institutions of the ETH Domain have been able to achieve an increase in the proportion of women at the different academic levels and leadership positions in recent years (cf. chapter B.3, figure 16). The ETH Domain institutions have set targets for increasing the proportion of women and report on the status of target achievement (cf. chapter B.3, figure 18).

ETH Zurich started to bring increased awareness and expertise on the topic of unconscious biases to the selection process of faculty members by facilitating several workshops. These include workshops aimed at the heads of the selection committees, at all professors at ETH (in the context of "Leadership4Faculty") and at student and scientific staff representatives in selection committees. By designating a gender and diversity advocate in each selection committee and updating its 'Gender strategy on the professorial level', ETH Zurich seeks to raise awareness and sensitivity to stereotypes and unconscious biases, particularly in hiring processes.

The EPFL policy on equal opportunities in Faculty recruitment, adopted in 2017, continues to be implemented and is enhanced by the target of 40% of faculty position offers to women candidates. The implicit bias awareness training, organised by EPFL since 2018, has also been available as Massive Open Online Course (MOOC) as of 2021. The Vice Presidency for Responsible Transformation established at EPFL in 2021 (cf. recommendation #15) has greatly strengthened the institutional anchoring of equality at EPFL and has broadened the scope of action, as reflected in EPFL's Equal Opportunity and Diversity Action Plan 2021–2024.

Numerous measures in the area of diversity, recruitment and career development have been implemented at the four research institutes, details of which can be found in chapter B.3.

#20: Measuring Impact

The recommendations of the Expert Committee related to Term of Reference B.1 mention the most important success factors; for better assessment of impact in the future, the Domain should consider the further development of indicators of success.

Recommendation partially implemented

The ETH Board agrees that there is a need for representing the impact of the ETH Domain institutions' activities on the economy and society at both the national and international levels. Meaningful indicators are required to assess different dimensions of impact (including scientific, economic, societal impact) taking account of the ETH Domain's core tasks in education, research and KTT as well as further tasks (e.g. including national and international cooperation and coordination plus transversal responsibilities). Impact evaluation is a long-term task, which should complement the existing system of evaluations and include both quantitative and qualitative aspects.

Various approaches applied by other institutions and organisations to evaluate their impact were reviewed and assessed for their applicability to the institutions of the ETH Domain¹⁷. The existing methods for evaluating scientific and economic impact are to be further developed and adapted to the institutions to be evaluated and the scope of the evaluation. The approaches for assessing societal impact pose the greatest challenge. The mostly qualitative methods, in particular the case studies, require an in-depth examination of feasibility and expectations.

The ETH Domain has extended the scope of the bibliometric study for the 2023 Intermediate Evaluation assessing the scientific performance and impact of the ETH Domain institutions and has further developed the methodology used. As such, shortcomings of previous studies were addressed and aspects that have since gained importance were included (cf. chapter C: Bibliometric Study). Conference proceedings have been included in the current study, as this type of publication represents an important form of output in certain fields of science, e.g. computer science. Collaboration with industry is an important task of the ETH Domain and was analysed through publications for which at least one co-author is affiliated with a company. Indicators related to the accessibility of the publications (open versus closed access) and to gender diversity of authors were also included. The bibliometric study provides outcomes for each institution separately as well as for the ETH Domain as a whole. The overview of the ETH Domain as a whole is a new

¹⁷ CAS-Arbeit I. Egli, 2019: Reflexion über Ansätze zur Erfassung der Wirkung (Impact) des ETH-Bereichs (German)

feature provided in the current study. Among other things, it gives insights into the impact of co-publications among the institutions (cf. chapter C: Bibliometric Study, figure 24; and recommendation #11 in this chapter).

To complement the quantitative approaches and methodologies applied by the ETH Domain institutions to assess their performance and their national and international positioning (cf. chapter B.4), the ETH Domain plans to apply a qualitative approach to describe the impact of the ETH Domain based on specific examples and considering the institutions' dual mission, i.e. pursuit of excellence as well as national impact. Such examples are to be selected to represent the different core and transversal tasks of the institutions so as to demonstrate how long-term investments and engagements lead to impacts of societal relevance. Eawag adopted a similar approach in the field of water research by describing the development of separation techniques and its impact¹⁸.

As the outcomes of this approach, presumably in the form of a brochure, are not yet available, the recommendation is considered to be partially implemented.

#21: Strategic Focus Areas

The Expert Committee strongly supports the choice of these strategic focus areas. Beyond that, the institutions of the ETH Domain should develop the mechanisms to anticipate research needs and to respond quickly to major challenges.

Recommendation implemented

This topic is addressed in detail in chapter B.2.

The Strategic Plan 2025–2028 of the ETH Board for the ETH Domain has been published in 2022. An important new element, the foresight process, has been added to the development process of this strategic plan compared to previous ones. The identification of the five Strategic Areas for 2025–2028 was supported by two parallel processes: (1) the identification of global challenges in the context of education, research and innovation through a foresight process (top-down approach); and (2) the identification of current and future activities of strategic importance in the ETH Domain institutions (bottom-up approach). For more information on the two approaches to identifying the Strategic Areas cf. chapter B.2, figure 14. In all five Strategic Areas defined for 2025–2028, the institutions of the ETH Domain are well positioned to have a particularly strong impact – on their own as well as through cooperation within the Domain and beyond.

Important elements of selected strategic processes at the level of the institutions are described below.

At ETH Zurich the Strategic Foresight Hub was established in the Office of the President in 2021 to deep-dive into the territory of long-term trends and plausible futures and develop a foresight culture at the institution. It provides the space, guidance, tools and methodologies to those interested in engaging with “what could be”. The ETH Zurich Strategy and Development Plan 2021–2024 includes a strong alignment of ETH Zurich focus areas with the SFAs 2021–2024 of the ETH Domain (and now also with the Strategic Areas for the period 2025–2028). The review of the strategic planning processes for the next strategy horizon started in 2021.

¹⁸ [History of Source Separation Technology at Eawag "Flows of Science"](#)

In the field of strategic foresight, EPFL will be setting up an advisory body (Strategic Academic Committee), which will aim to advise the Vice President for Academic Affairs and the EPFL management on strategic and academic matters related to EPFL's core missions. In the EPFL 2021–2024 Strategic Plan, there is a close alignment of EPFL focus areas with the SFAs of the ETH Domain. The review of the strategic planning processes for the EPFL Strategic Plan 2025–2028 commenced in 2021.

At PSI the Strategic Plan 2021–2024 has been developed bottom-up at divisional level based on ETH Domain priorities, including SFAs. The annual strategy retreat of the PSI leadership includes the directorate and the division and laboratory heads. For overarching strategic priorities, working groups are established by the director. User community workshops and scientific advisory boards for large-scale research facilities are established and advise PSI on relevant strategic topics.

The development plan 2025–2028 of WSL will be based on inputs from the evaluation of WSL in 2022 and WSL research units' strategic plans and will also take account of the Strategic Plan 2025–2028 of the ETH Board for ETH Domain.

At Empa, strategic planning is done by a mix of bottom-up and top-down initiatives and strategies. This permits conformity with the Empa development plan 2021–2024 and aligns future plans to the ETH Board's Strategic Plan 2025–2028.

Strategic planning at Eawag has always been a collaborative process between directorate and research departments. The 2025–2028 strategic plan of Eawag will again be an inclusive process led by the new director (as of January 2023). Eawag has established a strategy committee in which representatives from all departments are present, and which will support the directorate in developing the future strategic plan.

#22: Digitalisation

The ETH Domain should develop a digitalisation strategy that maximizes translational impact, and organize research and teaching to support diffusion of computational thinking into science and engineering.

Recommendation partially implemented

Digitalisation and diffusion of computational thinking in all fields of science and engineering of the ETH Domain is a priority of the ETH Board for the current period 2021–2024 and also in the period 2025–2028. Specifically with the Strategic Area Responsible Digital Transformation, the ETH Domain emphasises the importance of digitalisation and addresses the “transversal” topic in its technological and societal context in its Strategic Plan 2025–2028 (cf. chapter B.2). Digitalisation developments already benefit from strong and continued coordination at the ETH Domain level, but also come under the responsibility of the institutions. Thus, the ETH Board does not see the need for an overarching strategy, resulting in only a partial implementation of the recommendation.

Specific activities at ETH Zurich to promote computational thinking and digitalisation include embedding student-related administrative processes and learning environments in a Digital Campus, the Strategy for the Digitalisation of the ETH Zurich Administration, teaching of concept computational competencies, capacity-building in the fields of responsible digital transformations and dialogue with society, as well as the establishment of the ETH AI Center.

EPFL supports the development of computational thinking in science and engineering disciplines. The Digital resources for Instruction and Learning (DRIL) fund supports the creation of digital resources for teaching and learning. The Jupyter Notebooks in Education service allow classes of more than 200 students to run simulations simultaneously without prior installation. The Campus Analytics initiative uses data science to benefit education.

At PSI a new research division on Scientific Computing, Theory and Data was established in 2021 in close cooperation with EPFL. The same year, the new 3rd Hub of the Swiss Data Science Center (SDSC) was established at PSI along with EPFL and ETH Zurich.

Appendix: Financial management

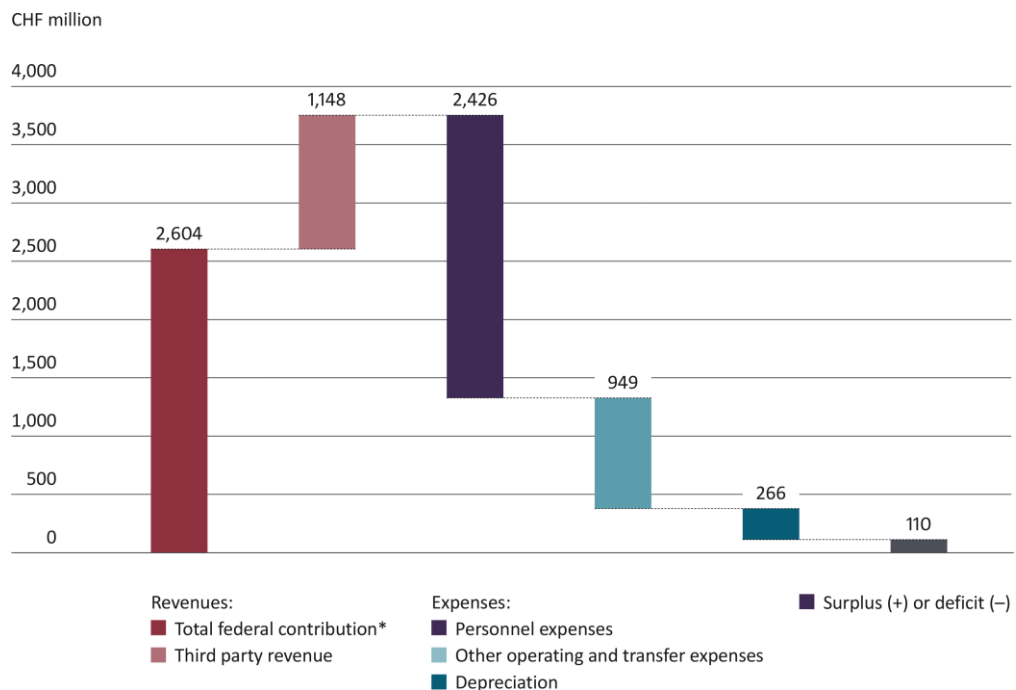
Stable and sufficient financial resources are an important prerequisite for strengthening the national research landscape and positioning the ETH Domain institutions at the forefront of international competition. Financial flexibility and security allow for long-term planning and the anticipation and implementation of strategic developments over multiple years. In this context, targeted diversification and responsible, economical handling of the entrusted financial resources are of central importance.

In 2021, direct federal contributions amounted to 69% and third party revenues to 31% of ETH Domain funding. Third party revenues consist largely of research contributions, which are funded by the private sector and other contributors as well as by the Federal Government and the EU (15%) (cf. figures 3 and 4). By considering these indirect federal contributions, the federal funding amounts to 84% of the ETH Domain total revenues. Adequate funding by the Confederation is thus key to the proper functioning of the ETH Domain and enables it to fulfil the ambitious strategic objectives set by the Federal Council. The federal contributions make a vital contribution to the institutions' strategic freedom of action and the independence of teaching and research.

Figure 3: Table of consolidated revenues and expenses 2021 of the ETH Domain

Year 2021	CHF millions	in %
Revenues		
Federal financial contribution	2,373	63%
Federal contribution to accommodation	230	6%
Total federal contribution*	2,604	69%
Tuition fees, continuing education	56	1%
Research contributions of the Federal Government and the EU	556	15%
Research contributions of the private sector, other cooperation projects	231	6%
Donations and bequests	122	3%
Miscellaneous revenues	182	5%
Total third party revenues	1,148	31%
Total revenues	3,751	100%
Expenses		
Personnel expenses	2,426	67%
Other operating and transfer expenses	949	26%
Depreciation	266	7%
Total expenses	3,641	100%
Surplus (+) or deficit (-)	110	

Figure 4: Illustration of consolidated revenues and expenses 2021 of the ETH Domain



* The total federal contribution in the figures 3 and 4 above refers to the summary as accounted for in the consolidated statement of financial performance. On the other hand, the total federal contribution summarised from the two credits approved by the parliament (federal financial contribution and investment credit), which are counted towards the expenditure ceiling, amount to CHF 2,600m.

In its ERI Dispatch, the Federal Council formulates future priorities, objectives and measures and requests the funding required for a four-year period. In this context, and for the 2021–2024 ERI period, the expenditure ceiling approved by the Federal Assembly for the ETH Domain amounts to CHF 10,810.7m.

The ETH Board allocates funds from federal funding to the institutions of the ETH Domain in accordance with Art. 33a of the ETH Act and Art. 12 of the Ordinance on the ETH Domain. Conforming to the Federal Council's Strategic Objectives for the ETH Domain for the Period 2021–2024, the ETH Board takes account of the institutions' achievement of the strategic objectives, their academic performance and the financial obligations arising from their teaching, research and KTT activities, as well as from the tasks assigned to them by the Swiss Confederation, when allocating funds. The funding effectively available to the ETH Board is then decided by the Parliament at the end of each year. In 2020, the Federal Assembly had approved a total of CHF 2,600m (credits counted towards the expenditure ceiling) for the 2021 budget of the ETH Domain. Figures for 2022 will be published in the first quartile of 2023.

An expenditure surplus, as in 2021, which had led to a reduction in the cash balances, is usually covered with funds from the reserves. Hence, the sum of both reserve positions (one with internal dedication, one without dedication) was reduced by CHF 80m in 2021. It should be noted, that this is not the same key figure as *other equity*, which was defined as a reserve reference figure in the strategic objectives by the Federal Council's Strategic Objectives for the ETH-Domain (cf. chapter "Retrospective", recommendation #17).

Strategic and proactive financial management is one of the key transversal tasks of the ETH Domain defined in the Strategic Plan 2025–2028 of the ETH Board¹⁹. In this context, the ETH Board and the institutions of the ETH Domain will continue to exercise sustainable financial management. This includes ensuring that funds are used appropriately and that reserves are actively managed at all levels of the organisation and in accordance with the established directives and regulations (cf. chapter “Retrospective”, recommendation #17). Synergies will be exploited further to share expertise – and, where possible, to save resources – by cooperating in administration, education and research and by sharing facilities.

¹⁹ Strategic Plan 2025–2028 of the ETH Board for the ETH Domain, pages 44-45

A

Specific aspects of the core tasks education, research and KTT

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A.1

Ensuring quality of education and associated challenges

Excerpt from the Mandate

“The ETH Domain's mandate is to educate its students and doctoral students so that they are equipped to meet the current requirements of science, the economy and society. To what extent can the ETH Domain ensure that it offers high quality education and that its objectives and modalities are aligned to this challenge while also guaranteeing equal opportunities? Moreover, the number of students and doctoral students in the ETH Domain is increasing substantially; this trend is likely to continue, especially to meet domestic demand for highly qualified professionals. In these circumstances, is the ETH Domain deploying the right strategies and instruments for fulfilling its educational mandate, particularly given the possibility that the Confederation's financial scope may decrease in the years to come (see financial scenarios in the EAER/SERI mandate dated 15 June 2021 and strategic objective to increase the share of third-party funding in its financial resources)? Are there indications that the rising number of students and doctoral students is severely jeopardising teaching quality? If this is the case, what would the best countermeasures be?”

Assessment by and considerations of the ETH Board

Assessment: The strong growth in student numbers increasingly jeopardises the quality of research-based education in the ETH Domain. The ETH Board considers that urgent action is needed here. Based on an overall strategy regarding the growth of student numbers that is currently being developed by the ETH Board for the ETH Domain, ETH Zurich and EPFL are therefore working on measures to safeguard the quality of education at their establishments. For the ETH Board, high-quality education is the top priority.

Considerations: It is the core task of the ETH Domain's educational mandate to train qualified professionals so that they meet the needs of science, the economy and society. The demand for STEM (science, technology, engineering and mathematics)²⁰ graduates from industry and the public sector is very high.

- Maintaining a high quality of education is a priority for the ETH Board. However, this goal is jeopardised by growing student numbers. Thus, while the ETH Board welcomes the growing interest in STEM fields, mainly in engineering and ICT, it recognises the enormous challenge that this growth is presenting. It is becoming especially difficult to respond to the substantial demand for highly qualified professionals while upholding the quality of education with limited resources.
- While ETH Zurich and EPFL have to make full use of digital technologies and ensure innovative and high-quality education, they should first and foremost remain in-person universities (Präsenzuniversität/université présentielle). Classroom teaching and practical courses remain important, as direct contacts between professors and students and between students – as well as social networking – are crucial for well-being and study success.
- Limits on student admissions may compromise the efforts made by the ETH Domain institutions to counteract the shortage of experts needed in Switzerland. Thus, this option should only be considered if the quality of education cannot be maintained or if capacity thresholds are exceeded, which may become the case if the trends of strongly increasing student numbers and much lower financial growth continue.
- Limiting admissions would require selection procedures before the actual start of the study programme. This could thus impair equality of access to studies at ETH Zurich or at EPFL and should be taken into consideration when devising strategies. Further, this could have implications on the quality of the Swiss Matura if it no longer allowed entry without exams and instead selection procedures would become the instruments to ensure quality (see also next point).
- The ETH Domain has a strong interest in upholding the quality of the Swiss Matura by close interactions with baccalaureate schools²¹ (Gymnasien/gymnases) (e.g., by offering specific training for teachers) and therefore promotes measures for the successful transition from baccalaureate schools to ETH Zurich and EPFL (self-assessment tools, bridging courses, Centre Propédeutique EPFL, etc.).
- Admitting foreign-educated foreign students (Bildungsausländerinnen und –ausländer/personnes de nationalité étrangère scolarisées à l'étranger) helps to counteract the shortage

²⁰ Including computer and communication sciences, in analogy to the German term MINT (Mathematik, Informatik, Naturwissenschaften, Technik).

²¹ upper secondary level school

of experts in Switzerland but presupposes that the majority stay in the country after graduation and thus contribute to Switzerland's economy and society.

- Promotion of STEM fields at university level must start by getting potential students interested in these fields at a young age. The ETH Domain institutions continuously support activities in this area. They especially target girls and children/pupils from underrepresented groups.

Evidence

Assessing education quality

Ensuring excellence means understanding the elements that influence the quality of education, and performing regular assessments. ETH Domain institutions assess the quality of education through a broad range of coordinated processes and with different instruments. These include institutional accreditations, unit evaluations (at the level of the departments, schools, divisions or laboratories, or across the whole institution, depending on its size), examinations, student surveys, evaluation of teaching by students and evaluation of professors' teaching performance upon appointment or during promotion procedures (cf. chapter "Retrospective", recommendation #1). The ETH Domain's commitment to fulfilling the mandate granted by the ETH Act – i.e. to educate students in scientific and technical fields, and enable them to become the experts needed by the economy, research and the public administration – is key in the development of curricula. In that regard, the institutions consider the adequacy between the education they provide and the demands of the Swiss labour market as an important indicator of quality (cf. figures 7 and 8).

The attractiveness of the ETH Domain is a mark of education quality. Between 2012 and 2021, the overall student and doctoral student population²² at ETH Zurich and EPFL increased by +33% (+25% at the Bachelor's level, +68.2% at the Master's level and +18% at the doctoral level).²³ According to national data from the Federal Statistical Office (FSO), the increase in student and doctoral student numbers between the academic years 2015/2016 and 2021/2022 is higher at ETH Zurich and at EPFL than the Swiss national average.²⁴ Similarly, the numbers of Bachelor's and Master's theses as well as doctoral theses co-supervised by the four ETH Domain research institutes increased by 36% and 8% between 2012 and 2021, respectively.²⁵ The international recognition and attractiveness of ETH Zurich and EPFL have also led to an increase in the proportion of foreign-educated foreign students (26.6% at the Bachelor's level and 45.2% at the Master's level in 2021, compared to 23.4% and 39.5% respectively in 2012). Since the increase in faculty positions has not been as fast as the increase in student numbers, the ratio of students to professors has increased continuously over the last ten years thus posing a risk to the quality of teaching and learning. Other teaching staff (incl. postdoctoral fellows, doctoral students, senior scientists, *Maîtres d'enseignement et de recherche*, as well as professors or researchers from other institutions, especially from the four research institutes) play an important role in the supervision of students, and allow to compensate for this trend to a certain extent and to maintain a high quality of teaching. Caution should be taken to avoid overloading the intermediate-level staff with teaching activities, especially doctoral students and postdoctoral fellows. Furthermore, their numbers may not increase as strongly as the numbers of students.

²² The term "student" encompasses the Bachelor's and Master's levels, as well as the Master of Advanced Studies and Master of Business Administration (MAS/MBA). Since 2021, exchange students are no longer included in the total number of students. In the monitoring of the ETH Board on the ETH Domain, doctoral students form a separate category of students.

²³ [Annual Report of the ETH Board on the ETH Domain 2021](#), page 93

²⁴ [Basis Table 1990–2021 on students of Swiss universities \(OFS\)](#)

²⁵ [Annual Report of the ETH Board on the ETH Domain 2021](#), page 96

The satisfaction of students and doctoral students is an important indication of the quality of teaching provided by the ETH Domain institutions. Thus, the institutions perform regular surveys to assess the situation of their students or graduates. Some results of these surveys can be found in the Facts & Figures section of this chapter. The satisfaction of doctoral students is also assessed in the context of the surveys for employees since they are a category of employees as well. Such surveys are also performed by the research institutes.

Understanding the elements that influence the quality of education and assessing them is a complex task. The same goes for identifying capacity thresholds, whether they relate to space, infrastructure, supervision or funding. In the context of the strategy that is currently being developed regarding the trend in student and doctoral student numbers, the plan is for ETH Zurich and EPFL to evaluate the indicators and criteria used to assess the quality of education and adjust them if necessary. Furthermore, they shall determine capacity thresholds for their own institution. These may be specific to each study programme and level.

Maintaining/improving education quality in the long-term

Maintaining – and possibly improving – education quality requires, among other factors, innovative approaches and a favourable learning environment, as well as good teaching, mentoring and supervision skills of lecturers and supervisors. It also depends on the framework conditions, especially in terms of human resources and infrastructure – and, by extension, in terms of financial resources too (see “Strategies” section below).

Innovative approaches to teaching are continuously being developed by the ETH Domain institutions to improve education quality on the one hand and to increase the capacity of study programmes wherever possible and relevant on the other. Examples of innovative education methods and strategies are numerous and have been flourishing during the coronavirus pandemic to accommodate remote learning and practical work. They include the creation of short informative video tutorials instead of lectures, lab experiments at home and lecture recordings to organise flipped classrooms. For example, simulations allow students to test scientific models by exploring how variations of parameters change the simulated phenomenon. The institutions are already using and will continue to use the insights from the coronavirus pandemic as learnings for developing their education offers. It is worth noting that innovation in education requires more time investment from supervisors, and possibly more funding, as well as flexibility in the use of real estate and workspace.

In addition to subject- and method-specific competencies, students develop various skills sets during their studies so that they are well equipped to help actively shape the future of Switzerland and of society in general²⁶. With the “ETH talent” initiative, the Rectorate and the departments of ETH Zurich have agreed on a clear competency grid (covering social competencies such as cooperation and teamwork, but also personal competencies such as creative and critical thinking). On the one hand, the competency grid enables those responsible for the study programmes to discover gaps in their curriculum and close them. On the other hand, it offers students the opportunity to search for specific courses in the course catalogue with which they can fill any gaps in their personal profile. The Student Project House²⁷ is another initiative of ETH Zurich for developing creative thinking and promoting transdisciplinarity. This

²⁶ [Strategic Plan 2025–2028 of the ETH Board for the ETH Domain](#), pages 26-29

²⁷ [Student Project House | ETH Zurich](#)

initiative adds to the many existing and developing offers within departments that aim to encourage project-based learning. ETH Zurich also ensures that the teaching of computational competencies/modelling runs like a thread through every Bachelor's and Master's programme.

Discovery Learning Laboratories (DLLs)²⁸ are an initiative of EPFL to encourage students to take a cross-disciplinary approach to research projects. Similarly, EPFL's MAKE interdisciplinary projects²⁹ allow students to acquire solid team-working and project management skills and get initial hands-on experience in a real-world project at the same time. Two examples of successful MAKE projects are the EPFL Rocket Team, which was crowned European Champion in the EuRoC 2021 rocket competition, and the Xplore team, which won the bronze medal for its space robot during the European Rover Challenge. EPFL is also establishing a new Center for Transversal and Career Skills, which will coordinate and further develop training in transversal skills for all EPFL students, primarily through integration of explicit skill development in curriculum courses.

Through the education and continuing education programmes offered by the research institutes, students and doctoral students also have access to complementary teaching offers – often integrated into broader, multidisciplinary research – and to various state-of-the-art large-scale research infrastructures and technology platforms, as well as to a wide range of applied research opportunities. Finally, students have opportunities to gather experience in interacting with external stakeholders and hence to also develop their network and networking competencies. For example, engineers and architects at EPFL have to do a mandatory internship in industry. ETH Zurich has study programmes with a compulsory internship as well, and some for which an internship is strongly recommended. This close contact with the real world helps the students to develop concrete competencies and transversal skills for their future life. In addition, they receive direct feedback about industry's needs and its satisfaction regarding students trained in the ETH Domain.

The fundamental principles of diversity, equal opportunities and inclusion are recognised as a premise for a creative and qualitative learning and working environment, and thus a prerequisite for academic excellence. Gender balance remains an issue in most of the study programmes, and the institutions thus continue to increase and diversify their efforts to attract women in the different disciplines. Most of the measures proposed to ensure equity are not directed only towards women, but also towards other underrepresented groups and minorities, as well as foreign nationals. These include outreach activities, financial support with social scholarships, language courses at reasonable prices, counselling for students and doctoral students with disabilities or chronic illnesses, associative activities, compensation for disadvantages in performance assessments, etc. Initiatives are also in place to support prospective students and enable them to succeed in their studies and to strengthen their competencies in basic science. This includes the preparatory year (CMS) at EPFL, which enables students who do not fulfil the admission requirements to acquire the necessary basis to be admitted into one of EPFL's Bachelor's programmes. It is also open to holders of a Swiss Matura on a voluntary basis before beginning their Bachelor's studies. ETH Zurich proposed two approaches to refresh basic mathematical knowledge: (i) a self-assessment in mathematics in the form of a test available online and (ii) an online and free-of-charge bridging course

²⁸ [Discovery Learning Laboratories \(DLLs\)](#)

²⁹ [MAKE interdisciplinary projects](#)

in mathematics. At EPFL, the newly created Centre Propédeutique (CePro) is in charge of the polytechnic courses (maths, physics) of the first year. The Centre coordinates the content, exercises, tutors and assistants. Specific exercise sessions are also organised and new pedagogical methods are introduced and analysed. The goals are to facilitate the adaptation from baccalaureate school to EPFL and to improve background sciences at the first year level. Overall success rates at the Bachelor and Master levels have been relatively stable over the past decade and foreign-educated foreign students perform similarly to students with a Swiss Matura.

Strategies (to mitigate the risks that an increase in student numbers may pose to the quality of education)

The growth of the ETH Domain student and doctoral student population echoes Switzerland's high demand for professionals in scientific and technical fields, especially in engineering sciences and in information and communication technologies (cf. figures 7 and 8). The continuous – and anticipated further – increase in student and doctoral student numbers can also to a certain extent be seen as a consequence of this demand. According to the Strategic Plan 2025–2028 of the ETH Board for the ETH Domain³⁰, ETH Zurich and EPFL predict an increase in the numbers of Bachelor's and Master's students by approximately +3.5% per year between 2025 and 2028.

The expected growth in student and doctoral student numbers, as well as developments in teaching and research, is generating increasing demand for human resources, space, infrastructure and support resources that may be difficult to meet in the medium to long-term. This is especially true if there is only a limited budget increase. The ETH Board is thus developing, together with the institutions of the ETH Domain, a strategy to provide guidance to mitigate the risks that such an increase in student numbers could pose to the quality of education in the long-term. This strategy shall also fulfil the mandate granted by the Federal Council in its Strategic Objectives for the ETH Domain 2021–2024 (Objective 1.6)³¹. The Strategy regarding the development of student and doctoral student numbers is foreseen to be published in 2023. While the development of the student and doctoral student population concerns the entire ETH Domain, the individual ETH Domain institutions – given their autonomy – take the actions that best match their respective situations and plans for strategic development. To this end, ETH Zurich and EPFL further develop their own measures to manage the student population growth and to integrate the growing student population into higher education planning while upholding quality in education.

The ETH Domain considers that limits on student admissions may compromise the efforts made by the ETH Domain institutions to counteract the shortage of experts needed for Switzerland's society, economy and administration, as well as their efforts to attract more women. Thus, limits should only be foreseen if the quality of education cannot be ensured because capacity thresholds are exceeded.

³⁰ [Strategic Plan 2025–2028 of the ETH Board for the ETH Domain](#), page 58

³¹ [Strategic Objectives of the Federal Council for the ETH Domain 2021–2024](#)

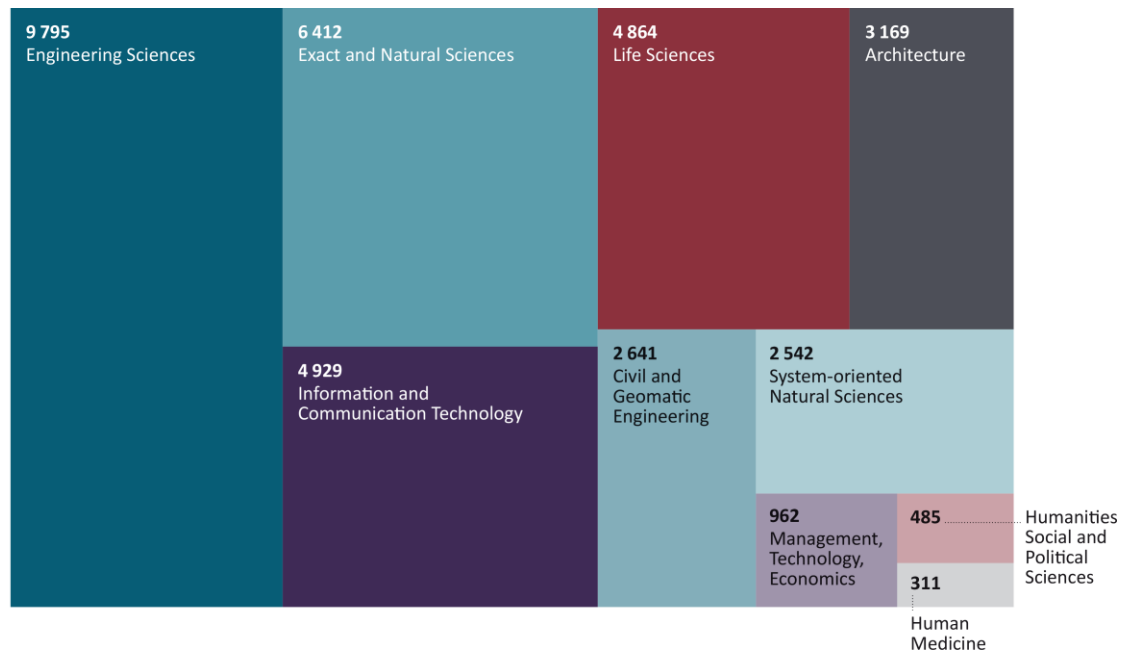
Facts & Figures

Disciplines offered at ETH Zurich and EPFL

The ETH Domain's unique contribution to the Swiss higher education sector lies in its focus on the STEM fields. Some of these fields are provided exclusively or predominantly by ETH Zurich and EPFL at university level in Switzerland (cf. figures 5 and 6).

Figure 5: Distribution of students and doctoral students at ETH Zurich and EPFL between the various disciplines in 2021

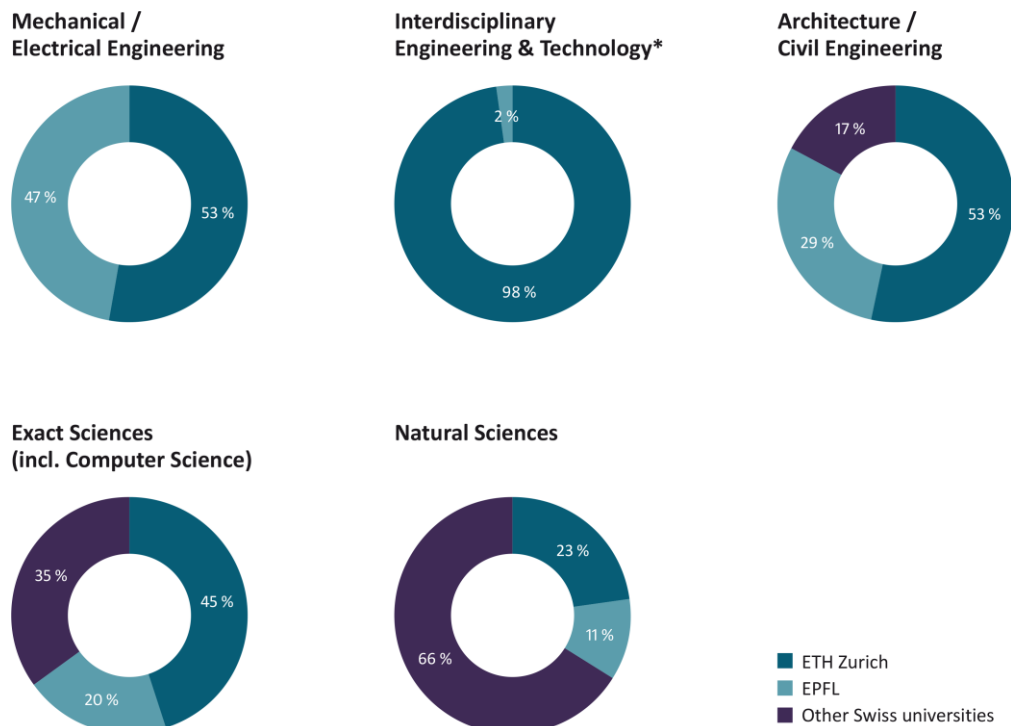
Number of students = **29 243**
 Number of doctoral students = **6 867**
 Total = **36 110**



Box areas are proportional to the number of students and doctoral students enrolled in the corresponding discipline. Note that the disciplines are not categorised in the same way by the ETH Board as by the FSO (figure 6) and cannot be compared directly.

Source: [Annual Report of the ETH Board on the ETH Domain 2021](#)

Figure 6: Proportion of STEM-field graduates of Swiss universities trained at ETH Zurich and EPFL (2021)



* incl. given programmes in health sciences

Source: FSO 2021 (statistics on university degrees)

Adequacy of educational offering in relation to Swiss labour market demand

According to the Swiss Skill Shortage Index 2021 (cf. figure 7), demand in the Swiss labour market is greatest for engineering and information§ technology occupations. Even though it is difficult to compare the ETH Domain disciplines and occupations as categorised by the Swiss Skills Shortage Index one to one, ETH Zurich and EPFL were especially successful in attracting an increasing number of students and doctoral students in these areas over the past decade (cf. figure 8). The growth of the student and doctoral student population in these fields – and to a lesser extent in Exact and Natural Sciences– is the main cause for the overall increase in student and doctoral student numbers (cf. figure 8).

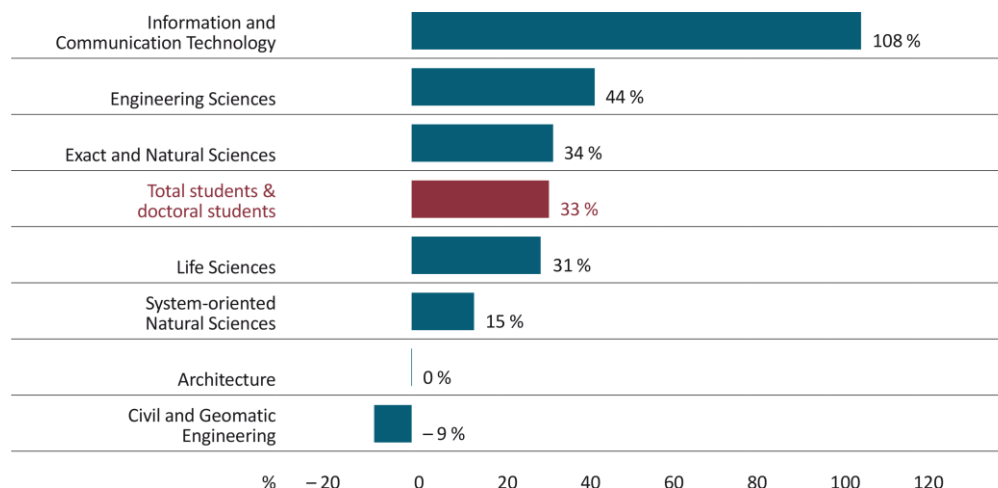
Figure 7: List of the seven occupations with skill shortage in Switzerland in 2021
(in order of skill shortage ranking)

1. Engineering occupations
2. Information Technology occupations
3. Technicians
4. Medicine and pharmaceuticals occupations
5. Trust business occupations
6. Technical specialists
7. Technical draughting jobs

Categories of occupations for which the ETH Domain offers education programmes

Source: [Swiss Skills Shortage Index 2021](#)

Figure 8: Growth in student and doctoral student numbers between 2012 and 2021
(for disciplines with more than 1,000 students)



Source: [Annual Report of the ETH Board on the ETH Domain 2021](#)

The professional prospects for ETH Zurich and EPFL graduates are excellent and reflect the high demand in the labour market (cf. figure 9). The employment rate of the ETH Domain's graduates is very high and has been relatively stable over the years.

Figure 9: Employment rate of ETH Zurich and EPFL graduates by degree level
(situation one year after graduation)

Graduation year	2012	2014	2016	2018	2020*
Master	93.7 %	95.7 %	94.8 %	95.5 %	97.3 %
Doctorate	96.1 %	95.6 %	94.8 %	95.5 %	98.3 %

* Revision of the questions concerning the status on the labour market

Source: FSO Graduate Survey ([German](#) and [French](#))

Educating foreign-educated foreign students helps to counteract the shortage of experts in Switzerland and requires a majority of them to stay in the country after their graduation. Surveys from the FSO show that a large number of these graduates actively contribute to Switzerland's economy and society after completing their studies (figure 10), and that they are indeed needed in the Swiss labour market.

Figure 10: Proportion of graduates of ETH Zurich and EPFL residing in Switzerland after graduation, by degree level (situation one year after graduation)

Graduation year		2012	2014	2016	2018	2020
Master	Swiss and Swiss educated foreign nationals	93.8 %	93.8 %	92.6 %	94.1 %	94.6 %
	Foreign educated foreign nationals	70.0 %	68.9 %	68.6 %	65.8 %	68.7 %
Doctorate	Swiss and Swiss educated foreign nationals	81.9 %	87.9 %	83.7 %	85.0 %	86.8 %
	Foreign educated foreign nationals	65.9 %	68.0 %	68.6 %	64.4 %	69.8 %

Source: FSO Graduate Survey ([German](#) and [French](#))

Student, doctoral student and graduate surveys

Different surveys are based on different sets of questions and cannot be compared with each other, and even less between schools. Comparisons are only made with surveys performed with similar or the same questions years apart.

ETH Zurich: A survey performed in 2021³² found that just 62% of the students were satisfied or even very satisfied with their studies, down from 82% in 2015. Another 27% were undecided and 12% were dissatisfied or very dissatisfied. The survey showed that students had suffered in the pandemic, and that for many it interfered with their academic work. Indeed, only 57% agreed with the statement that they could devote themselves adequately to their studies despite the pandemic. Reasons ranged from lack of motivation to missing the interaction with other students or suffering from temporary psychological stress. These results demonstrate the limitation of remote learning. However, most of the students rate the teaching at ETH positively: despite remote learning, 79% said that they did attend the lectures they were enrolled in. 78% said that lecturers were available to answer questions outside of class, and 74% agreed with the statement that studying at ETH Zurich hones their abilities to think critically and to consider various viewpoints. Agreement with that last point had increased since 2015. The survey showed also that students are still struggling with time management. Finally, a large majority of respondents experienced respectful treatment at ETH and say that their study environment is “free of discrimination that diminishes a person's dignity”.

Preceding the coronavirus pandemic, the Swiss Economic Institute KOF conducted a survey amongst ETH Alumni between November 2019 and January 2020³³. The survey indicated that most survey participants were satisfied with their position. On a scale of 1 to 5, more than 80% of the respondents rated their overall job satisfaction with a 4 or 5 while only about 5% of the respondents gave a score of 1 or 2.

EPFL: Students can provide feedback on all courses, each semester. In the academic year 2020–2021 student feedback indicated that the quality was satisfactory for 87.6% of courses at Bachelor's and Master's levels. This rate had changed little over the previous five years.

³² [Survey 2021 on ETH Zurich students' satisfaction](#)

³³ [Results of the ETH Alumni survey, 2019, KOF, 2020](#)

EPFL also carries out periodic surveys on the campus climate. The 2019 Doctoral Survey³⁴ asked students about the quality of their doctoral experience. Overall, 71.1% of students responded to the question on overall satisfaction positively (either ‘completely agree’ or ‘agree’). 12.3% responded negatively (either ‘disagree’ or ‘completely disagree’). Since the question asked in 2012 had a slightly different format it is not possible to directly compare the results between the two surveys. Satisfaction in 2012 was 85% (also greater than in 2019). Broadly speaking, given the change in question format, this indicates that the overall satisfaction/dissatisfaction levels appear similar between 2012 and 2019.

The 2021 Culture of Respect survey³⁵ asked a number of questions related to student satisfaction at EPFL. Students were broadly satisfied with the climate on campus in general (83.2% satisfied, 6.8% dissatisfied), and with their sense of belonging to a community at EPFL (63.1% satisfied, 12.9% dissatisfied). Students were, however, less satisfied with some aspects of campus life. Only 34.7% were satisfied with equality between men and women with respect to scientific careers and administrative and technical roles (45.1% dissatisfied). 53% of students were dissatisfied with measures designed to foster a healthy work-life or study-life balance (24.2% were satisfied). 66.4% of students agreed that academic staff help to shape a positive and enabling environment (while 9.3% disagree with this view). For sections of this survey related to discrimination, harassment and violence, please refer to chapter B.3.

In the academic year 2021–2022, EPFL conducted a survey of alumni who had graduated during the period 2014–2019. Almost all of the respondents indicated that they had sufficient knowledge and skills in basic sciences (mathematics and physics) for their job at the end of their studies. Over 90% indicated that they had sufficient skills in computer science and chemistry for their job at the time of graduation. Similarly high percentages indicated that their proficiency in communication in English, in French, and in oral and written forms was sufficient for their job. However, satisfaction was somewhat lower with transversal skills; over 30% indicated that the curriculum did not prepare them for what their job required in terms of team-working or in taking and giving feedback, while between 20% and 30% indicated that it did not prepare them for what their job required in terms of environmental sustainability and in complying with legal and ethical requirements.

Feedback received by students on specific courses (course evaluation) varies too much over time to be compared and to extract information on individual quality trends. However, viewed at an institutional level, the individual variations level out, and the indicative feedback gives a reasonable indication of overall quality and trends. The students’ overall satisfaction with EPFL courses has been stable for the past 5 years, increasing gradually from 84% in 2017 to 90% in 2021.

³⁴ [Doctoral Surveys EPFL](#)

³⁵ [EPFL Culture of Respect Survey 2021](#)

Key points

- ETH Domain institutions assess the quality of education through diverse processes and with different instruments. This includes monitoring the adequacy of their programmes in relation to labour market demand, the level of satisfaction among students and the attractiveness of the ETH Domain.
- Measures and tools are continuously developed to maintain and/or improve the education offered in the ETH Domain institutions.
- Education programmes allow students to develop the various skills required to help actively shape the future of Switzerland and society in general.
- ETH Domain institutions continue to ensure equity in education with adequate measures. Initiatives are also in place to support prospective students.
- The expected growth in student numbers, as well as developments in teaching and research, is generating an increasing demand for human resources, space, infrastructure and support resources that may be difficult to meet in the medium to long-term. The ETH Domain – and especially its institutions – is actively developing strategies to provide measures and solutions to mitigate the risks that such an increase in student numbers could pose to the quality of education in the long-term.

A.2

Sustainable international positioning

Excerpt from the Mandate

“The ETH Domain aims to maintain its strong international positioning and its close links within the European Research Area even though Switzerland is not a member of the EU and therefore cannot always be guaranteed unrestricted participation in EU research programmes. Does the ETH Domain have the necessary preconditions in place and does it take suitable measures to be able to defend its international position sustainably, to maintain and build partnerships with the best foreign universities and research institutions, and to attract and retain the most talented scientists? Which other strategies could also help to achieve the desired objective?”

Assessment by and considerations of the ETH Board

Assessment: Non-association with Horizon Europe damages the Swiss Higher Education System as well as the ETH Domain's competitiveness. This non-association is already having an impact. Moreover, the ETH Board fears that this will gradually erode the appeal and strong positioning of the ETH Domain's institutions. The ETH Board is supporting the institutions in their efforts to compensate as best as possible for the lack of opportunities for cooperation in the EU Framework Programme for Research and Innovation and to extend their activities to non-European countries.

Considerations: The ETH Domain is very well positioned and integrated in the international research and education landscape. These assets are being challenged by various geopolitical developments. The greatest challenges at the moment lie in securing cooperation with the European Union and preserving the ETH Domain institutions' strong position and close collaboration within the European research and higher education area.

- Switzerland's full association with the EU Framework Programme for Research and Innovation Horizon Europe, Digital Europe, Euratom Research and Training Programme and ITER is central and remains the goal to be pursued.
- Strengthening national measures (transitional and complementary measures) and bilateral and multilateral research cooperation can only partially compensate for the lack of full association with Horizon Europe.
- The ETH Board and the institutions of the ETH Domain continue to emphasise the importance of full association with Horizon Europe in their communications with Federal and European authorities, stakeholders and the public, in outreach activities and actions (see e.g. "Stick-to-science" Initiative, resolution passed jointly with scienceindustries and swissuniversities) and by making use of practical examples demonstrating the consequences of the exclusion.
- Meanwhile, the ETH Board and the institutions encourage their researchers to continue participating as intensively as possible in the Horizon Europe Calls for Collaborative Projects in order to maintain and actively promote the existing networks and, if possible, to establish new ones. The continuation of active participation in European affiliations, forums and panels for science-policy making is important but is increasingly limited.
- The institutions of the ETH Domain continue to foster the following measures to keep themselves internationally attractive within and beyond Europe despite the non-association with Horizon Europe:
 - emphasis on excellence in research and education to achieve impact;
 - attracting and retaining talents (through participation in international networks and by ensuring a critical mass of excellent students, researchers and support staff);
 - continuous upgrades of and investments in national research infrastructures to offer unique resources and services to the national and international scientific communities, as well as significant contributions to international research infrastructures;
 - promotion of initiatives in key areas of international interest (e.g. cybersecurity, space, quantum, AI, energy).

Evidence

Reinforcing the ETH Domain's international presence and collaborations

The ETH Domain institutions' footprint is global, making them an important asset for Switzerland. They are engaged worldwide through many of their activities, from education to research to knowledge and technology transfer. The ETH Domain institutions' global network consists of academic institutions, industry partners, international organisations, NGOs, and media. The institutions continuously reinforce existing alliances, networks and communities and pursue relevant new opportunities, guided by strategic considerations. These include the alignment with their mandate, specific research interests, complementarities and funding prospects while ensuring the reputation of excellence enjoyed by the ETH Domain and Switzerland. In particular, participation in alliances and networks enable the institutions of the ETH Domain to maintain and cultivate international institutional ties with peer institutions with similar visions or in areas of complementary strategic interests. For example, both ETH Zurich and EPFL are affiliated to several university alliances, such as CESAER (Conference of European Schools for Advanced Engineering Education and Research), International Alliance of Research Universities (IARU), IDEA League or EuroTech. ETH Zurich and EPFL are both currently exploring the opportunity offered by the 2021–2027 programme generation of Erasmus+ to become associate partners of new networks within the European Universities Initiative. ETH Zurich joined the Enhance Alliance of ten European technical universities in November 2022. Memberships in alliances are also crucial and of strategic importance to safeguard Switzerland's interest vis-à-vis the EU.

The institutions of the ETH Domain are crucial partners in research infrastructures and networks in the European landscape. Switzerland is involved in all main intergovernmental research organisations in Europe and invests approximately EUR 100m each year³⁶. The ETH Domain institutions participate in most of these organisations. PSI, for example, has a leading role in major European research infrastructure partnerships, such as the League of European Accelerator-based Photon Sources (LEAPS) and the League of advanced European Neutron Sources (LENS). This engagement directly benefits Swiss researchers by representing their interests and competencies in the use of these infrastructures, and complementing what is available in Switzerland. Another example is the European Long-Term Ecosystem Research Infrastructure (eLTER RI) in which WSL participates. Since 2022, Empa has been a member of the Boreal Alliance, a transnational research collaboration network for bio-based materials innovations utilising boreal forest resources. With the non-association of Switzerland to EU programmes, Switzerland cannot continue its participation in the European Strategy Forum on Research Infrastructures (ESFRI) which will hinder the research infrastructure coordination at European level.

Bottom-up activities of individual researchers and units are crucial for the international positioning of the ETH Domain institutions and strengthen their respective global research networks. According to the bibliometric study 2022 of the ETH Domain, 67% of the ETH Domain's publication output between 2009 and 2020 involved international collaborations (cf. chapter C: Bibliometric Study). Researchers from the ETH Domain institutions participate in international research projects, which are often funded by international grants. In the past decade, the EU Framework Programmes for Research and Innovation have been an important source of funding for the ETH Domain institutions (cf. figure 11) allowing their researchers to lead or

³⁶ [Swiss Participation in International Research Infrastructures](#)

participate in large international projects. The possibility to secure prestigious international research grants is an important factor in attracting global talents. Other funding sources for international projects include national agencies, in particular the Swiss National Science Foundation (SNSF) with targeted international programmes, the Swiss Agency for Development and Cooperation (SDC) and other Federal Offices. In addition to their research activities, the ETH Domain institutions' researchers are active and valued members of the international scientific community. For example, they serve as editors or on editorial boards of international journals, as members and officers of international professional societies or as peer reviewers for international organisations, or hold faculty positions at universities abroad (cf. figure 13). Finally, professors, staff and students of the ETH Domain institutions are great global ambassadors, serving as board members in industry and international organisations and hence increasing the visibility of their institutions, of the ETH Domain and of Switzerland.

International cooperation is driven by the further development and strengthening of networks, in particular in Europe, North America and Asia, but also with a view to developments on the African continent. ETH Zurich, for example, is strengthening its commitment on the Asian continent, by leveraging its already strong presence in Singapore (see also chapter B.1.2) and as Leading House Asia³⁷. The institutions of the ETH Domain are also engaged in cooperation on the African continent, in particular in low- and middle-income countries, with initiatives such as Excellence in Africa³⁸ from EPFL or ETH4D³⁹ at ETH Zurich. The institutions of the ETH Domain are likewise active in South Asia through several projects supported, for example, by the SDC. Among other things, this helps the ETH Domain institutions to increase their global visibility, to strengthen intercultural knowledge and to facilitate collaborations as well as to attract the best talents. Within the European Union, ETH Zurich and EPFL recently supported the establishment of the Institute for Computer Science, Artificial Intelligence and Technology (INSAIT) in Bulgaria in collaboration with Sofia University, underscoring Switzerland's commitment to strengthening the European Research Area as an active and reliable partner.

The ETH Domain in the European Research Area

Switzerland and the EU share a long-standing and successful cooperation in the areas of education, research and innovation. Swiss participation in the EU Framework Programmes (FP) for Research and Innovation increases the programme impact and strengthens the European research and innovation landscape. Indeed, projects with Swiss coordination had one of the highest success rates in the context of Horizon 2020 calls for proposals⁴⁰ and thus not only benefited Swiss researchers, but also their project partners. The ETH Domain provides e.g. key technologies for the development of ITER: the Swiss Plasma Center at EPFL operates one of only three Medium-Sized Tokamaks used by EUROfusion. Furthermore, the SULTAN facility at PSI is the only facility able to test the superconducting elements of ITER under real-world conditions. The EU-FP's promotion instruments, in particular ERC grants and Marie Skłodowska-Curie Actions (MSCA) grants, are crucial for the positioning of the ETH Domain institutions, and of Switzerland in general. In Switzerland's current situation of non-association to Horizon Europe, the Swiss Government has established replacement and transitional

³⁷ [Leading House Asia](#)

³⁸ [Excellence in Africa](#)

³⁹ [ETH4D](#)

⁴⁰ [Forschung und Innovation in der Schweiz](#), (German) pages 77 et seq.; [Recherche et innovation en Suisse 2020](#), (French) pages 77 et seq.

measures for ERC and MSCA grants. These are important, but may not be sufficient in the mid- to long-term to retain or attract top-notch researchers striving to collaborate and compete with the best in the respective fields and aiming to contribute to shaping the programmes.

The ETH Domain, together with other institutions of the Swiss higher education landscape, strives to reinforce Switzerland's relationships with international and European institutions and is a driving force in national efforts in key areas affected by the non-association to Horizon Europe and Digital Europe (e.g. cybersecurity, space, quantum, AI, energy). In May 2022 for example, Switzerland signed a Memorandum of Cooperation with the European Space Agency (ESA) for the establishment of a joint Centre of Excellence at PSI (European Space Deep-Tech Innovation Centre, ESDI). The Centre will play a coordinating role and facilitate projects by leveraging existing infrastructures with a network of partners in universities and industry across Europe. Since 2016, EPFL has been coordinating the Swiss research community involved in the Square Kilometer Array (SKA), the largest telescope ever built. Since 2022, Switzerland has been a full member of the SKA Organisation (SKAO). Finally, the institutions of the ETH Domain are helping to ensure continuing access to key international facilities, in particular in Europe. This is for example the case for the Swiss-Norwegian beam-line at the European Synchrotron Radiation Facility (ESRF). Here EPFL took over the coordination of the Swiss participation, thereby guaranteeing access to the facility for Swiss researchers despite discontinuation of financial support at the national level for this endeavour.

The ETH Board, together with other actors in the Education, Research and Innovation (ERI) Domain and the economy, are making major outreach efforts to demonstrate to the public and to politicians how important it is for Switzerland to be associated with Horizon Europe. Together with scienceindustries and swissuniversities, the ETH Board passed a resolution⁴¹ at the beginning of 2022 calling on the Federal Council to renew Switzerland's full association to Horizon Europe and to launch an innovation offensive to preserve the excellence and competitiveness of the Swiss research and innovation cluster. Jointly with ETH Zurich, EPFL, Universities UK, the Wellcome Trust and the Royal Society, the ETH Board launched an online signature campaign⁴² in February 2022 that calls for an open and inclusive European Research Area as an active response to the delayed progression of association agreements with Switzerland and the UK due to political barriers. This "Stick to Science" initiative has been widely supported by the European research community, which is calling for a rapid association of Switzerland and the UK to Horizon Europe.

Attracting and retaining talent and top researchers

Today top researchers and talents in general are solicited globally by universities, private and public research institutions, and increasingly also by industry. The attractiveness of the ETH Domain is the result of the strong emphasis put on academic excellence and academic freedom as well as the unique ecosystem of research infrastructures and platforms provided to its researchers. ETH Zurich and EPFL are ranked regularly amongst the best universities in the world (cf. chapter B.4, figures 19 and 20), and the scholarly impact of the ETH Domain's publications have remained high in the last decade (cf. chapter C: Bibliometric Study). Academic excellence, as well as the presence of top researchers who already study and work

⁴¹ [Horizon Europe Resolution](#)

⁴² [Stick to Science online signature campaign](#)

at institutions of the ETH Domain, are strong assets attracting additional top researchers and talents to Switzerland.

To remain globally competitive and secure its appeal for top researchers and talent, the ETH Domain and its institutions set mid- to long-term strategies in relevant areas of research and education. These are defined using a bottom-up approach with top-down incentives. This includes Strategic Areas (cf. chapter B.2), as well as participation in various national initiatives such as the National Centres of Competence in Research (NCCR) and National Research Programmes (NRP). It also entails the development and continuation of large collaborative initiatives and centres at the national and international level around key topics such as health and personalised medicine, quantum sciences and engineering, artificial intelligence and data science, climate change and the environment, and cybersecurity. These centres and initiatives help to attract the best researchers and provide excellent platforms for the pursuit of fundamental discovery science, the deployment of new, future-oriented study programmes and hence the training of specialists needed in the future for cooperation with business and administration and for interaction with society.

Examples include:

- ETH Zurich’s Quantum Center, ETH Zurich-PSI Quantum Computing Hub and EPFL’s Center for Quantum Science and Engineering; PSI’s Quantum Matter and Materials Discovery Centre (QMMC)
- ETH AI Center, Swiss Data Science Center (with hubs at ETH Zurich, EPFL, PSI), Swiss National Supercomputing Centre (CSCS) of ETH Zurich, EPFL’s Center for Intelligent Systems;
- Strategic Focus Area (SFA) Personalized Health and Related Technologies (PHRT)
- ETH Zurich’s Center for Climate Systems Modelling (C2SM) and EPFL’s Climate Center for Impact and Action (CLIMACT);
- Swiss Support Center for Cyber Security, Cyber-Defense Campus and the Zurich Information Security and Privacy Center (ZISC);
- ETH Zurich’s Center for the Origin and Prevalence of Life.

The ETH Domain also provides a unique ecosystem with state-of-the-art infrastructure for research and teaching, giving scientists from Switzerland and abroad access to unique research opportunities and training and promoting technology transfer through numerous collaborations with industry. The institutions of the ETH Domain play a leading role internationally with regard to the conceptualisation, development and operation of world-class large-scale research infrastructures and platforms, and also ensure their open access for research communities, based on scientific excellence and transparent selection processes. Open access to infrastructures for researchers from around the world is particularly important as it is a reciprocal process and the access to and development of facilities abroad are of great benefit to Swiss researchers. For the period 2025–2028, the ETH Board gives strategic priority to four substantial upgrades of existing large-scale infrastructure projects as well as two new projects, which have been selected for inclusion in the Swiss Roadmap for Research Infrastructure 2025–2028, the Confederation’s central planning instrument for large-scale research infrastructure (cf. chapter B.2). By setting these priorities, the ETH Domain aims to remain relevant and attractive in the national and international research context. Furthermore, the institutions of the ETH Domain play an important role at the European and global level by contributing to international research infrastructures, such as the European-wide greenhouse gas research infrastructure ICOS (Integrated Carbon Observatory System) or the European Spallation Source (ESS) in Lund. Several institutions of the ETH Domain are also participating in other infrastructure projects listed on the Roadmap of the European Strategy Forum on Research Infrastructures (ESFRI).

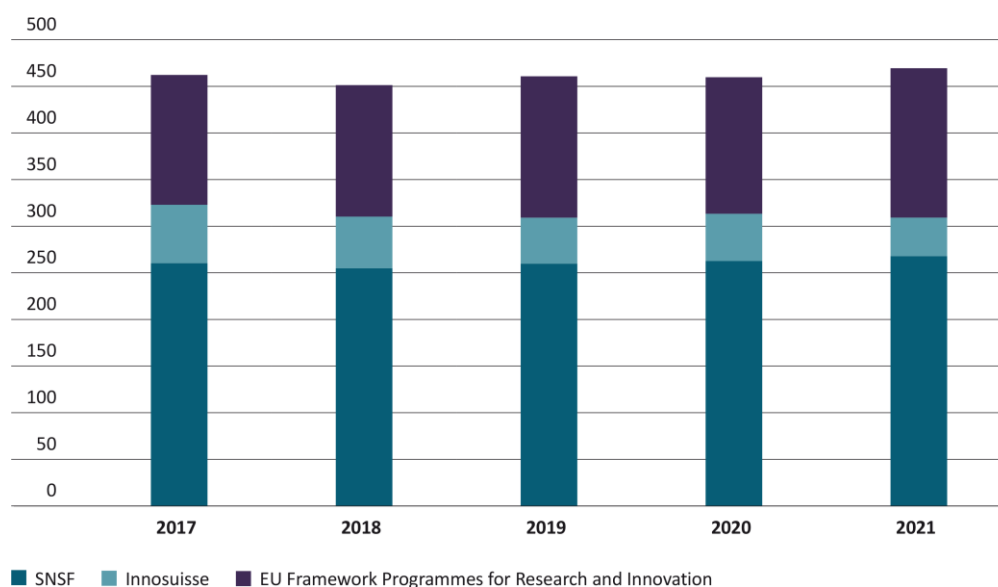
In addition, the ETH Domain institutions provide their researchers with adequate basic funding and resources to pursue their goals in research, education, and knowledge and technology transfer. They support the best researchers, and especially early-career academics, by putting in place a variety of instruments. Examples include the following:

- Competitive funding programmes to promote innovative research such as ETH Research Grants, the ETH Career Seed Award, the ETH Fellowships, the Branco Weiss Fellowships at ETH Zurich or research awards and prizes at EPFL. At PSI, the MSCA COFUND Programme PSI Fellow III-3i enables individual postdoctoral researchers from all over the world to pursue their research career at PSI for two years. At Empa two distinct fellowships for doctoral students and postdoctoral researchers are awarded twice a year: Empa Young Scientist Fellowship and Empa Entrepreneur Fellowship (EEF). With the PSI Research Grants, PSI promotes interdisciplinary, collaborative and transformative research projects involving one early career researcher as principal investigator and at least one more senior co-applicant with complementary skills. Each year, WSL issues an internal call for innovative research and implementation projects that cannot be funded through other channels. This call is open to permanent staff members and staff members employed with a fixed-term contract of at least two years at WSL, which thus also allows early-career scientists to submit proposals. Eawag awards one postdoc scholarship per year for two-year research residencies.
- Support for researchers competing for international funding, for example through the EU Grants Access advisory service jointly run by ETH Zurich and the University of Zurich or the Research Office EPFL;
- The institutions of the ETH Domain offer various mentoring and coaching programmes, in particular for early career scientists.

Facts & Figures

Figure 11: Research contributions SNSF/Innosuisse/EU for the ETH Domain for the period 2017–2021

Research contributions, mandates and scientific services (in CHF millions)



Source: Annual Report of the ETH Board on the ETH Domain 2020, page 87 and Annual Report of the ETH Board for the ETH Domain 2021, page 91

Key points

- The institutions of the ETH Domain are engaged worldwide through many of their activities, from education to research to knowledge and technology transfer.
- Participation in alliances and networks enable the institutions of the ETH Domain to maintain and cultivate international institutional ties with peer institutions with similar visions or in areas of complementary strategic interests. Memberships in alliances are also crucial and of strategic importance to safeguard Switzerland's interests vis-à-vis the European Union (EU).
- The institutions of the ETH Domain are key partners in research infrastructures and networks in the European landscape.
- To remain internationally attractive, it is vital to invest in and continue establishing and expanding cross-disciplinary initiatives and centres in promising areas as well as state-of-the-art research infrastructures that bring together a critical mass of relevant expertise (top researchers and talents).
- The ETH Domain strives to reinforce Switzerland's relationships with international and European institutions. It is a driving force in national efforts in key areas affected by the non-association to Horizon Europe and Digital Europe.

A.3

Good practices in knowledge and technology transfer

Excerpt from the Mandate

“Are the ETH Domain’s institutions making best use of their potential as regards to knowledge and technology transfer for the benefit of Switzerland’s economy and society? Which of the ETH Domain’s current approaches are achieving this aim, and which are capable of improvement? How efficient and effective is the ETH Domain in this area overall? Are there international best practices that could be adopted?”

Assessment by and considerations of the ETH Board

Assessment: The ETH Domain plays a key role in knowledge and technology transfer (KTT) to the benefit of the Swiss economy and society. The ETH Board is of the opinion that the instruments for KTT are comprehensive and of good quality. They need to be steadily developed further in line with external partners' needs. ETH Domain graduates make one of the biggest contributions to the transfer of knowledge and know-how to Swiss industry and society. Although the ETH Domain is training a growing number of people in STEM fields, it cannot meet the Swiss labour market's rising demand for these skills. Given the limits on growth in funding, this is presenting the ETH Domain with major challenges (cf. chapter A.1).

Considerations: The ETH Domain strives to serve Switzerland's society and economy in the best possible way. Knowledge and technology transfer (KTT) is a core element, in addition to excellence in education and research, to strengthen Switzerland's prosperity and competitiveness and to contribute to the sustainable development of society.

The ETH Domain has a wide set of instruments for KTT – including collaboration with industry, the creation of spin-offs, knowledge transfer to the public sector at federal, cantonal and local level, education and continuous education, engagement and dialogue with society – that are strongly supported by the institutions.

- Fundamental discovery science is the cornerstone of all the ETH Domain institutions' activities and forms the indispensable basis for KTT.
- KTT through people is further encouraged and remains the most important way to transfer knowledge (e.g. graduates and interns are important players in KTT by bringing their latest knowledge to the private or public sector they work for).
- Continuing education and retraining of the workforce further contribute to transferring knowledge and technology between academia and practice.
- Entrepreneurial thinking is an important element in education to provide graduates with the skills required to become actors of knowledge transfer between academia and society.
- The ETH Domain institutions support innovation through close collaboration with Swiss-based industries in numerous direct mandates and projects funded by Innosuisse.
- The ETH Domain is successful in creating spin-offs. They have a high survival rate and generate jobs in future-oriented fields. The ETH Board supports initiatives and measures to secure their funding in the particularly challenging scale-up phase.
- The ETH Domain institutions contribute significantly to KTT to the public sector as reliable partners in joint activities and by providing expert opinions and other services in various fields (energy, environment, transportation, public health, security policy, etc.).
- The ETH Board emphasises the dialogue with society through the Strategic Area "Engagement and Dialogue with Society" of its Strategic Plan 2025–2028. Corresponding Joint Initiatives have already been launched in 2022 to strengthen cooperation and coordination between the institutions of the ETH Domain in this most relevant field (cf. chapter B.2).
- The ETH Domain fulfils numerous specific tasks assigned to it by the Swiss Confederation as well as many other services. The transfer of findings from research into applications is continually improving the quality and value of these tasks (e.g. national avalanche warning service, Swiss seismological service, proton therapy, measurement of COVID virus load in waste water), which benefit the economy, society and the environment.
- The ETH Board supports the institutions' active role in the innovation parks of Switzerland Innovation (e.g. Switzerland Innovation Park Innovaare, Switzerland Innovation Park

Zurich, Switzerland Innovation Park Ost, Switzerland Innovation Park Network West EPFL) as well as in the Advanced Manufacturing Technology Transfer Centers (AM-TTC).

- The set of instruments for KTT is continuously adapted through the exchange of good practices in national and international networks and efforts to improve the performance of specific processes.

Evidence

KTT potential of the ETH Domain for the Swiss economy and society

Knowledge and technology transfer (KTT) from the ETH Domain are key factors for innovation and economic growth in Switzerland. The ETH Domain plays a key role in knowledge creation in Switzerland and as such carries great responsibility for the management of its knowledge. Knowledge is a public good and its responsible management covers two important features. First, to distribute knowledge to the greatest possible extent in order to allow a continuous flow and creation of further knowledge. Second, to put knowledge to practical use by industry, public administration and society at large in the form of innovation and expertise. Know-how, patents, licensing and the creation of spin-off companies are key elements in this continuous flow of knowledge and innovation⁴³.

The ETH Domain's graduates make one of the biggest contributions to the transfer of knowledge and know-how to Swiss society when they take on professional activities in the private or public sector. In 2021, ETH Zurich and EPFL awarded 3,898 Master's and 1,257 doctoral degrees and 304 MAS/MBA degrees⁴⁴. Specifically in STEM fields, ETH Zurich and EPFL train a large proportion of the graduates of Swiss universities and these graduates are in high demand on the labour market (cf. chapter A.1, figures 6, 7 and 8). Various continuing education programmes and courses to retrain the workforce further contribute to transferring knowledge and technology between academia and practice (cf. chapter "Retrospective", recommendation #2). In addition, members of the ETH Domain institutions share their expertise and knowledge by consulting and participating in advisory and scientific boards, as well as serving on national task forces.

Manifold good practice examples in the field of knowledge and technology transfer can be found at all ETH Domain institutions. A selection of such examples from collaborations with industry, as well as spin-offs, knowledge transfer to the public sector and tasks assigned to the ETH Domain serving the economy, society and the protection of the environment are listed in the Facts & Figures section. A synthesis deriving from these examples is presented in the following.

Collaboration with industry

Collaboration with industry is one important element of knowledge and technology transfer. In such collaboration, the institutions of the ETH Domain rely on a set of good practices, which include the following activities and services:

- Long-term framework agreements with large enterprises (e.g. the ETH Zurich agreements with Roche in the areas of translational bioengineering and translational models and therapies, the Disney Research Zurich, the Microsoft Mixed Reality & AI Lab Zurich, or the strategic partnership with Clariant for catalysis).
- Management of industry relationships under the responsibility of senior management staff representatives (e.g. the responsibilities of the EPFL Vice President of Innovation).

⁴³ The recent numbers for patents, licenses and spin-offs for the ETH Domain are presented in figure 12. These and further data on technology transfer activities from the two schools and three of the ETH Domain's four research institutes are also included in the [swiTT annual report](#).

⁴⁴ [Annual Report of the ETH Board for the ETH Domain 2021](#), page 95

- Establishment of public-private partnerships and special committees to facilitate industry collaboration (e.g. Empa's engagement for Innosuisse with the "Remask" project in the context of the COVID pandemic and its partnership with swissM4M PPP, ETH's engagement at Innovationpark Zürich for new ways of technology transfer, or the Binnig and Rohrer Nanotechnology Center research facility jointly operated with IBM).
- Technology transfer centers with embedded peer level services to facilitate transfer of scientific know-how to industry (e.g. ANAXAM within Switzerland Innovation Park Innovaare by PSI).
- Organisation of joint events with industry leaders and researchers (e.g. the ETH Zurich Industry Day, ETH Meets Davos).
- Flexibility in the focus of research according to market expectations, societal needs and global challenges (e.g. all COVID pandemic-related research activities).

Spin-offs

Innovative product ideas and the resulting companies that bring these ideas to the market are an important factor in Switzerland's economic development that strengthens its innovative capacity. According to the definition applied in the ETH Domain, a spin-off is a company that emerges based on the intellectual property of an institution in the ETH Domain and that is founded by employees or students as part of their work at this institution⁴⁵. A prerequisite for such companies is a solid and sustainable business idea or business plan. Spin-off companies are a key instrument when it comes to translating research results into business practice. The ETH Domain has a successful track record of spinning off new ventures from research findings that were generated within the ETH Domain (cf. e.g. the ETH Zurich spin-off study⁴⁶).

Regarding the creation of spin-offs, a number of specific programmes and centers have been established to promote awareness of entrepreneurship and to support new spin-offs:

- Translational centres dedicated to research in a specific field (e.g. the Wyss Zurich Translational Center, a joint accelerator of the University of Zurich and ETH Zurich).
- Support programmes for incubating innovative ideas (e.g. the glatec business incubator with Empa and Eawag or the European Space Agency - Business Incubation Center Switzerland at ETH Zurich, open to Swiss start-ups).
- Business accelerators for fast deployment and successful market launch (e.g. the Blaze accelerator with EPFL).
- Dedicated spin-off licensing, equity and compliance support (e.g. the spin-off licensing, equity, and compliance group (SLEC) with ETH Zurich).
- Dedicated support for entrepreneurship, including finance and coaching (e.g. under the Pioneer Fellowship programme at ETH Zurich and the PSI Founder Fellowship programme).
- Business training programmes for potential entrepreneurs and assistance on the path to funding (e.g. the Changemakers programme with EPFL or the CAS Entrepreneurship at ETH Zurich as part of the offering for Pioneer Fellowships and other interested people).
- Promoting entrepreneurship among students (ETH Entrepreneurclub, ETH Student Project House, ETH juniors).
- Dedicated lab and office space for entrepreneurs and spin-offs (ETH Innovation and Entrepreneurship Labs, ieLabs).

⁴⁵ Contrary to spin-off companies, start-up companies are those companies that work with or are supported by institutions in the ETH Domain but have not emerged from them in the form of IP of an ETH Domain institution.

⁴⁶ [The Performance of Spin-Off Companies at the Swiss Federal Institute of Technology Zurich](#)

Knowledge transfer to the public sector

The institutions of the ETH Domain contribute significantly to knowledge transfer to the public sector (with federal, cantonal, local authorities and international organisations). The ETH Domain institutions are important partners for the Federal Offices and for the cantons (e.g. in the areas of energy, environment, transportation, public health, security policy, etc.). As reliable partners in joint activities, experienced staff of the ETH Domain institutions provide expert opinions and other services in exchanges with public sector institutions. Knowledge transfer to the public sector occurs through a diverse set of good practices, many of which are strongly stakeholder-centered:

- Policy hubs for inquiries and support of researchers engaging with policymakers (e.g. ETH Zurich's Science-Policy Interface, coordinating activities and supporting researchers in their engagement with policymakers).
- Thematic centres for knowledge and technology transfer and continuing education as a form of technology transfer to the public sector (e.g. the Institute of Science, Technology and Policy at ETH Zurich, the Center for Digital Trust with EPFL).
- Engaging in or hosting consortia including partners from the public sector in order to fulfil policy-driven mandates from the Swiss Confederation (like the Empa engagement with "Verein zur Dekarbonisierung der Industrie").
- Building a long-term relationship of trust with stakeholders and engaging with the public sector at different government levels together with the private sector in order to develop best practice solutions for the protection of public goods (like in the case of Empa Academy).
- Establishment of demonstrators to make research findings more tangible and visible to society (like NEST at Empa and Eawag, move at Empa or the Energy System Integration Platform at PSI).

Tasks assigned to the ETH Domain by the Swiss Confederation and other tasks serving the economy, society and the protection of the environment

The ETH Domain fulfils numerous tasks serving the economy, society and the protection of the environment. Tasks assigned to the ETH Domain by the Swiss Confederation meet specific criteria and are listed in the Appendix to the Strategic Objectives of the Federal Council for the ETH Domain for the period 2021–2024. In addition, the ETH Domain fulfils other tasks by providing scientific services and research infrastructures of national interest. These tasks, services and research infrastructures benefit from proximity to research in the ETH Domain that ensures their quality and science-based continuous development. Knowledge and technology transfer is one important feature that takes place in different ways:

- Providing suitable access models for industrial users of large research infrastructures of the ETH Domain (e.g. the research infrastructures SLS, SwissFEL and SINQ with PSI).
- Operation of national competence centres providing advisory services to Swiss stakeholders (e.g.: WSL fulfils several societal tasks in the fields of forest protection, plant health in the forest and avalanche warning).
- Providing scientific services in fulfilling legal mandates conferred upon individual institutions of the ETH Domain (e.g. the Center of Security Studies at ETH Zurich).
- Science-based development of quality and technology standards in the public interest (e.g. Empa testing standards for masks during the COVID pandemic).

International good practices

The ETH Domain institutions are engaged in various national and international KTT networks where they contribute to, exchange, and learn about new good practices in tech transfer.

Such organisations include e.g. the Swiss Technology Transfer Association (swiTT), the Association of Science and Technology Professionals (ASTP), the European Community Joint Research Centers Tech Transfer Office Circle (EC-JRC-TTO Circle) or the Association of University Technology Managers (AUTM). These dynamic networks cover the exchange of good practices in the full spectrum of technology transfer from research collaborations to intellectual property protection, licensing, spin-offs and equity.

At ETH Zurich several good practices have been adopted, including the establishment of a professional expert team for export control of technological goods, the clear separation of support activities for spin-offs and licensing activities to such spin-offs, the establishment of clear regulations and the implementation of a strict process for the management of potential conflicts of interest, as well as conflicts of commitment and reputational risks of professors engaging in the foundation of spin-offs.

Exchange of good practices leads to institutional principles or standardised rules for collaborations with industry or licenses. Empa, for example, has elaborated collaboration models to facilitate collaboration with industry. Intellectual property principles for funded research⁴⁷ projects as well as general terms and conditions for research are published on the internet.

Possible improvements

The performance of the ETH Domain institutions in the field of knowledge and technology transfer is exemplary and their expertise is in high demand, as shown by the many visits from other universities, research institutions and governments. The proposals for possible improvements mentioned here do not derive from practical shortcomings but are the expression of a continuous effort to enhance performance for specific KTT processes.

A standard (default) inter-institutional agreement across the ETH Domain for the sharing of IP ownership and IP protection and exploration, as well as use rights to cover the 'default' situation could be valuable to avoid situations where there is no clear agreement. An alternative would be an ETH Domain template. This would still allow the institutions to create inter-institutional agreements to fit their needs. Another option would be the establishment of a common template for Non Disclosure Agreements (NDAs) for the ETH Domain.

In a recent position paper, the Federal Department of Economic Affairs, Education and Research ('Umsetzung Prüfauftrag zur Beschleunigung der Wissensnutzung', June 2022) proposes the development of nationwide guidelines for the handling of intellectual property by universities and research institutes (maximum and minimum values for licence fees, profit sharing, role of stakeholders, options for patent transfer, etc.).

The ETH Domain institutions, like most public research entities, are in a weak position when it comes to defending their patent portfolios against infringement. The institutions typically solve infringements by seeking amenable agreements. However, in case the infringing party is not interested there are only limited resources available for legal action. With small companies, this is typically not a problem, but with larger international companies that have the potential to litigate, the resistance to reaching an agreement is much greater. A credible public statement of the ETH Domain's readiness to defend its IP rights would be of great value.

⁴⁷ [Intellectual property principles for funded research](#)

Credibility might be supported by a litigation fund or an umbrella insurance for patent litigation at the ETH Domain level.

The licensing principles of the US Association of University Technology Managers (AUTM) ('nine points to consider in licensing university technology') may serve as a further model for international good practice.

The loss of potential spin-offs due to international entrepreneurial minds leaving Switzerland because of the difficulties in obtaining a residence permit is an economic loss for Switzerland. International students could be given an interim status that would allow them a grace period for starting up companies within Switzerland.

Facts & Figures

Figure 12: Knowledge and technology transfer in the ETH Domain

	2017	2018	2019	2020	2021
Invention disclosures	343	358	329	310	330
ETH Zurich	171	205	159	165	169
EPFL	134	119	132	107	121
Research institutes	38	34	38	38	40
Software notifications¹	26	36	40	32	39
ETH Zurich	20	19	26	18	24
EPFL	6	13	13	14	12
Research institutes	0	4	1	0	3
Patents	206	230	224	217	213
ETH Zurich	84	109	102	115	99
EPFL	95	95	98	75	88
Research institutes	27	26	24	27	26
Licences²	377	341	324	338	181
ETH Zurich	82	87	62	43	27
EPFL	50	39	50	53	40
Research institutes	245	215	212	242	114
Spin-off	48	55	59	66	60
ETH Zurich	25	27	30	34	25
EPFL	15	25	23	25	32
Research institutes	8	3	6	7	3

¹ Open Source Software not included.

² The definition of licences was revised in 2021. This category no longer includes contracts with prior IP transfer and contracts for software licences of less than CHF 1,000. This should be taken into account when comparing with the figures for previous years. Without this change, the total number of licences would have been 406 in 2021.

Source: [Annual Report of the ETH Board for the ETH Domain 2021](#), page 97

Examples of collaboration with industry

ETH Zurich

- The Vice Presidency for Knowledge Transfer and Corporate Relations (since 2021) is responsible for strategic guidance and forging links between ETH Zurich and technology transfer partners.
- 2022 signing of two agreements with Roche in the areas of translational bioengineering and translational models and therapies.
- The Industry Day held every year at ETH Zurich connects more than 500 industry leaders and ETH Zurich researchers.
- Partnership agreement between ETH Zurich and UBS in the area of Entrepreneurship and STEM support.

EPFL

- Vice President of Innovation (VPI) manages the relationship with industry, start-ups, NGOs and the government.
- Launch of the ‘Key Account Management’ service for companies installed at the EPFL Innovation Park to help them develop new research collaboration ventures with EPFL's laboratories and EPFL spin-offs.
- Swiss Data Science Center, a joint venture between EPFL, ETH Zurich and PSI, collaborates successfully with 17 leading Swiss companies, such as Swisscom, Romande Energie, Bühler, Roche, Logitech, Firmenich and Richemont.

PSI

- The dedicated peer-level service offered by ANAXAM, the recently founded technology transfer centre within the new Switzerland Innovation Park Innovaare, has opened the door to making PSI's capabilities more accessible to SMEs.
- Examples include neutron diffraction and synchrotron-CT for CondensZero GmbH and manufacturing process for electric motors for Leister Technologies. The pilot plants ‘Ganymeth’ for methanation and ‘HydroPilot’ for hydrothermal gasification have achieved sufficient technology maturity to allow industrial partners to take the next step.

Empa

Formation of clusters, public private partnerships and consortia to collaborate with partners from science and industry. Examples include:

- ‘Verein zur Dekarbonisierung der Industrie’ and collaboration in hydrogen energy with the Tech Cluster Zug AG.
- Empa is the leading house in Advanced Manufacturing, a strategic initiative of the ETH Domain which supports and co-funds the establishment of Advanced Manufacturing Technology Transfer Centers (AM-TTC) as public-private partnerships in Switzerland.

Eawag

- Development of a modern urine separation toilet (Save!) with Laufen.

Examples spin-offs

ETH Zurich

- As of May 2022, procedures for licensing intellectual property to spin-offs have been streamlined; a dedicated Spin-Off Licensing, Equity, and Compliance (SLEC) group takes care of the specific needs.
- In 2022, establishment of the new ETH Entrepreneurship unit dedicated uniquely to coordinating and supporting all aspects of community entrepreneurship.
- As the joint accelerator of the University of Zurich and ETH Zurich, the Wyss Zurich Translational Center fosters translational research in the fields of regenerative medicine, robotics and hybrid technologies and aims to establish world class spin-offs in these fields.

EPFL

- Support for new ventures specifically addressing the student community and recent engineering graduates, in addition to the researcher community. The Changemakers programme incubates innovative ideas and the Blaze Accelerator forwards fast-deploying spin-offs to incorporation and successful market launch.
- The “Enable” programme offers a dedicated platform for collaboration between researchers and entrepreneurs.

PSI

- The PSI Founder Fellowship (PSIFF) programme provides dedicated support for entrepreneurship and the creation of spin-offs.

Empa

- The business incubator glatec supports spin-offs and high-tech start-ups by providing space, coaching, funding (loan or convertible loan) and access to research groups, experts and investors. An impressive number of companies was successfully incubated in the last few years. Examples include Compliant Concept AG, IRsweep AG, Carbo-Link AG, MIRO Analytical AG, Sympheny AG, and Viboo AG. Many have become established companies or have been sold to larger corporations. Since 22021, Empa has been partner of Switzerland Innovation Park Ost.

Eawag

- With support from glatec (joint business incubator with Empa), various spin-off companies were founded in the areas of sanitation, behavioural change and analytics (biological, toxicological and gas).

Examples of knowledge transfer to the public sector

ETH Zurich

- More than 400 exchanges per year between ETH community members and cantonal, federal and international policymakers, including support by ETH Zurich scientists for the Swiss National COVID-19 Science Task Force and the Center for Security Studies (CSS) for analysis of the war in Ukraine.
- September 2022: establishment of a Science-Policy Interface at ETH Zurich as central point of contact for inquiries, coordinating activities and supporting researchers in their engagement with policymakers.

EPFL

- The Center for Digital Trust (C4DT)⁴⁸ brings together 20 partners, 37 laboratories, civil society, and policy actors. C4DT is supporting the public sector by acting as an expert and facilitating technology transfer in domains such as privacy protection and security, democracy and humanitarian assistance and critical infrastructures. EPFL and the Cyber-Defence (CYD) Campus of Armasuisse have jointly launched the 'CYD Fellowships – A Talent Program for Cyber-Defence Research'.

PSI

- Support in understanding the mechanisms involved in the spread of COVID-19 through aerosol dispersion and with accelerating the development of vaccines through the sharing of knowledge about the Sars-CoV-2 pathogen.
- Support with the energy transition via participation in several new project networks (SFOE SWEET and Innosuisse Flagship).

WSL

- Many of WSL's activities target practitioners in Switzerland at different levels, from the federal to the cantonal and community level, as well as those in the private sector. WSL has established a relationship of trust with its stakeholders over many years.

⁴⁸ [Center for Digital Trust \(C4DT\)](#)

Empa

- Demonstrators such as NEST and move enable Empa to attract a large number of visitors (some 12,000 per year).
- During the COVID pandemic, Empa facilitated the development of non-pharmaceutical measures such as textile-based face masks and interlinking industry with academia and regulators to set the European standard for the novel 'community masks': the Swiss guidance document SNR30000 defining minimum specifications for community masks.
- Empa Academy⁴⁹ is an established technology transfer platform, also including public sector representatives.

Eawag

- Eawag has long-established collaborations with practitioners in governmental organisations and cantonal authorities.

Examples of tasks assigned to the ETH Domain by the Swiss Confederation serving the economy, society and the protection of the environment ⁵⁰

ETH Zurich

- The Swiss Seismological Service (SED)⁵¹ at ETH Zurich is the federal agency for earthquakes. Its activities are integrated in the federal action plan for earthquake mitigation.
- The *Atlas of Switzerland* (AdS), developed at ETH Zurich's Institute of Cartography and Geoinformation, has been the official Swiss national atlas since the Federal Council decision of 1961. It shows phenomena and structures, as well as processes and changes, relating to all the various aspects and gives readers access to topics such as society, the economy, history, nature and the environment.
- ETH Zurich's Swiss Economic Institute (KOF) provides forecasts and a broad portfolio of indicators which are used to monitor the Swiss economy. In addition, KOF analyses the innovation activities of Swiss companies, publishes studies on the labour market and healthcare spending, and comments on the latest economic developments.

EPFL

- Coordination of several projects financed by the Federal Roads Office to improve the resistance and safety of road structures in Switzerland.
- Launch of several research projects funded by the Federal Office for the Environment on air and water contamination or climate change policy in Switzerland.

PSI

- The Center for Proton Therapy (CPT), together with hospital partners, continuously is steadily advancing spot-scanning technology. CPT treats over 300 cancer patients per year.
- The Center for Radiopharmaceutical Sciences (CRS), as a joint endeavour between PSI and ETH Zurich and in close collaboration with the University Hospital in Zurich, develops radiopharmaceutical agents for targeted cancer diagnosis and therapy.

⁴⁹ [Empa Academy](#)

⁵⁰ In addition to those already mentioned in the annex to the Strategic Objectives of the Federal Council for the ETH Domain 2021–2024.

⁵¹ [Swiss Seismological Service \(SED\)](#)

WSL

- WSL performs several societal tasks in the fields of forest protection, plant health in the forest and avalanche warning.

Empa

- Empa supports the Noise Abatement Division of the Federal Office for the Environment in various research and development projects and service contracts.

Eawag

- The Swiss Centre for Applied Ecotoxicology (Ecotox Centre) of Eawag and EPFL detects and assesses the environmental effects of chemicals and develops strategies for minimising the associated risks.

Key points

- Collaboration with industry – through long-term framework agreements, public-private partnerships, technology transfer centres and dedicated events – is one important element in knowledge and technology transfer at all institutions of the ETH Domain.
- The ETH Domain institutions partner closely with Swiss-based industries for performing research in strategically relevant fields. The ETH Domain has a successful track record in spinning off new ventures from research findings.
- The institutions of the ETH Domain contribute significantly to knowledge transfer to the public sector at federal, cantonal and local level in Switzerland.
- Serving the economy, society and the protection of the environment, the ETH Domain performs numerous tasks assigned to it by the Swiss Confederation as well as further tasks of national interest.
- The ETH Domain institutions are (pro)active in communication with stakeholders and society, delivering immense know-how and educating large numbers of highly qualified graduates.

B

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B.1

The ETH Domain's structure, organisation, governance and associated locations

Excerpt from the Mandate

“To what extent do its current structure, organisation and governance assist the ETH Domain to fulfil its mandate effectively and efficiently and to position itself optimally for the future while still being able to react agilely to changing conditions and future challenges? Could changes to its structure, organisation and governance bring about improvements from an overall perspective (ETH Domain, owner)? Are there international examples that – adapted where appropriate – could serve as role models for the ETH Domain? Moreover, is it clear that the ETH Board strategically plans the national and international locations of the ETH Domain rather than making decisions based on opportunities?”

The chapter is divided into two subchapters: B.1.1 – The ETH Domain's structure, organisation and governance, and B.1.2 – The ETH Domain institutions' associated locations.

Assessment by and considerations of the ETH Board

B.1.1 The ETH Domain's structure, organisation and governance

Assessment: The ETH Domain needs to improve flexibility to respond swiftly to new challenges. The ETH Board strives to ensure that the ETH Domain is an organisation that meets future needs, promotes complementarity as well as collaboration, and benefits from synergies. The ETH Board is therefore examining whether this objective can be met with the present structure, or whether an alternative structure would be a better fit for purpose.

Considerations: The structure, organisation and governance of the ETH Domain has evolved historically and in line with the needs and developments of education, research and knowledge and technology transfer in order to best serve society and the economy.

- The ETH Domain has shown in the past that it functions well. In view of increasing global competition and scientific and societal challenges, the higher education sector operates in an environment of continuous change. Thus, the question arises as to what extent the structure of the ETH Domain is flexible enough to align itself in a timely and optimal manner. The considerations regarding the optimal organisational structure of the ETH Domain build on the following key principles:
 - best serve Switzerland, responding to the needs of society
 - remain/become highly agile and responsive
 - be able to adapt quickly to changing environments, new challenges and opportunities, and increasing complexities
 - promote synergies and bundle competencies, especially in the Strategic Areas as defined in the Strategic Plan 2025–2028, and in the development and operation of research infrastructures of the ETH Domain
- In the course of reviewing the ETH Domain's structure in the light of increasing global competition and scientific and societal challenges, the ETH Board has set out the various available options. The first step in this process is to develop a common view and evaluate the initial situation, taking account of the ETH Domain institutions' own priorities.
- The progress of the structural review process for the ETH Domain will be presented to the Expert Committee in March 2023.

B.1.2 The ETH Domain institutions' associated locations

Assessment: The ETH Board welcomes the fact that the institutions maintain associated locations and thereby contribute to regional development and generating synergies. In the strategy it has developed, it has defined criteria for the establishment, evaluation, renewal or closure of the locations less than fifteen years old. Not all of these locations meet the newly defined criteria; decisions regarding the future of these sites will need to be made.

Considerations: The Strategy for the ETH Domain institutions' associated locations working with cantonal or international partners responds to the experts' recommendation of the 2019 Intermediate Evaluation and the corresponding Strategic Objective 2021–2024 of the Federal Council for the ETH Domain.

- The Strategy provides the ETH Board and the ETH Domain institutions with guiding principles for strategic decision-making related to associated locations by defining such locations

and the criteria for opening and closing locations, including approval by the ETH Board, and evaluation processes, as well as internal and external communication.

- The ETH Board expects the institutions to implement the Strategy both for the locations less than fifteen years old and the potential future associated locations.

B.1.1 The ETH Domain's structure, organisation and governance

Evidence

The ETH Domain's structure

The ETH Domain currently consists of the two Federal Institutes of Technology – ETH Zurich and EPFL – as well as the four research institutes, namely PSI, WSL, Empa and Eawag. Under the ETH Act, these six institutions are autonomous federal institutions with a legal personality. The Federal Assembly can decide on the creation and abolition of research institutes by means of an ordinance. The current structure of the ETH Domain is the result of developments over the past decades. In 1960, the research institutes were an integral part of ETH Zurich. In 1970, they became subsidiary institutes of ETH Zurich. Then finally, in 1992, the owner decided to make them independent research institutes. This complex system whereby the six institutions are woven into the ETH Domain has proven very successful; the ETH Domain has shown in the past that it functions efficiently and that it is effective. At the same time, the higher education sector operates in an environment of continuous change and the ETH Domain's structure must allow for flexibility in order to align itself in a timely and optimal manner with changing requirements. Only then will the ETH Domain be able to maintain its very high standards in education, research and innovation for the benefit of Switzerland.

In its strategic objectives for the ETH Domain for the period 2021–2024, the Federal Council expects the ETH Board to review the ETH Domain's structure in view of increasing global competition as well as economic and societal challenges. Over the last decades, the ETH Domain has made organisational adjustments whenever they promised to facilitate and improve its ability to deliver on its stated mission. It shall continue to do so as necessary and in order to align with its strategy. Accordingly, the organisational development of the ETH Domain is a central pillar of the Strategic Plan 2025–2028 of the ETH Board for the ETH Domain⁵².

In the course of reviewing the ETH Domain's structure in the light of increasing global competition and of scientific and societal challenges, the ETH Board has set out the various available options. The first step in this process is to develop a common view and evaluation of the initial situation, taking account of the ETH Domain's own priorities. The progress of the structural review process for the ETH Domain will be presented to the Expert Committee in March 2023.

In parallel, the ETH Domain is evaluating the future of the strategic initiatives and research infrastructures that were supported in the past ERI periods. Whether consolidation of such activities should take place within the existing Domain structure or whether adjustments to the current organisation are needed must be determined on a case-by-case basis. Finally, the ETH Domain needs to remain responsive to possible initiatives and developments emanating from other parts of the Swiss ERI system, to requests and needs raised by the Swiss Confederation, and to strategic developments that emerge “bottom-up” from within the ETH Domain and its institutions themselves (such as Joint Initiatives within Strategic Areas, cf. chapter B.2, or the initiative “ENRICH – Engagement 4RI for Switzerland”, see below).

⁵² [Strategic Plan 2025–2028 of the ETH Board for the ETH Domain](#), pages 46–48

ENRICH – Engagement 4RI for Switzerland

The four ETH Domain research institutes (4 RI) complement ETH Zurich and EPFL and seek to further strengthen this complementarity through the bottom-up ENRICH initiative launched at the beginning of 2021.

ENRICH aims to strengthen the dynamic, mission-oriented collaboration of the 4 RI in the ETH Domain and with partners from academia, industry, public authorities and society. The 4 RI develop and operate research infrastructures, sensor networks and technology as well as data and information platforms for this collaboration and for the benefit of Switzerland. The strengths of the 4 RI are complementary and synergetic to ETH Zurich and EPFL, the cantonal universities and the universities of applied sciences.

Based on the complementarities of the 4 RI to the outside world and the commonalities between them, the following concrete collaboration projects have been identified.

"Academy4Four" aims to combine continuing education and training as a joint venture of the 4 RI (as with the joint library service Lib4RI) for both staff and external customers. The scientists of the 4 RI would benefit from a wide range of in-house training in leadership, management, science organisation, scientific integrity, safety, radiation protection, etc. A common platform of the 4 RI (working title "Lead Campus", roll-out 2023) will provide customer-oriented, high-quality topic-specific continuing education and training in a highly efficient manner. Employees of the 4 RI as well as external customers will be able to expand their competencies and create added-value both for themselves and for their institute or company.

"Swiss Sensor Net" aims to strengthen the joint position of the 4 RI in the field of sensor application and development and to increase the corresponding visibility of the 4 RI in this field. It enables faster progress in sensor application through joint projects and promotes the development of advanced sensor technologies by bringing sensor developers and sensor users directly together. Activities include a "marketplace" where developers (mainly PSI and Empa) and users (Eawag and WSL) meet, and two subgroups on data management and low-power sensor networks.

"Net Zero" aims to combine the skills and capacities of the 4 RI to develop solutions for transforming our society towards net zero CO₂ emissions. It facilitates a common vision and provides additional momentum for research and technology transfer. "Net Zero" enables the 4 RI to efficiently exchange knowledge and to pool competencies and common interests, including in their offer to collaborate with partners outside the ETH Domain or with the two Federal Institutes of Technology (especially, but not exclusively, in the framework of the Strategic Areas "Energy, Climate and Environmental Sustainability" and "Engagement and Dialogue with Society").

ENRICH is an important strategic collaboration initiative at top management level and has also led to common positions of the 4 RI on topics such as "Data", "Health", "Strategic Staffing", which are relevant not only for the 4 RI, but for the entire ETH Domain.

Facts & Figures

The strong ties within and beyond the ETH Domain in education and research are reflected, among other things, in the joint professors and senior lecturers between the institutions (cf. figure 13).

Figure 13: Joint professors and senior lecturers between the research institutes and ETH Zurich or EPFL and other Swiss and international universities

		ETH Zurich	EPFL	Other Swiss Universities	Universities of Applied Sciences	International Universities
Eawag	Professors (tenured)	8	3	4	1	1
	Assistant professors (tenure track and non tenure track)			1		
	Adjunct professors	8	1	3		3
	Senior lecturers	6		1		
Empa	Professors (tenured)	7	1		2	3
	Assistant professors (tenure track and non tenure track)	1				3
	Adjunct professors	8	2	6		5
	Senior lecturers	1		2		
WSL	Professors (tenured)	1	1	1		3
	Assistant professors (tenure track and non tenure track)	2	1			1
	Adjunct professors	7		2		9
	Senior lecturers	3		3		
PSI	Professors (tenured)	14	8	7	1	
	Assistant professors (tenure track and non tenure track)	1	1	3		
	Adjunct professors	6	5	9		4
	Senior lecturers	5	2	4		1

Figure 13 presents all joint professors (full, associate, assistant, adjunct) and senior lecturers (including only Privatdocents at Empa) between the research institutes and ETH Zurich and EPFL and other Swiss and international universities as of December 2021 (in headcounts). The directors of the research institutes are joint professors at ETH Zurich and EPFL and thus counted at each school.

There are 86 joint professors and 17 senior lecturers between the research institutes and ETH Zurich and EPFL. Between the research institutes and other Swiss universities, universities of applied sciences and international universities, there are 72 professors and 11 senior lecturers.

Key points

- The structure, organisation and governance of the ETH Domain evolved historically and was shown to function efficiently and be effective.
- This structure is reviewed in the light of increasing global competition and of scientific and societal challenges.
- The progress of the structural review process will be presented to the Expert Committee in March 2023.
- The bottom-up ENRICH initiative launched by the four research institutes (4 RI) in 2021 strengthens the dynamic, mission-oriented collaboration of the 4 RI in the ETH Domain and with partners from academia, industry, public authorities and society.

B.1.2 The ETH Domain institutions' associated locations

Evidence

Over the past fifteen years, the ETH Domain – mainly EPFL and ETH Zurich – has developed long-term partnerships with several Cantons and with government authorities abroad. In this context, ETH Zurich and EPFL have established a durable and sizeable academic presence and activity at the respective sites. These associated cantonal or international locations are an integral part of the academic strategy of their parent institution, namely the six institutions of the ETH Domain, and contribute to the strength and positioning of the ETH Domain.

Based on the recommendations of the experts of the 2019 Intermediate Evaluation, the Federal Council formulated a mandate to develop a strategy for cooperation and locations of the entire ETH Domain in its Strategic Objectives for the ETH Domain for the period 2021–2024, specifically “the Federal Council expects the ETH Domain to develop a strategy for branches with cantonal or international partners, and to evaluate the existing facilities periodically” (sub-objective 5.6).

Mandate of the ETH Board for a strategy

To achieve the objective of the Federal Council, at its meeting of 19/20 May 2021 the ETH Board mandated the institutions to constitute a working group charged to develop a coherent strategy for the cantonal/regional and international presence of the ETH Domain. The working group submitted the “Strategy for ETH Domain institutions' associated locations, working with cantonal or international partners” (thereafter: “strategy on associated locations”) for a first reading at the ETH Board meeting of 8/9 December 2021 and – after an internal consultation in the ETH Domain – for a second reading at the ETH Board meeting of 18/19 May 2022 at which the ETH Board adopted the strategy⁵³.

Main outcomes and conclusions of the strategy on associated locations

The strategy on associated locations responds to the Strategic Objectives of the Federal Council for the ERI period 2021–2024 and also provides an exhaustive response to the respective recommendation of the 2019 Intermediate Evaluation. The contributions of the strategy on associated locations are multiple.

The strategy defines the “**associated locations**” within and outside Switzerland.

Within Switzerland, a location of the ETH Domain has the following characteristics:

- a durable physical representation of the parent institution in addition to its main location;
- the need and existence of a local operational management;
- full academic and administrative subordination to the parent institution;
- a separate financial management for reporting purposes, consolidated with that of the parent institution;
- the operation under the name and brand of the parent institution.

Outside Switzerland, an (international) location also presents the following aspects:

- a legal structure compatible with the Swiss legislation and approved by the ETH Board;
- the possibility to enter into contracts locally (regarding employment, insurance, etc.).

⁵³ [Strategy for ETH Domain institutions' associated locations working with cantonal or international partners](#)

The strategy on associated locations indicates the processes and **criteria for the opening (and closing)** of associated locations, which refer to:

- academic considerations;
- the structure (name, agreement, and duration of a location);
- the management (own management and management in relation with the parent institution);
- finance and infrastructure (ownership, financial plan, infrastructure costs);
- the environment and partners (legal and standard aspects).

As a corollary to these criteria, the strategy aims to systematically provide **advance information** at the Domain-level for strategic discussions at the ETH Board level to ensure timely decisions before opening (and closing) an associated location.

The **processes for periodic evaluations** are also defined by the strategy. The latter recommends 2-3 evaluations over the first 6-year initial phase, followed by evaluations of the location by the parent institution at regular intervals and with reporting to the ETH Board. The strategy also includes specific evaluations of the location, e.g. in the context of contract renewal and including analysis of real estate or risk analysis when needed.

The strategy on associated locations emphasises the importance of **good communication both internally**, i.e. within the institutions and by the ETH Board, as well as **externally**, i.e. to a broad public.

Further information is available in the **Executive Summary** of the strategy on associated locations drawn up by the working group (updated June 2022) (cf. Appendix B.1.2).

Development after the publication of the strategy

The associated location **EPFL Middle East** was closed as of 30 September 2022⁵⁴. The ETH Board was informed in advance at its meeting of 18/19 May 2022 of the planned closure of EPFL Middle East due to the fact that no new partnership agreement between the United Arab Emirates and EPFL could be concluded.

⁵⁴ [EPFL news 30 September 2022: EPFL center in Ras Al Khaimah closes after a successful 13 years](#)

Facts & Figures

The ETH Domain institutions are present in thirteen cantons and currently operate twelve associated locations in Switzerland, in addition to the main location of the parent institutions (cf. chapter “Introduction”, figure 2). The strategy on associated locations focuses on the five cantonal associated locations which are less than fifteen years old as well as the international associated location(s) listed below⁵⁵.

Cantonal associated locations:

- Basel (ETH Zurich, Basel Campus)
- Geneva (EPFL Geneva)
- Neuchâtel (EPFL Neuchâtel)
- Fribourg (EPFL Fribourg)
- Sion (EPFL Valais-Wallis, which includes Empa-Sion)

International associated locations:

- Singapore (ETH Zurich, Singapore-ETH Centre (SEC))
- United Arab Emirates (EPFL Middle East) (closed as of 30 September 2022)

Key points

The strategy on associated locations led to five key outcomes:

- a definition of associated locations;
- clear criteria for opening (and closing) associated locations;
- the duty of pre-information at the ETH Domain level and approval by the ETH Board before opening (and closing) an associated location;
- a process for periodic evaluations of each associated location, with an adjustable frequency according to the need;
- the need to improve internal and external communication about the associated locations.

⁵⁵ The other cantonal associated locations were established earlier; i.e. Eawag Kastanienbaum (1960), the WSL locations Davos, Cadenazzo, Lausanne, Sion, and ETH Zurich Lugano (CSCS) were established between 1989 and 1995.

Appendix: Strategy on associated locations

Executive summary (updated Version, June 2022)

Strategy for ETH Domain institutions' associated locations, working with cantonal or international partners

Over the past fifteen years, the ETH Domain — mainly EPFL and ETH Zurich — has developed long-term partnerships with several Cantons and with government authorities abroad. In this context, ETH Zurich and EPFL have established a durable and sizeable academic presence and activity at the respective sites. Although geographically remote, these associated cantonal or international locations are an integral part of the academic strategy of their parent institution and contribute to the strength and positioning of the ETH Domain.

A distinction is made between associated locations that have emerged in the past fifteen years and have a “campus-like” form and other locations not included in this mandate, which have been designed with specific missions. Under this mandate and unless specified differently in the text, an associated location (hereafter simply referred to as location — or locations) is a durable local presence of an institution outside of its headquarters that hosts academic units consisting of professors, scientists, doctoral students, technical and administrative staff. These units carry out research, education and innovation activities on site and in coordination with the parent institution. With its own local operational and financial management, each location acts under the name, academic supervision and administrative authority of its parent institution. Experience has shown that such a location should at least achieve the critical mass of an institute with 10 or more research laboratories (around 200 people or more) to enable a material and intellectual community on site. Achieving critical mass is a key-factor to ensure the long-term success of the location and to reduce the risk of isolation that might otherwise exist due to the geographical distance from the headquarters of the parent institution.

The rationale for the existence of a location is based on the alignment with the parent institution's academic missions and goals. It rests on expected and confirmed long-term opportunities for all the partners involved, with a research focus on global and national challenges that can be better addressed locally. There are currently seven main locations, all of which present academic complementarity within the ETH Domain activities at the national or international level respectively^{56,57}. They play a key role in positioning the ETH Domain nationally and globally, in enhancing technology transfer, in attracting and nurturing talent and in the transfer of knowledge. These locations operate mainly in facilities provided by the local partners, which will represent over 61,000 m² by 2024. This enables the parent institutions to concentrate the use of federal resources efficiently on their core academic missions. Moreover, the two international locations operate predominantly or entirely with local resources including government and third-party funds, both in terms of infrastructure (3,100 m²) and operating costs (CHF 273m over the years 2009–2024).

⁵⁶ Cantonal locations are: Basel (ETH Zurich, Basel Campus), Geneva (EPFL Geneva), Neuchâtel (EPFL Neuchâtel), Fribourg (EPFL Fribourg), Sion (EPFL Valais-Wallis, which includes Empa-Sion)

⁵⁷ International locations are: Singapore-ETH Zurich Centre (SEC), United Arab Emirates (EPFL Middle East)

Currently, the seven locations are home to more than 1,200 researchers and staff from the ETH Domain, soon to grow to nearly 1600, and have already produced a significant body of research outcomes and numerous technology transfers. They represent a global investment of about CHF 2.8bn, with contributions from the respective local partners (22%), third-party competitive funds (23%) and the ETH Domain (55%). In general, the locations do not represent an additional investment for the parent institutions, rather a delocalization of activities that are amplified by local investments. Federal budget invested in the locations since their respective inceptions, between 2007 and 2024, amounts to CHF 1.55bn. This number is estimated to be on the order of 4% of the total ETH Domain funds (CHF 40 bn) for that same period. An input-output review of the locations shows that the impact of the locations is substantial in terms of scientific outcomes, innovation and economic development.

A location can be set up on the basis of a federal mandate or a decision by the parent institution based on an opportunity identified with the local partners and the ETH Domain. Based on the definition, a common set of criteria is put forward that qualifies a location and guides the assessment of the feasibility, viability and sustainability of a location. Thereby, cantonal and international locations are dealt within a single strategy as they are both constituted according to the same criteria, with adjustments where needed. These criteria cover all the aspects of the planned activity and include:

- academic strategy and complementarity;
- scope and opportunities;
- local environment and partners;
- intellectual property;
- structure;
- management principles;
- political, legal, financial and infrastructure conditions.

An opportunity-risk analysis is an integral part of the decision-making process at the institutional, ETH-Board and federal level. At the end of this executive summary the definitions, governance processes and criteria that qualify a location are presented.

The seven locations included in this mandate were examined alongside a review of previous proceedings of the ETH Board on locations. Although not always formalized at the level of the ETH Board, the criteria and good practices summarized in this document were generally found to be already in place and implemented by the parent institutions when planning the creation of a new location. The review also shows that opportunities and challenges were appropriately identified prior to inception as the development of these locations has already started to produce the expected long-term benefits in strategic areas of national and global importance. Examples of such areas are energy, sustainability, smart living and urban environments, systems biology, neuro- and brain sciences, and microengineering.

The review further shows that the existing risk management plans are effective and that the financial and infrastructure risks at the locations are under control, a common scenario when the local partners are responsible for the infrastructure. The current locations have reached or will soon reach a mature stage, and their respective renewals are all supported by the local partners and by the respective parent institutions. This is a sign that their inceptions have seized relevant development opportunities for all parties involved and were not just opportunistic in nature. Finally, it should be noted that locations may take different forms, both in their organization and in their relationship with their respective parent institutions. For example, an entire institute or department (like ETH Zurich Basel campus, home to the D-BSSE), an

extension of a department or school (like EPFL Fribourg or EPFL Neuchâtel), or a thematically coordinated or multidisciplinary emanation of several departments or schools (like EPFL Valais-Wallis, EPFL Geneva or the two international locations).

These different forms are governed by institutional strategy and build on the strengths of the parent institutions. They also offer the ETH Domain the agility needed to optimize the collaborations with the local partners.

This review also results in **three recommendations** for improving governance at the institutional and ETH Board level:

- it is in the autonomy of the parent institutions to incept, renew or close locations, and lead the process. But they need to systematically provide advance information for strategic discussions at the ETH Board level to ensure timely decisions;
- two to three formal evaluations should take place during the initial six years of existence of a location; after this initial phase, the ETH Board and the parent institution should decide on a regular evaluation schedule, commensurable with the size, scope and age of the location;
- the parent institutions and the ETH Board should enhance their internal, public and political communication with respect to the benefits and impact of the locations for the ETH Domain and for Switzerland.

Definition of a location

Definition

Within Switzerland, a location of the ETH Domain has these characteristics:

- a durable physical representation of the parent institution outside of its headquarters;
- the need (and existence) of a local operational management;
- full academic and administrative subordination to the parent institution;
- a separate financial management for reporting purposes, consolidated with that of the parent institution;
- the location operates under the name and brand of its parent institution.

Outside Switzerland, a location (international) also verifies the following:

- a legal structure compatible with the Swiss legislation and approved by the ETH Board;
- the possibility to enter contracts locally (employment, insurance, other).

Governance

Governance and decision-making process

The location can be established or maintained based on and/or as a result of

- a federal decision, in consultation with the parent institution and the ETH Board;

-or-

a decision by the parent institution, with the prior approval of the ETH Board;

- a necessary positive multidimensional opportunity/risk analysis;
- compliance with federal regulations (ETH Board, Bundesamt für Bauten und Logistik BBL/Office fédéral des constructions et de la logistique OFCL) for real estate, where needed.

Formal contracts proposals and revisions for approvals by the ETH Board are

- submitted in their final form by the parent institution 3 months before the date of decision;
- reviewed by the Owner of the ETH Domain at the request of the ETH Board.

Communication

- Regular communication by the ETH Board and the parent institutions to the involved governments and to the general public on the benefits, impact and resources invested.

Evaluations

Ongoing evaluations of the location by the parent institution

- comprise 2-3 evaluations over the first 6-year initial phase, extendable by the ETH Board;
- follow a regular calendar and mode of evaluation after the initial phase, according to a schedule agreed upon between the ETH Board and the parent institution;
- are regularly communicated to the ETH Board for information.

Specific evaluations of the location (e.g., in the context of contract renewal)

- take place at the time of the review to decide on the renewing of a contract;
- take place as ad hoc evaluations, if necessary or as required by the contract;
- take the form of reports and peer-review evaluations;
- include an analysis of the value of the location to the parent institution, and of its management;
- include an analysis of the real estate when a new building is needed;
- present updated opportunity and risk analyses.

Criteria

Academics

The location presents

- a distinct contribution to the missions and goals of the parent institution;
- coherence with the parent institution's strategy;
- a focus on global and national challenges that are better addressed at the location;
- complementarity within the parent institution and the ETH Domain;
- complementarity in the local/regional context (academic, economic);
- improved positioning of the parent institution, the ETH Domain, and Switzerland;
- a critical mass that ensures success, national and international competitiveness.

Structure

The location exists

- under the parent institution's own name and brand;
- by means of a renewable long-term agreement if the location is in Switzerland;
- by an agreement of 5+ years, renewable if it is an international location;
- for a duration commensurable with the activity (e.g. full-chair lifetime in cantonal locations).

Management

The location operates

- within the autonomy and under the management authority of the parent institution;
- with full academic independence from local partners;
- with its own local management, organized and steered by the parent institution;
- with regular performance reviews by the parent institution, discussed at the ETH Board;
- with transparency and full disclosure (academic, financial, operational) to the ETH Board.

Finance and infrastructure

The parent institution must

- document the total cost of ownership over the planned lifetime of the location;
- provide a financial plan that includes all contributions over the lifetime of the location;

- preferably not carry the infrastructure costs at the location (CAPEX or OPEX);
- preserve the institutional budgets to fulfil its core mission;
- make commitments commensurate with the expected lifetime of the location;
- establish a contingency plan in the event that the location has to reduce or cease its activity;
- have a fall-back strategy that includes financial and infrastructure aspects.

Environment and partners

In general, the environment at the location presents

- reputable local partners who participate operationally;
- positive long-term relationships with local government, academia and industry;
- standards for ethics, academic integrity and IP practices compatible with the ETH Domain's.

Particularly for international locations, the environment presents

- a general context of societal and human values compatible with those of Switzerland;
- the required stability (geopolitics, security and context, access to healthcare);
- a legal framework compatible with the operations of the parent institution at the location;
- an official representation of Switzerland in that country;
- a history of positive bilateral relations with Switzerland (political and economic).

Main observations and
recommendations

Main observations

The review of all the locations in the scope of this mandate indicates that

- the strategy of the institutions does drive the existence of their respective locations;
- opportunities identified earlier fulfil their expected potential;
- strategic decisions were well-guided;
- governance processes at institutional and ETH Board levels were adequate in terms of criteria, planning, risk management, implementation;
- critical mass for a (campus-like) location is at least 10+ laboratories/200+ people, to create a local intellectual and material community.

Recommendations

The document puts forward the following main recommendations:

- the parent institutions are autonomous and lead the process, but should systematically provide advance information to the ETH Board to ensure timely decisions;
- evaluations should follow the schedule defined under Governance (see above);
- enhanced communication is needed by the parent institutions and the ETH Board internally as well as to government(s) and to the general public, regarding resources, benefit and impact for society.

B.2

Identifying the Strategic Areas for 2025–2028

Excerpt from the Mandate

“To what extent has the ETH Board correctly set the focus in its Strategic Plan for the ETH Domain 2025–2028, so that the ETH Domain can continue to make significant contributions to managing the most urgent challenges facing science, the economy and society? Have any important developments not been taken into account? Does the ETH Board’s strategic planning fulfil the corresponding EAER/SERI mandate dated 15 June 2021 (including planning in scenarios with prioritisations)?”

Assessment by and considerations of the ETH Board

Assessment: The five Strategic Areas defined by the ETH Board for the period 2025–2028 respond to global challenges of particular societal importance and fit well with the strengths of the ETH Domain institutions. They will require increased cooperation with other institutions inside and outside of academia. Basic research and technological development are crucial not only for the Strategic Areas but for the long-term success of all the ETH Domain's activities. The ETH Domain's strength in fundamental discovery science must therefore be upheld.

Considerations: The following five Strategic Areas identified in the strategic planning process of the ETH Board together with the ETH Domain institutions aim to respond to global challenges which are of particular societal importance.

- Human Health
- Energy, Climate and Environmental Sustainability
- Responsible Digital Transformation
- Advanced Materials and Key Technologies
- Engagement and Dialogue with Society
- The institutions of the ETH Domain are well positioned to have a particularly strong impact in all five Strategic Areas – on their own as well as through cooperation within the ETH Domain and beyond.
- Two complementary processes have helped the ETH Board to identify these Strategic Areas: on one hand, a foresight process to identify a set of global challenges based on inputs from internal and external stakeholders; and, on the other hand, bottom-up inputs from the ETH Domain institutions.
- The ETH Board emphasises the importance of fundamental discovery science as a cornerstone of all institutions' activities and as an essential element spanning all five Strategic Areas. Scientific advances and solutions are able to address global challenges thanks to knowledge previously acquired through fundamental and applied research as well as the development of novel methodologies and technologies.
- The Strategic Areas are addressed through existing or new activities at the level of the individual institutions and with Joint Initiatives at the ETH Domain level to promote collaboration within the ETH Domain. Further information about the concretisation of the Strategic Areas will be available in March 2023.
- The ETH Domain continues to devote adequate resources to conceptualising, developing, operating and upgrading large-scale research infrastructures and platforms of national and international importance.
- The ETH Domain actively participates and contributes to the coordination of research infrastructures through the process of the Swiss Roadmap for Research Infrastructures 2023 (in view of the ERI Dispatch 2025–2028).
- The ETH Board accords priority to selected large-scale research infrastructures based on strategic considerations and on an evaluation of their scientific quality, feasibility and financing. The ETH Board decided to support six large-scale research infrastructures for the period 2025–2028.

- In its Strategic Plan 2025–2028 for the ETH Domain, the ETH Board has taken into account the transversal themes that are foreseen for the ERI Dispatch 2025–2028, the core challenges identified for the entire ERI sector and the three financial scenarios as mandated by the Federal Department of Economic Affairs, Education and Research (EAER) and the State Secretariat for Education, Research and Innovation (SERI).
- The ETH Board is convinced that the focus of the Strategic Plan 2025–2028 provided a good basis for the corresponding section of the ERI Dispatch 2025–2028.

Evidence

The ETH Domain aims to be internationally competitive and to serve Switzerland by addressing important challenges in the context of education, research and innovation. In its Strategic Plan 2025–2028 for the ETH Domain, the ETH Board identified a set of measures in the context of its core and its key transversal tasks as the basis for achieving excellence in education, research, and knowledge and technology transfer (KTT). The Strategic Plan also addresses the long-term organisational development of the ETH Domain as a whole. For the period 2025–2028, the ETH Board has prioritised five Strategic Areas to respond to the most pressing global challenges. This chapter focuses on the processes adopted to identify the five Strategic Areas of the ETH Domain and the large-scale research infrastructures included in the Strategic Plan 2025–2028 of the ETH Board for the ETH Domain.

Strategic Areas

For the period 2025–2028, the ETH Board used a selection process (see below) to identify five Strategic Areas of particular societal importance where the institutions of the ETH Domain are well positioned to have a strong scientific – and also political and economic – impact on their own, as well as through cooperation within the ETH Domain and beyond⁵⁸:

- **Human Health**
- **Energy, Climate and Environmental Sustainability**
- **Responsible Digital Transformation**
- **Advanced Materials and Key Technologies**
- **Engagement and Dialogue with Society**

These Strategic Areas relate to the Strategic Focus Areas (SFAs)⁵⁹ and the Thematic Focus⁶⁰ that the ETH Board specified in its Strategic Planning 2021–2024 for the ETH Domain. The Strategic Areas go well beyond the SFAs and the Thematic Focus as they may encompass educational, research and innovation activities with a focus on the needs of society. Beside these Strategic Areas, the ETH Board and the ETH Domain institutions emphasise the general importance of **Fundamental Discovery Science** as the cornerstone of all the ETH Domain institutions' research activities.

The **five Strategic Areas** of the ETH Domain 2025–2028 aim to respond to some of the most pressing **global challenges** facing Swiss society in particular and for which the ETH Domain institutions are well positioned to have a strong impact – on their own as well as through co-operation with the ETH Domain and beyond. They are implemented either through existing or new teaching, research and KTT activities at the level of the institutions, or through Joint Initiatives between institutions at the level of the ETH Domain. Joint Initiatives are large, time-limited collaborative initiatives that include at least two ETH Domain institutions (and external partners if appropriate). The activities and the Joint Initiatives cover the whole spectrum of the ETH Domain's tasks according to the ETH Act – from education to research to KTT – and may span several Strategic Areas. With the Joint Initiatives, the ETH Board has thus created the possibility of swiftly addressing upcoming issues and challenges in and between the identified Strategic Areas.

⁵⁸ For the detailed description of the Strategic Areas, see [Strategic Plan 2025–2028 of the ETH Board for the ETH Domain](#), pages 16–25

⁵⁹ Personalized Health and Related Technologies (PHRT), Data Science, and Advanced Manufacturing (AM)

⁶⁰ Energy research

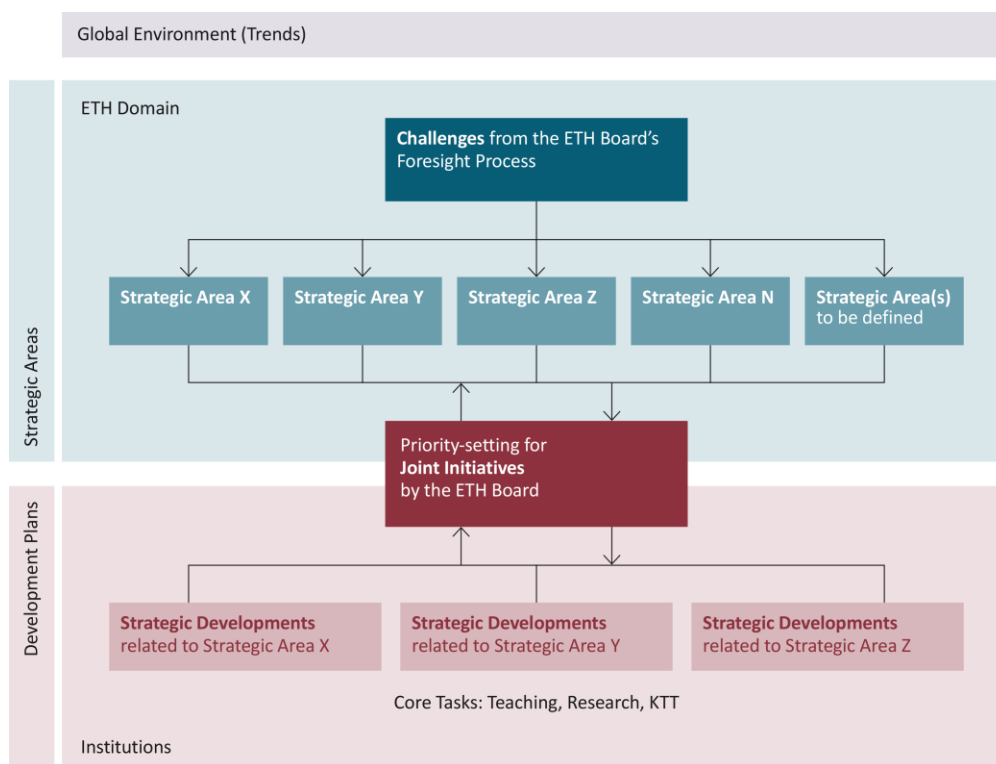
While the ETH Board decided to finance the SFAs for two ERI periods (2017–2020 and 2021–2024) but not beyond — consideration on their future have also been included in the Strategic Plan 2025–2028⁶¹ — it decided to adopt a new process for identifying its strategic orientations for the ERI period 2025–2028. The new process also aims to ensure that the Strategic Areas receive the necessary institutional, political and financial support.

More specifically, the Strategic Areas for the period 2025–2028 differ from the SFAs for the period 2021–2024 on two central points: (i) in their funding scheme and (ii) in their governance. In the case of SFAs, the ETH Board reserved four years of funding for each of the three focus areas in its Strategic Planning 2021–2024. Distinct committees manage each SFA and decide how to attribute funding to projects and activities. On the other hand, activities and initiatives within the Strategic Areas for the period 2025–2028 are funded through the base budget of the institutions for initiatives carried out individually by ETH Domain institutions. The ETH Board also reserved funds to finance Joint Initiatives (see above) to encourage synergies between the institutions within Strategic Areas. In this case, funds are allocated on a competitive basis through specific calls for each Strategic Area. To maximise efficiency, a single Steering Committee manages the Joint Initiatives in the five Strategic Areas.

The identification of the five Strategic Areas for 2025–2028 was supported by two parallel processes: (1) the identification of global challenges in the context of education, research and innovation through a foresight process (top-down approach); and (2) the identification of current and future activities of strategic importance in the ETH Domain institutions (bottom-up approach). The diagram below (figure 14) depicts the two approaches for the definition of Strategic Areas.

⁶¹ Strategic Plan 2025–2028 of the ETH Board for the ETH Domain, pages 47-48

Figure 14: Framework for Strategic Areas and Joint Initiatives



(1) Foresight Process: Identification of global challenges

In order to identify global challenges of particular importance for society in the context of education, research and innovation in the period leading up to 2030, a foresight process was carried out. In the first phase of the process, the outside view of national and international stakeholders external to the ETH Domain was collected through individual interviews. Stakeholders were chosen based on their backgrounds and expertise spanning the areas of science, technology, economy, environment and politics⁶², ⁶³.

In a second phase, the main results of the interviews served as a basis for the ETH Board and the directors of the research institutes to formulate the main global societal challenges for the period to 2030 where the ETH Domain is particularly well positioned to contribute to solutions. Six global challenges were identified⁶⁴:

- Encouraging and ensuring scientific excellence in an increasingly complex world
- Strengthening the dialogue between science and society for more inclusive and ethical decision-making
- Generating comprehensive environmental and societal knowledge and working towards a positive environmental impact
- Enabling access to a global and inclusive education
- Accelerating technology for the benefit of people and the planet

⁶² The stakeholders are listed in the annex to this chapter,

⁶³ For more details about the foresight process, please see document “Summary report of strategic foresight project to identify key contextual challenges for the ETH Domain and inform the Strategic Planning 2025–2028 of the ETH Board”, Arup + Future Impacts, June 2021.

⁶⁴ For the definition of the six identified challenges, see Strategic Plan 2025–2028 of the ETH Board for the ETH Domain, pages 9-10

- Promoting, enabling and practising new forms of employment

(2) Bottom-up approach: Inputs from the institutions

Parallel to the foresight process, the institutions of the ETH Domain were asked to identify Strategic Areas that are or will be of high societal importance and address challenges where they can have a particularly strong impact, either on their own or jointly. The proposition of Strategic Areas by the institutions had to go beyond their development plans 2021–2024 in addressing challenges. To support their propositions, the institutions drafted 24 potential Joint Initiatives, serving as non-binding examples illustrating their common strategic interests. Based on these drafts, the institutions proposed and further consolidated five Strategic Areas.

In light of the global challenges identified through the foresight process and the aforementioned Strategic Area propositions, the ETH Board defined the five Strategic Areas for the ERI period 2025–2028. To ensure the conceptual link between the Strategic Plan 2025–2028 of the ETH Board for the ETH Domain and its implementation in their Development Plans 2025–2028, the institutions jointly develop “Action Plans” for each Strategic Areas that include (but are not limited to) the Joint Initiatives. They also develop a “Foundation” document which features Fundamental Discovery Science and addresses the foundational, transversal role of discovery science. One aspect is the importance and role of building and maintaining large-scale research infrastructure to enable cutting-edge research.

Large-scale research infrastructures

Similar to the Strategic Areas, large-scale research infrastructures represent an important focus of the Strategic Plan 2025–2028 of the ETH Board. The ETH Domain conceptualises, develops and operates a portfolio of large-scale research infrastructures and platforms that offer unique resources and services for research communities within the higher education sector in Switzerland and abroad, and for industry users.

The ETH Domain contributes to the coordination of large-scale research infrastructures at the national level by participating to the Swiss Roadmap 2023 process led by the State Secretariat for Education, Research and Innovation (SERI)⁶⁵.

In its Strategic Plan 2025–2028, the ETH Board accords strategic priority to selected large-scale research infrastructures that were submitted to the Swiss Roadmap 2023 process⁶⁶. Following the scientific evaluation of the proposed projects by the Swiss National Science Foundation (SNSF) and the evaluation of their feasibility and financing, the ETH Board prioritised the research infrastructures for the period 2025–2028 as follows.

The six research infrastructure projects rated “A” (high scientific quality/excellence) by the SNSF’s scientific evaluation are selected for inclusion in the Swiss Roadmap for Research Infrastructures 2023⁶⁷.

⁶⁵ For more detailed information on the Roadmap process see [Swiss Roadmap for Research Infrastructures](#)

⁶⁶ [Strategic Plan 2025-2028 of the ETH Board for the ETH Domain](#), pages 33-36

⁶⁷ The eight research infrastructure projects submitted by the ETH Domain institutions to the Roadmap process were rated highly by SNSF’s scientific evaluation (six A- and two B-ratings).

Substantial upgrades of existing research infrastructures

- Swiss Data Science Center (**SDSC+**), EPFL, ETH Zurich, PSI
- Sustained Scientific User Laboratory for Simulation and Data-based Science at CSCS (**HPCN-28**), ETH Zurich
- **Swiss Fusion Hub**, EPFL
- Isotope and Muon Production using Advanced Cyclotron and Target Technologies (**IMPACT**), PSI in collaboration with University of Zurich

New research infrastructures

- **EM-Frontiers**, EPFL, ETH Zurich, PSI, Empa in collaboration with Universities of Lausanne, Basel, Bern and Geneva
- Swiss Biosites for Sustainable Agriculture and Agroecology (**SISAL**), ETH Zurich, WSL, Empa, Eawag, EPFL

Substantial upgrades of existing research infrastructures are given higher priority than investments in new research infrastructure projects. The implementation and the financing of the research infrastructure projects will be commensurate with the budget granted by the Swiss Confederation to the ETH Domain for the period 2025–2028. The ETH Board foresees earmarking 3-5% of the requested financial contribution 2025–2028 for Joint Initiatives within the Strategic Areas and large-scale research infrastructures⁶⁸. Thus, different financial scenarios⁶⁹ are considered and the ETH Board will decide on the implementation and financing of the research infrastructures in March 2024, i.e. when the payment framework 2025–2028 for the ETH Domain, as per the Federal Council's request to Parliament in the ERI Dispatch 2025–2028, will be known.

Compliance of the Strategic Plan 2025–2028 with the mandate

The Strategic Plan 2025–2028 of the ETH Board for the ETH Domain informs, among other documents, the elaboration of the dispatch for the promotion of Education, Research and Innovation (ERI Dispatch) and the strategic objectives of the Federal Council for the ETH Domain for the same period. In this context, the ETH Board has been mandated by the State Secretariat for Education, Research and Innovation (SERI) to take into account the four transversal themes that are foreseen for the ERI Dispatch 2025–2028 (digitalisation/sustainable development/equity/national and international cooperation) when elaborating its Strategic Plan 2025–2028 for the ETH Domain. The ETH Board was also requested to prepare its Strategic Plan according to three financial scenarios and address three core challenges identified for the entire ERI sector (long-term consequences and lessons of the COVID-19 crisis/improving effectiveness and efficiency/taking account of the findings of the intermediated evaluation of the ETH Domain).

The details of how this mandate was fulfilled are outlined in the Strategic Plan 2025–2028 of the ETH Board for the ETH Domain⁷⁰.

⁶⁸ [Strategic Plan 2025–2028 of the ETH Board for the ETH Domain](#), page 49

⁶⁹ [Strategic Plan 2025–2028 of the ETH Board for the ETH Domain](#), pages 53-54

⁷⁰ [Strategic Plan 2025–2028 of the ETH Board for the ETH Domain](#), pages 55-58

Key points

- For the period 2025–2028, the ETH Board identified five Strategic Areas of particular societal importance: “Human Health”, “Energy, Climate and Environmental Sustainability”, “Responsible Digital Transformation”, “Advanced Materials and Key Technologies”, “Engagement and Dialogue with Society”.
- The identification of the Strategic Areas was supported by two parallel processes:
 - A foresight process to identify “Global Challenges” involving stakeholders external and internal to the ETH Domain
 - A bottom-up process to identify current and future activities of strategic importance in the institutions of the ETH Domain
- Through the Joint initiatives within and between the Strategic Areas, the ETH Board has adopted a system that allows agile and appropriate responses to future issues and challenges for Switzerland.
- Large-scale research infrastructures are an important focus of the Strategic Plan 2025–2028 of the ETH Board. Based on strategic considerations and the evaluation of the scientific quality as well as the evaluation of the feasibility and the financial scheme, the ETH Board decided to support six large-scale research infrastructures for the period 2025–2028.
- The implementation of the mandate given by SERI to the ETH Board to develop its strategic plan is described in detail in the Strategic Plan 2025–2028 for the ETH Domain, pages 55–58.

Annex: List of persons interviewed in the context of the Foresight Process

Karl-Heinz Bauer (Chief Technological Officer, Schindler Group), Katja Becker (President, German Research Foundation), Stefanie Bosshard (Director, Dachverband Schweizer Jugendparlament), Martin Bosshardt (Chief Executive Officer, Anapaya Systems), Martin Dahinden (former Ambassador of Switzerland to the United States), Mauro Dell’Ambrogio (former State Secretary for Education, Research and Innovation), Karin Frick (Head, Gottlieb Duttweiler Institute), Peter Grünenfelder (Director, Avenir Suisse), Servan Grüniger (President, Reatch!), Hans Gut (former President, Careum Stiftung), Cynthia Hansen (Head, Adecco Group Foundation), Fabienne Hoelzel (Founder/Head, Fabulous Urban), Urs Hölzle (Senior VP for Technology Infrastructure, Google), Jennifer Jordan (Professor, IMD), Beat Kappeler (economics commentator), Kenneth Lee (Senior Partner, VisVire New Protein), Felix Meier (Executive Director, PUSCH), Rudolf Minsch (Head Economist, Economiesuisse), Bruno Oberle (Director General, International Union for Conservation of Nature (IUCN)), Andrea Pfeiffer (Founder/CEO, AC Immune SA), Jeannine Pilloud (Chief Executive Officer, Ascom Holding AG), Georg Polzer (Head of Strategy, Teralytics AG), Philipp Rösler (Chief Executive Officer Concessor AG, Former Managing Director at WEF, Former Minister for Economy and Technology and Vice-Chancellor of Germany), Ursula Schneider Schüttel (parliamentarian, Swiss National Council), Stephan Sigrist (Founder/Head, W.I.R.E), Thomas Stocker (Professor of Climate and Environmental Physics, University of Bern), Sabine Süsstrunk (President, Swiss Science Council)

(Affiliations at the time of the interviews)

B.3

The potential of diversity and respectful working conditions

Excerpt from the Mandate

“Diversity, with particular regard to the international aspect, is one of the ETH Domain’s strengths, as well as a challenge. Is the potential of diversity used in the best way while ensuring that individuals are treated respectfully and without discrimination at all times?

The specific matter of the proportion of women in teaching and research and particularly in management positions and decision-making bodies, is addressed specifically by the Federal Council in its Strategic Objectives for the ETH Domain 2021–2024. Is the ETH Domain applying the right strategies to increase the proportion of women in line with what is expected of it? Is there potential for improvement and are there international best practices that could be adopted?”

Assessment by and considerations of the ETH Board

Assessment: The ETH Board welcomes the efforts of the institutions to constantly improve their offering with respect to learning, teaching and working conditions that enable their students and employees to achieve their full potential. Furthermore, the ETH Board encourages the institutions to further strengthen their initiatives to improve and promote diversity and inclusion. These initiatives have started bearing fruit. The institutions have in some cases already met their targets in respect of female appointments to leadership positions. However, success is unevenly distributed and continued efforts are still needed.

Considerations: The ETH Domain institutions strive to foster diversity among students and employees by applying appropriate strategies and measures. Inclusion is recognised as key to fully realising the diversity potential of the students and employees to the benefit of the individuals, the institutions and society.

- The ETH Board decided to develop a Diversity Strategy for 2025–2028 based on the current Gender Strategy for the ETH Domain, but integrating a broader concept of diversity.
- The ETH Board wants to stress that much has already been achieved in terms of diversity due to the various measures established by the ETH Domain institutions, the ETH Domain-wide initiatives and strategy, and participation in national programmes. However, further efforts are needed – specifically to increase the proportion of women in education, research and leadership positions and to ensure the inclusion of minorities.
- The internationalisation of the ETH Domain – as one dimension of diversity – has advanced to a high level, reflecting the attractiveness of its institutions. Attracting and retaining international students and researchers is of great importance for the Swiss society and the Swiss labour market.
- The ETH Domain has made continuous efforts to increase the proportion of women in education, research and in leadership positions as well as decision-making bodies. These efforts are showing positive effects. In particular, the share of women among newly appointed professors at ETH Zurich and EPFL has increased steadily in recent years.
- A salary-equality analysis in 2020 showed that women and men in the ETH Domain institutions receive equal pay. The ETH Board welcomes this result and expects the institutions to continue their efforts to ensure equal opportunities and guarantee equal pay irrespective of gender.
- An important element of inclusion is to make sure that individuals experience respectful treatment and a discrimination-free learning and working environment. The ETH Board encourages the institutions to continue their efforts in terms of inclusion and respectful treatment of all their members.

Evidence

Diversity and inclusion

The ETH Domain institutions strive to foster diversity among their students and employees. Internationalisation is one dimension of diversity and is seen as key to excellence. Foreign nationals make up about two thirds of the professors of ETH Zurich and EPFL (a figure that has been stable over the years), while the proportion of foreign-educated foreign doctoral students is about 77%. The share of foreign-educated foreign Bachelor's and Master's students increased slightly but steadily over the last decade and is now 34% (cf. figure 15). The ETH Domain institutions also focus on gender as a transversal dimension of diversity. The proportion of women is increasing, especially for female professors and women in leadership positions⁷¹, but was still low in some areas (20-34%) in 2021 (cf. figure 16). Thus, the ETH Domain institutions are continuing to put major efforts into increasing these numbers. Moreover, the ETH Domain institutions are now monitoring the diversity dimensions of age and mother tongue. For example, in 2019/2020, ETH Zurich developed its yearly "Gender Monitoring" into an "Equality Monitoring" which encompasses quantitative data not only on gender aspects, but also on internationality, age and language. Furthermore, Empa is planning to compile a sustainability report including social aspects. This report would contain indicators of gender ratio, workload ratio or age. Factors such as gender identity and sexual orientation (LGBTQIA+), impairments and disabilities, ethnicity, religion as well as cultural and socio-economic background are assessed purely on the basis of voluntary surveys. Available data on these other diversity dimensions are scarce, as they are not monitored within the ETH Domain. However, these diversity dimensions remain central to the ETH Domain institutions, which have developed various measures to foster an inclusive culture.

The ETH Board decided at its meeting of 03/04 March 2021 to elaborate a strategy on diversity for the years 2025–2028 on the basis of the current Gender Strategy for the ETH Domain (2021–2024)⁷² but integrating a broader concept of diversity. The individual equal opportunities/gender action plans⁷³, which define the goals and specific measures for implementing the ETH Domain-wide Gender Strategy at each institution, are regularly updated. They increasingly include not only gender aspects but also elements for fostering other diversity dimensions. For example, the 2021–2024 action plans of EPFL, PSI and Empa include measures to support members of the LGBTQIA+ community and to improve accessibility and job offers for people with impairments and disabilities. In addition, Empa has anchored multicultural diversity in its new action plan for 2021–2024. In November 2021, ETH Zurich began a process to develop a new and comprehensive diversity strategy that will be devised by many stakeholders from both the departments and the central administration. It will function as an umbrella for all current and future initiatives and measures to promote diversity and ensure an inclusive culture.

⁷¹ In the following, the term "leadership position" refers to women in leadership positions and decision-making bodies.

⁷² Gender Strategy 2021–2024. Strategy for Gender Balance and Equal Opportunities for Women and Men

⁷³ ETH Zürich Gender Action Plan 2014; EPFL Equal Opportunity & Diversity Action Plan 2021–2024; PSI Diversity, Equity and Inclusion Action Plan 2021–2024; WSL Gender Action Plan 2022–2024; WSL Equity Strategy 2022–2024, Equal opportunities and Diversity at Empa Action Plan 2021–2024.

One of the main aims of the ETH Domain is to ensure that diversity is accompanied by inclusion so that people in the institutions are appreciated for their uniqueness, experience a sense of belonging and are treated fairly. The ETH Domain institutions have established various measures to promote inclusion. For example, ETH Zurich has developed a concept for accessible digital learning materials that can be used efficiently and effectively by all students, regardless of any sensory or motor disabilities or any special needs due to neurological characteristics (“ETH Zurich e-Accessibility”). In addition, the “Barrier-Free at ETH Zurich” programme – designed to make the university as accessible as possible in the coming years – got under way at the beginning of 2021. The Equal Opportunity & Diversity Action Plan 2021–2024 of EPFL has set action items that include making the campuses more accessible and inclusive to people with disabilities and updating facilities so as to better serve the diverse community of EPFL.

The ETH Domain is convinced that attracting international students and researchers is necessary to maintain excellence in education and research. International graduates and scientists bring knowledge and skills to Swiss society and help combat the shortage of skilled employees in technical, engineering and related fields in Switzerland. The successful inclusion of these students both on campuses and in Swiss society would not only enable them to thrive during their studies but would also encourage them to remain in Switzerland after their graduation, and hence fully participate in the Swiss labour market and society. This aspect is also addressed in the strategy regarding the development of student and doctoral student numbers in the ETH Domain (cf. chapter A.1). ETH Zurich and EPFL are already operating international student support facilities, which help students coming from abroad with immigration formalities, accommodation searches or insurance questions. They also provide scholarship programmes, offer language courses – which are vital for inclusion – and conduct surveys on student satisfaction (e.g. EPFL’s Culture of Respect survey 2021).

An important element of inclusion is to make sure that individuals experience respectful treatment and a discrimination-free learning and working environment. Achieving these goals is dependent on cultural change, and thus the ETH Domain institutions focus on creating an inclusive culture. They have directives and code of conducts in place⁷⁴, which are regularly updated, to promote mutual respect and prevent all forms of inappropriate behaviour, such as discrimination, bullying, mobbing, threats, violence and sexual harassment. Furthermore, in the ongoing ERI period 2021–2024, the institutions have conducted “respect campaigns” that are directed at all of their members and aim to foster mutual respect and raise awareness of inappropriate behaviour, also giving advice on where to seek help when inappropriate behaviour occurs and how to combat it. On a national level, ETH Zurich and WSL (as representative of the four research institutes) are also participating in the swissuniversities cooperation project “National campaign against sexual harassment at Higher Education Institutions” (University of Lucerne as lead university)⁷⁵. EPFL is not directly involved in the project (yet),

⁷⁴ ETH Zurich Respect Code of Conduct (2021); EPFL Compliance Guide (2022); PSI Code of Conduct "Respect"; PSI Mission Statement on Diversity, Equity, and Inclusion; WSL Code of Conduct Respect (2021); The following documents are not available online but only internally: **Empa** Code of Conduct; **Eawag** Directive concerning protection from sexual harassment, stalking, mobbing and discrimination at the workplace (2018); **Eawag** Guidelines for Search Committees: Increasing Diversity (2021).

⁷⁵ Project description on the website of the University of Luzern only available in German and partly in French

but is kept informed on its development. The project envisages having a prevention, sensitisation and awareness campaign in March 2023 in cross-media form. Raising awareness for stereotypes and unconscious biases is also at the heart of various training courses for employees in leadership functions. For example, WSL introduced mandatory manager training on the topic of equal opportunities and diversity in 2021. Moreover, in 2022, the Diversity Manager and Ombudsperson of WSL gave online courses to all 330 employees in leadership functions at PSI in order to further sensitise them to the topics of respect, inclusive working environment and their duty of care as managers. Eawag also provides training courses for new employees in leadership functions for strengthening diversity and gender competencies, e.g. in the context of the CAS Leadership in Science⁷⁶, in which PSI, Empa and WSL are participating as well. At ETH Zurich, “living inclusivity” has been defined as one of six social and leadership competencies that will contribute to leadership development. In June 2022, the four research institutes organised an online event open to all their employees to sensitise them to LGBTQIA+ topics at the workplace and thus help to create a more inclusive work environment.

The ETH Domain institutions are also working on their overall processes to promote inclusion. For example, EPFL set up the “Task Force Harassment A-Z & Promoting a Culture of Respect” with several sub working groups in 2021. This aims to ensure that existing and future measures cover the entire spectrum of actions (prevention, support, case management, sanctions) and that these actions are consistent. For example, the task force engaged in the “EPFL Culture of Respect Survey 2021” (see also chapter A.1), which among other things investigated whether members of EPFL witnessed or experienced discrimination, (sexual) violence and psychological or sexual harassment. Similarly, at ETH Zurich a new “Diversity and Cooperation” unit has been formed within the Vice Presidency for Personnel Development and Leadership, which is currently reviewing and improving the grievance procedures for inappropriate behaviour as well as the structures for help that are in place for those affected. Finally, inclusion starts with knowledge. To sensitise people to diversity & inclusion topics, PSI, WSL and Empa have launched a joint monthly “Newsletter for Equity” covering a broad range of subjects relevant to the ETH Domain, including information on events or campaigns.

Gender equality and proportion of women in education, research and leadership positions

With regard to the gender dimension of diversity, the ETH Domain aims at ensuring equal opportunities for women and men as well as improving the gender balance among its member institutions. The institutions seek to increase the share of women in education and in research, as well as in leadership positions in areas where they are underrepresented. Note that Eawag has already reached a good gender balance with 49% women (2021) among its members. For ensuring equal opportunities and improving the gender balance in the ETH Domain good strategic framework conditions are in place. The Gender Strategy for the ETH Domain 2021–2024⁷⁷ defines five different focus areas which address these issues comprehensively and from different angles. Compared to the Gender Strategy of the previous period (2017–2020), several improvements have been implemented, including setting a higher target value for funds to be spent for measures supporting the promotion of equal opportunities/gender balance (0.5% of the overall annual Federal financial contribution as compared to

⁷⁶ CAS Leadership in Science of FHNW University of Applied Sciences and Arts Northwestern Switzerland

⁷⁷ Gender Strategy 2021–2024. Strategy for Gender Balance and Equal Opportunities for Women and Men

0.4% in the previous period). Moreover, following a recommendation formulated in the context of the Intermediate Evaluation 2019 of the ETH Domain, each institution has set quantitative targets for increasing the proportion of women in academia, administration and technical professions, depending on the institution's particular situation (cf. figure 18).

A wide range of measures are in place for ensuring equal opportunities for women and men and for increasing the proportion of women. In 2020–2021 the institutions reorganised their structures significantly so that they are better equipped to address equal opportunity issues. ETH Zurich established a new Vice Presidency for Personnel Development and Leadership, to which the ETH Diversity office reports, thus taking better account of equal opportunities aspects in the field of leadership. At EPFL, the equality office is now the responsibility of the newly founded Vice Presidency for Responsible Transformation. In the new organisational setting, equal opportunity issues are more firmly positioned within the EPFL directorate, generating new synergies with other vice presidencies and faculties. Moreover, the four research institutes have joined forces by establishing the “Center of Competences for Diversity & Inclusion PSI - Empa - Eawag”⁷⁸, which works closely together with the Diversity Manager of WSL and ensures a regular exchange between the research institutes. The different equal opportunity offices are required every two years to report in detail on all measures implemented at the institutions and on the funds spent on these measures.⁷⁹ Following up on a survey conducted in 2019, ETH Zurich and EPFL have each created a commission to investigate the status of women faculty. Their findings are expected to result in recommendations for the attention of the schools' management and executive bodies.

For fostering the career development of women, the six ETH Domain institutions have since 2007 jointly organised the programme “Fix the leaky pipeline!”⁸⁰. Supported by the ETH Board since its creation, the programme offers courses, coaching and mentoring to young female scientists who wish to pursue an academic career (it is aimed at doctoral students and postdocs). For the period 2021–2024, the offering has been extended considerably due to almost a doubling of the budget (60% provided by the institutions and 40% by the ETH Board). To support the career planning of young female scientists and to better link them with industry and the public sector, all ETH Domain institutions participate in the cooperation project CONNECT (lead PSI).⁸¹ PSI also has a mentoring programme for women with ambitions to reach leadership positions. The pilot phase was given a positive rating, so it has now been extended to Empa and WSL. ETH Zurich and EPFL offer a wide range of mentoring programmes addressed to women as well. At EPFL, the majority of the programmes are organised in collaboration with other universities and are aimed at doctoral students and postdocs. ETH Zurich provides various programmes at the level of the departments, such as the mentoring programme offered by the Department of Management, Technology and Economics and the mentoring programme for doctoral candidates organised by the Gender and Diversity Commission (GDK) at the Department of Civil, Environmental and Geomatic Engineering. These programmes are inclusive of all genders.

⁷⁸ Fachstelle Diversität und Inklusion (D&I) PSI - Empa – Eawag.

⁷⁹ The reporting is not available online; it is brought to the attention of the ETH Board every two years at its meeting of May.

⁸⁰ Fix the leaky pipeline! A career-building program for women in science.

⁸¹ CONNECT. Connecting Women's Careers in Academia and Industry.

Dual career solutions are a very important element in the range of career development measures. As these solutions need common and cooperative efforts, the topic was taken up at the 2021 dialogue meetings between the institutions and the ETH Board, and is being pursued, especially with regard to developing an ETH Domain-wide approach if possible. To establish the right conditions for a good 'life domain balance', the institutions provide child-care services. Additional measures include Eawag's Tailwind Program and Empa's Restart Support (financial support for young mothers). Fair recruitment and promotion processes are also important for increasing the proportion of women. In this regard, ETH Zurich and EPFL have established gender-sensitive processes for the appointment of new professors. The Ordinance for Professors at the Federal Institutes of Technology⁸² also provides for a one-year extension of the contract period (normally max. 8 years) for assistant professors for each case of maternity. The four research institutes have taken similar measures for hiring procedures, e.g. Eawag has a systematic 8-step process for all searches for tenured and tenure track positions.

The ETH Domain institutions have a regular dialogue with different national and international networks and participate in conferences relating to gender equality. The Equal Opportunities Working Group, consisting of the gender/equal opportunities delegates of the six institutions, is the central platform for exchange between the six institutions. On a national level, the institutions (with a representative of the research institutes as guest) are affiliated to the IDEAS network, which links up the equal opportunities delegates of the ten cantonal universities and the two Federal Institutes of Technology. Furthermore, WSL is in regular exchange with the University of St. Gallen, while Empa is part of Advance, a business network for gender equality in Switzerland. On an international level, EPFL is member of the CESAER Equality, Diversity and Inclusion (EDI) working group and has contacts with Equal Opportunities Delegates of the EuroTech Alliance Universities. PSI has contributed to a toolbox of good practices published by LEAPS IDEA, a taskforce of the League of Accelerator-based Photon Sources dedicated to inclusion, diversity, equity and anti-discrimination. With its "EQUAL! tools", ETH Zurich has also compiled a toolbox of measures for the promotion of equal opportunities at (technical) universities. These various forms of exchange help the institutions to implement good practices.

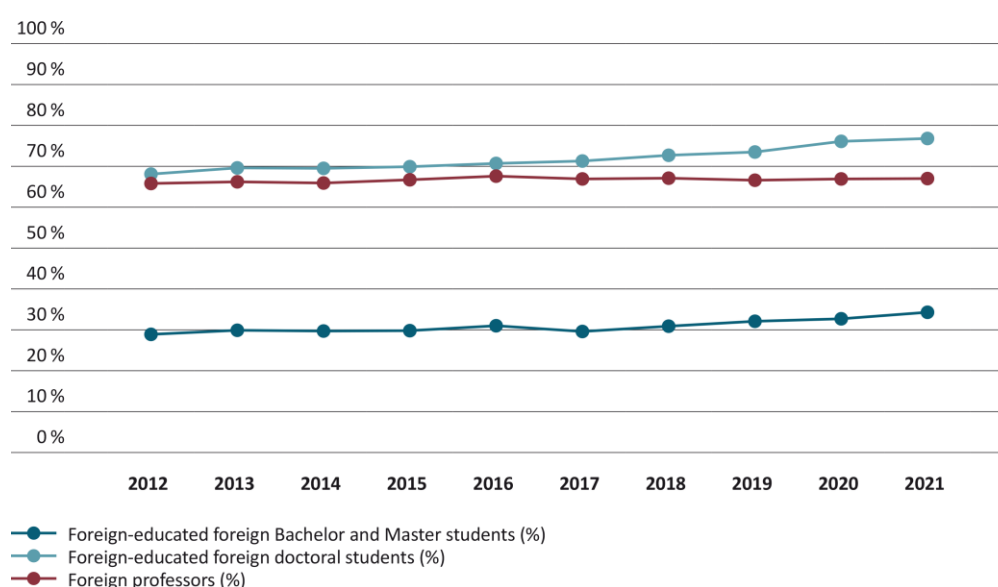
Equal pay for the employees –regardless of their gender– is a key aspect of equal opportunities. In 2020, PricewaterhouseCoopers carried out an equal pay analysis for the institutions of the ETH Domain using the scientifically and legally endorsed EQUAL-SALARY method. The analysis confirmed the good results of the 2015 equal pay analysis. At the different institutions, the pay gap between men and women varied from 2.0% in favour of men to 1.4% in favour of women. All these figures are well within the tolerance level of 5% set by the Confederation.

⁸² Verordnung des ETH-Rates über die Professorinnen und Professoren der Eidgenössischen Technischen Hochschulen (Professorenverordnung ETH) (German) / Ordonnance du Conseil des EPF sur le corps professoral des écoles polytechniques fédérales (Ordonnance sur le corps professoral des EPF) (French)

Facts & Figures

The internationalisation of the ETH Domain is increasing (cf. figure 15). This reflects the strong appeal of its institutions as well as recruitment policies based on merit and performance, regardless of the candidate's country of origin.

Figure 15: Proportion of international students, doctoral students and professors at ETH Zurich and EPFL (based on headcounts)



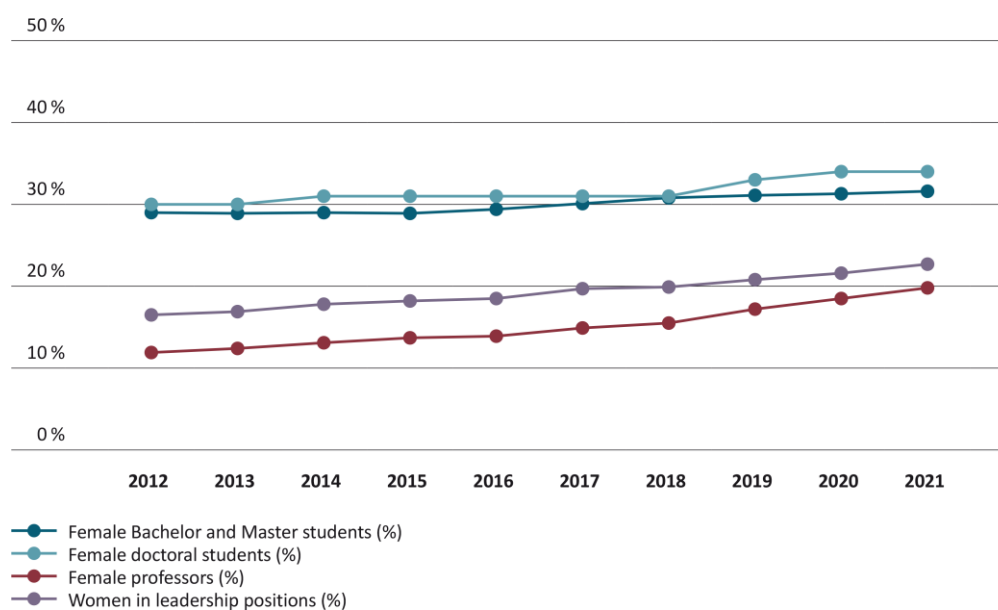
Source: [Annual Report of the ETH Board for the ETH Domain 2021](#) and internal data

The strategies and measures applied in the ETH Domain to improve gender balance are producing positive results. The proportion of women among students, doctoral students, professors and employees in leadership positions over the last ten years has been increasing (especially for professorial and leadership positions – cf. figure 16). One of the reasons for the positive trend in the proportion of women among professors is the success of both ETH Zurich and EPFL in recruiting more women for new positions (cf. figure 17).

Women are very well represented on the ETH Board; in 2021, the eleven-member body (president and ten members) included six women. For further information regarding the members of the management bodies of the ETH Domain institutions, i.e. the Executive Boards of ETH Zurich and EPFL and the directorates of the research institutes, please see the governance section of the annual report of the ETH Board on the ETH Domain 2021⁸³.

⁸³ [Annual report of the ETH Board on the ETH Domain 2021](#), page 40

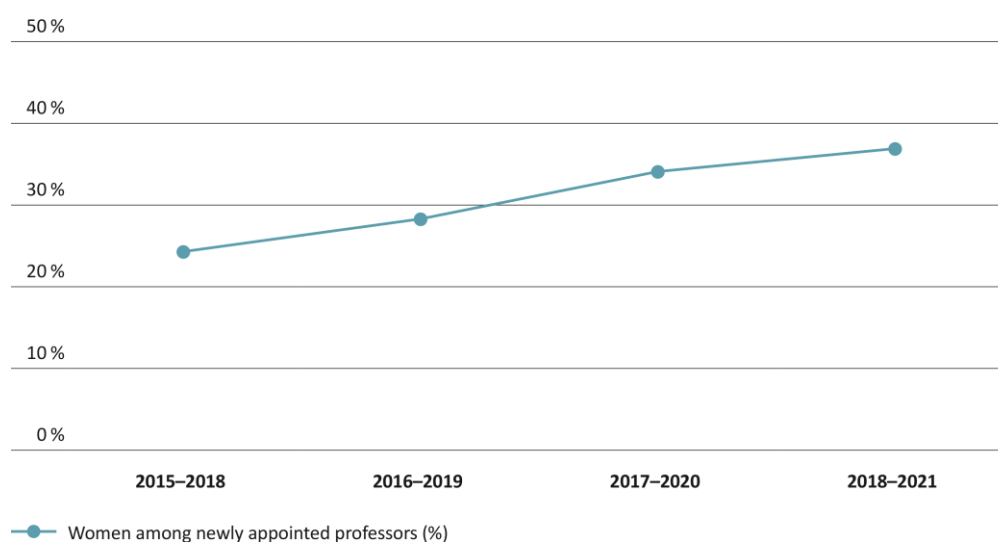
Figure 16: Proportion of women at ETH Zurich, EPFL and the research institutes at different academic levels and positions (based on headcounts)



Note that employees counted in leadership positions include professors. Professors include full, associate and assistant professors of ETH Zurich and EPFL. Leadership positions encompass the entire ETH Domain (six institutions and the ETH Board)

Source: [Annual Report of the ETH Board for the ETH Domain 2021](#) and internal data

Figure 17: Proportion of women among newly appointed professors at ETH Zurich and EPFL



The proportion of women is stated per four-year period to take into account the variation observed annually due to the relatively low number of new appointments per year.

Source: [Annual Report of the ETH Board for the ETH Domain 2021](#) and internal data

Figure 18: Targets set by the individual institutions for increasing the proportion of women

Institution	Indicator	Current value (2021)	Target value
ETH Zurich	Proportion of female new hires at professor level	45.8 %	40 %
	Proportion of women in leadership positions (Functional levels 10–15 and professors)	24.5 %	25 % until 2024
EPFL	Proportion of female new hires at professor level	48.3 %	40 % job offers, 35 % new hires, moving average over 4 years
	Proportion of women in leadership positions (Functional levels 10–15 and professors)	22.8 %	25 % until 2024
	Proportion of female Bachelor and Master students (without Dipl.)	29.5 %	33 % until 2024
PSI	Proportion of women in leadership positions (Functional levels 10–15)	12.2 %	15 % until 2024
	Proportion of female new hires for leadership positions (Functional levels 10–15)	40 %	25 % moving average over 4 years
	Proportion of female new hires at postdoc level	30.8 %	30 % moving average over 4 years
WSL	Proportion of women in leadership positions (Functional levels 10–15)	27 %	28–30 % until 2024
	Proportion of female new hires for whole WSL	40 %	40–60 % average for period 2022–2024
	Proportion of female new hires for scientific positions	41 %	50–60 % average for period 2022–2024
Empa	Proportion of women in leadership positions (Functional levels 10–15)	17.3 %	21 % until 2024
	Proportion of female new hires for leadership positions (Functional levels 10–15)	20 %	25 % moving average over 4 years
	Proportion of women on the shortlist for new hires, especially in leadership positions.	will only be recorded from 2023	Minimum 1/3
	Proportion of female new hires at postdoc level	28.6 %	30 % moving average over 4 years
Eawag ¹	Proportion of women in leadership positions Functional levels 10–15 (Functional levels 9–15 incl. Tenure Track)	29.6 % (36.0 %)	tbd
	Proportion of female new hires for leadership positions (Functional levels 9–15)	100 %	tbd
	Proportion of women on the shortlist for new hires, especially in leadership positions.	Estimate: 30 %	tbd
	Proportion of female new hires at postdoc level	47.1 %	tbd
	Proportion of female staff at postdoc level	46.8 %	tbd

¹ Eawag has not set targets in this regard yet. Since it is the ETH Domain institution with the highest proportion of women (49% overall in 2021), the research institute has postponed the establishment of targets until the arrival of its new director in 2023. Current values (2021) are given based on headcounts.

Key points

- The ETH Domain institutions strive to foster diversity among their students and employees, with appropriate strategies, action plans and measures. These are regularly evaluated and updated if required.
- The ETH Board has decided to formulate an ETH Domain strategy regarding diversity for the period 2025–2028.
- Inclusion is recognised as key to fully realising the diversity potential at the institutions, to ensure fairness for students and employees and to enable them to thrive in their uniqueness. Measures in this area are being continuously developed.
- The dimensions of nationality, gender, age and language are monitored. Other aspects of diversity are not monitored, but also assessed through voluntary surveys – to identify appropriate measures to foster inclusion.
- The internationalisation of the ETH Domain is increasing, and reflects the appeal of its institutions. It also results from recruitment policies based on openness, transparency, merit and performance regardless of the candidate's country of origin – a key aspect for achieving excellence in education and in research.
- The ETH Domain institutions are continuing their efforts to improve gender balance. Equal opportunities measures are being developed and expanded. In this context, good practices are considered within the ETH Domain as well as on a national and international level. Trends (share of women in educational, professorship and leadership positions) are positive but need to be maintained – and, where possible, improved.

B.4

Future requirements in education and research

Excerpt from the Mandate

“Measuring the quality of education (cf. A.1) and research in national and international comparison is of fundamental importance to universities and research institutes, yet at the same time it presents a major methodological challenge. Does the ETH Domain systematically use tools that permit it to evaluate its positioning on the one hand and achieve steady development and improvement with ambitious target values on the other? In which direction will the requirements for excellence in teaching and research move, and what might the future benchmarks be?”

Assessment by and considerations of the ETH Board

Assessment: The ETH Board and the institutions of the ETH Domain have well-functioning instruments both for strategic development and for quality assurance and development. While the current processes ensure high standards of education and research, they must continuously be challenged and developed further, so that they also meet future requirements. The ETH Board appreciates the progress made by ETH Domain institutions both in their strategic development as well as in teaching and in staff recruitment and development.

Considerations: Excellence in education and research does not only comprise academic criteria but also personal development, entrepreneurial mindset, societal engagement and leadership skills.

- Educating students and doctoral students must involve giving them knowledge and skills that will optimally prepare them for their future tasks in business, the public sector and academia (e.g. interdisciplinarity, creativity, critical thinking, teamwork, responsibility, independence).
- The ETH Domain institutions are working on the further development of the criteria for staff recruitment in order to recruit and employ people with a greater diversity of backgrounds, skills and knowledge.
- Strategic planning processes of the ETH Domain institutions include considerations of excellence in education and research. Planning tools must remain flexible to adapt quickly to changing circumstances, and they must be open and responsive to changes in practices and culture.
- The ETH Board appreciates the regular external evaluations of the ETH Domain institutions or of their individual departments and divisions as an important quality assurance tool. These provide an important external view and support the institutions in maintaining and improving the quality of education and research.

Evidence

Tools to evaluate the ETH Domain's positioning in education and research

The ETH Domain institutions use a wide set of tools to evaluate their positioning in education and research, including evaluations by external experts, institutional accreditation according to the Higher Education Act (HEdA) and study programme accreditation, surveys of graduates, availability and use of research infrastructures, bibliometric studies and university rankings. The tools primarily serve the organisational development of the institutions and in certain cases the monitoring of performance. The qualitative findings in particular are useful for further developing the institutions in terms of scientific excellence.

The ETH Domain institutions are periodically evaluated in accordance with the "Procedure of Evaluations in the ETH Domain" manual (updated in 2019). Each unit of ETH Zurich, EPFL and PSI (departments, schools, research divisions) and the research institutes WSL, Empa and Eawag as a whole are evaluated at least once within an 8-year period. The institutions inform the ETH Board about the main results, recommendations and measures to be taken deriving from these evaluations. As part of the strategic controlling process, the institutions inform the ETH Board about the implementation status of the measures at the Dialog Meetings (yearly meeting of the ETH Board with each institution).

According to the HEdA, institutional accreditation is a requirement for an institution to be eligible to use the designation "University". The institutional accreditation procedure inspects the internal quality assurance system in a Higher Education Institution and must take place every seven years. In 2021, ETH Zurich received its accreditation from the Swiss Accreditation Council and its quality standards were rated as fully satisfactory. In 2022, EPFL received accreditation from the Swiss Accreditation Council subject to one condition relating to the communication of the quality assurance processes and outcomes. The fulfilment of this condition will be examined in 2024. In addition to the institutional accreditation, EPFL's study programmes are accredited by the French "commission des titres d'ingénieur" (CTI); the recurring accreditation procedure is in progress (as at 2022).

The intermediate evaluation of the ETH Domain, which takes place every four years in the middle of each ERI period, complements the institutional evaluations and accreditations as well as the reporting and controlling measures, and primarily focuses on forward-looking strategic questions. Every four years – in the context of this intermediate evaluation – the ETH Board commissions a bibliometric study of the ETH Domain institutions (cf. chapter C: Bibliometric Study). This study measures the bibliometric performance of the institutions over at least a decade with a variety of bibliometric indicators, which include some benchmarking. Bibliometric indicators provide objective evidence about production, collaboration and impact, though only for the research that has been published in (international) journals and proceedings. Therefore, quantitative evaluations should always be complemented with qualitative information (e.g. the mission and the research goals of an institution/department etc.) and expert assessments.

Third-party rankings at international level are another indicator for improving the understanding of the positioning of ETH Zurich and EPFL in education and research. The good and stable positions of ETH Zurich and EPFL over the years according to the Times Higher Education (THE), the QS, the ARWU, and the CWTS Leiden rankings are shown in figures 19 and 20. While such university rankings provide a quick impression of where a university stands on a

global comparison, their informative value is limited and they do not adequately reflect the diverse and wide-ranging qualities of the universities.

Regular benchmarking with other education and research entities at the international level is one important element in the process of evaluating education and research. For example, PSI – as a developer and operator of large research infrastructures in Switzerland – compares the excellence of its facilities with peer institutions such as ESRF in Grenoble or DESY in Hamburg using benchmarks such as: number of instrument days, number of experiments and user visits, distribution of users by institution, publications, etc.

In terms of education and training, one important measure of excellence is the ETH Domain's contribution to alleviating the skills shortage in Switzerland. Alumni and employer surveys will therefore remain an important tool (cf. chapter A.1).

Processes for developing and improving excellence in education and research

The strategic planning processes of the ETH Domain institutions and of the ETH Board for the ETH Domain comprise a mix of bottom-up and top-down approaches. These approaches were applied in the “Strategic planning process of the ETH Board for the ETH Domain 2025–2028” for identifying the five Strategic Areas, as described in chapter B.2. In its Strategy and Development Plan, ETH Zurich (for example) sets out strategic priorities for the respective planning period and identifies measures for realising them. This is a tool to help ETH Zurich chart its course in respect of education, research, and knowledge and technology transfer. Similarly, the EPFL Strategic Plan outlines objectives and initiatives aimed at transforming EPFL over the four-year period and beyond. It seeks to offer robust academic programmes that are strategically important, to promote excellence within these programmes and to forge stronger ties among schools and colleges.

Annual strategy retreats and regular strategic reviews of divisions in consultation with other internal divisions and external advisory bodies are other means of promoting excellence. At PSI, e.g., this process has recently led to the establishment of a new Research Division for Scientific Computing, Theory and Data (SCD)⁸⁴ as well as new laboratories and research groups in nano- and quantum technologies and materials science. Similarly, at ETH Zurich various processes – strategic planning of the departments, planning of professorships, regular evaluations of the departments and units by international expert commissions and dialogues between the Executive Board and the departments – serve to assess and determine categories of excellence. Advisory boards with external experts are another way to acquire external strategic advice. This is in particular relevant with large-scale research infrastructures (e.g. the Scientific Advisory Committee of SINQ at PSI).

In recruitment, the focus is placed on the careful selection of employees and – specifically for permanent positions – support is provided by evaluation committees and criteria that not only consider past achievements but also assess the candidates' future scientific potential. WSL, for example, applies multiple criteria relating not only to output and performance but also to leadership skills, team-working ability, experience in outreach, etc. At Empa, a judicious mix of permanent and non-permanent scientists ensures “institutional memory” and helps to maintain high standards of research and education to fully meet the needs of industry and society.

⁸⁴ [Division for Scientific Computing, Theory and Data](#)

The development of future excellence in education hinges in particular on guidance in new teaching techniques. In the case of ETH Zurich this is done by the Educational Developers – contact persons in the departments who play a key role in stimulating, coordinating and disseminating innovation in teaching. They are embedded in the department and provide a subject-specific view and understanding of didactics. A similar role is carried out at EPFL by Pedagogical Advisers, who work with lecturers to improve teaching methodologies, providing a combination of classroom and project-based learning opportunities. The newly created “Centre Propédeutique”⁸⁵ at EPFL coordinates courses and assures their homogeneous quality.

Throughout the ETH Domain, processes are in place to continuously develop and improve excellence in education and research (among other things) by adapting human resources procedures. HR-related quality development procedures include detailed processes for recruiting faculty members, researcher assessment with clear tenure processes for senior scientists, training and support for management and supervision skills (specifically for supervising doctoral students and postdocs), mentoring programmes for early-career researchers and female leadership candidates, continuous exchange with peers in Switzerland and abroad, exchange of good practices, and sabbaticals.

Processes to develop excellence in education also include specific support for innovative teaching projects and degree programme initiatives. For example, the ‘Innovedum’ fund at ETH Zurich promotes initiatives which contribute to the long-term development of the quality of education at ETH Zurich. At EPFL, the ‘DRILL’ fund supports projects for developing digital resources for teaching, such course-specific Jupyter Notebooks. EPFL has also launched the LEARN center, which drives translational research within and around EPFL. ETH Zurich and EPFL have developed a joint doctoral programme in learning sciences. This will produce generations of scientists who master the sciences and engineering disciplines taught in the ETH Domain and have expertise in education research.

It is important to provide students with learning opportunities that go beyond the classroom, taking their aspirations and needs into account. Working on an interdisciplinary project or being part of an association or a coaching programme develops skills beyond what students learn in the classroom. Providing students with these opportunities helps them to diversify their skills. At EPFL the MAKE programme⁸⁶ facilitates the structuring of interdisciplinary projects. Students learn how to structure and conduct a project with teams of up to 100 students, to interact with external partners, or to collaborate among researchers from different disciplines. Through the MAKE initiative, EPFL provides competitive funding for new student-driven projects. Close contact with the business world (e.g. via internships) helps students to develop specific competencies and transversal skills. To coordinate and develop activities aimed at strengthening transversal skills, EPFL launches the “Centre de Compétences Transverses et de Carrière” in 2023.

At Empa, as at other ETH Domain institutions, the Research Management Office supports all applicants in applying for external funding with the aim of increasing the quality of research applications. Another important measure to promote quality is the evaluation of more than 70 project applications annually by a Research Commission.

⁸⁵ Centre Propédeutique

⁸⁶ MAKE programme

Future requirements and benchmarks for excellence in education and research

One important challenge for the ETH Domain in terms of its place among the centres of excellence in research is Switzerland's non-association to the EU Framework Programme for Research and Innovation Horizon Europe. While the current and planned transition measures by SNSF and SERI alleviate the most immediate negative effects, maintaining the country's attractiveness as one of the best places to do research in Europe will remain challenging (cf. chapter A.2).

The ETH Domain offers an inclusive working and academic environment. Its institutions strive to recruit the best talent from around the globe, independently of gender, culture or social origin, and to create an excellent framework for their development. It is important to promote the motivation of employees by trusting them and giving them room for manoeuvre. Collaboration with alumni and partners across the world are key elements of global engagement in education and research. Innovative approaches, modern technology, up-to-date infrastructure and resources are necessary to create an efficient, flexible and safe working environment.

As important players in the national and international higher education and research landscape, the ETH Domain institutions are guided by international standards and good scientific practices and contribute to their further development. Easier and more meaningful than determining future requirements and benchmarks in education and research is identifying processes and instruments for developing and improving education and research. The concept of excellence in research comprises a variety of dimensions with different possible indicators and benchmarks. Excellence can focus on a topic (research assessment) as well as on a person or career (researcher assessment). Excellence in education and research does not happen in isolation but is embedded in a societal and political context. The research environment and culture, with a focus on inclusivity and scientific integrity, also play a vital role. Seamless transfer of knowledge into society and the economy is another dimension of excellence that should be taken into account.

Recruitment and promotion practices should value cooperation and collaboration outside the restraints of a single research field. They must also take account of research careers (track records) and focus on content rather than output quantity, considering achievements in teaching, outreach, innovation and service to the public as well as research. Moves towards such new measures of excellence can already be seen in the advent of the new CV structure introduced by SNSF in 2022 in application of the San Francisco Declaration on Research Assessment (DORA)⁸⁷, and in project evaluations where the identity of the applicant is not disclosed to the evaluators (e.g. the SNSF Spark Pilot).

Scientific integrity is an inherent dimension of excellence in research and education, and pertains to reliability, honesty, respect and accountability as fundamental principles. General guidance on implementing integrity is provided at the European level by the "European Code of Conduct for Research Integrity"⁸⁸ and at the Swiss national level by the "Code of conduct for scientific integrity" of the Swiss Academies of Arts and Sciences⁸⁹.

⁸⁷ [San Francisco Declaration on Research Assessment \(DORA\)](#)

⁸⁸ [The European Code of Conduct for Research Integrity - ALLEA](#)

⁸⁹ [Code of conduct for scientific integrity by the Swiss Academies of Arts and Sciences](#)

In 2021, the Domain Meeting⁹⁰ decided to set up a working group within the ETH Domain to review and assess the need for adjustments of existing guidelines and procedural rules on scientific integrity at the institutions. In addition, the working group is mandated to examine whether uniform or at least harmonised regulations can be created within the ETH Domain. Further information on this ETH Domain-wide approach will be available in March 2023. The following examples (non-exhaustive) show current activities at the institutional level. ETH Zurich revised its guidelines on scientific integrity⁹¹, developed a research integrity promotion plan and implemented a new course, “Ethics and Scientific Integrity for Doctoral Students”. EPFL revised its relevant directive⁹² and developed a dedicated online course.

The coronavirus pandemic has highlighted the importance of direct contributions by research to solving societal challenges. Thus the notion of impact and outreach across and beyond different research communities is likely to become even more important. One result may be a higher regard for intersectional mobility or the number of transdisciplinary research or direct collaborations. The pandemic has shown that strategies may be challenged by unforeseen events. Processes and strategic plans must therefore remain flexible and adapt quickly to changing circumstances, letting go of what has become obsolete and seizing new opportunities.

⁹⁰ Members of the Domain Meeting: President ETH Board, Presidents ETH Zurich and EPFL, Directors Research Institutes (German: Art. 13 Geschäftsordnung ETH-Rat), (French: art. 13 Règlement du Conseil des EPF)

⁹¹ ETH Zurich Guidelines on scientific integrity

⁹² Directive concerning research integrity and good scientific practice at EPFL

Facts & Figures

Figure 19: Ranking of ETH Zurich in the World Rankings of THE, QS, ARWU and CWTS Leiden 2013–2022

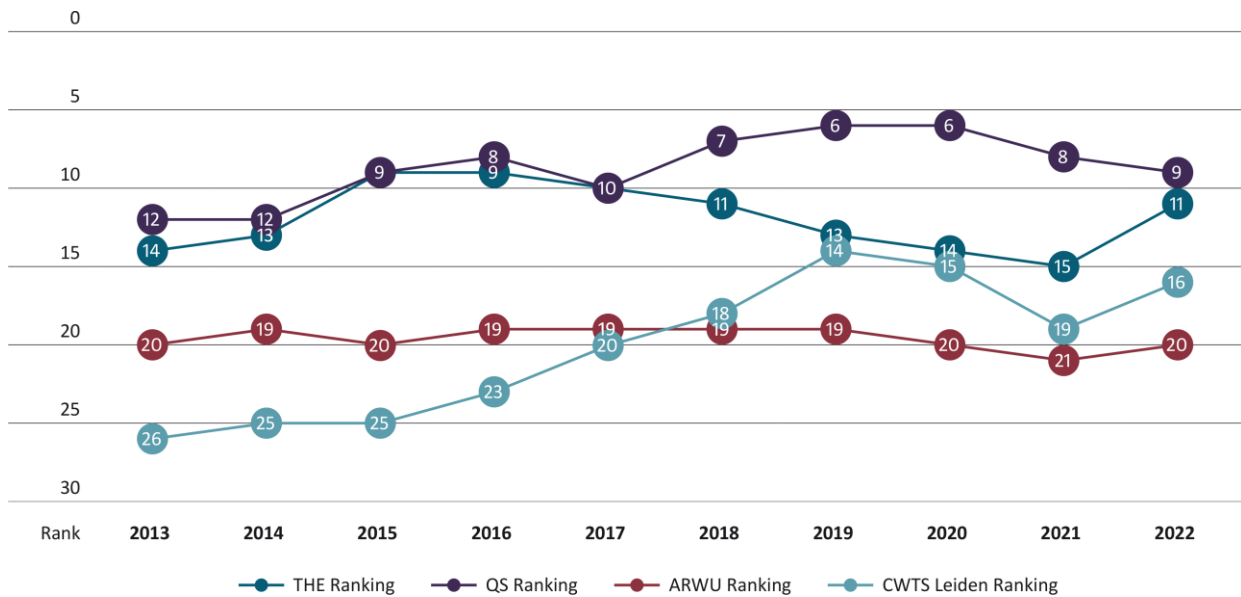
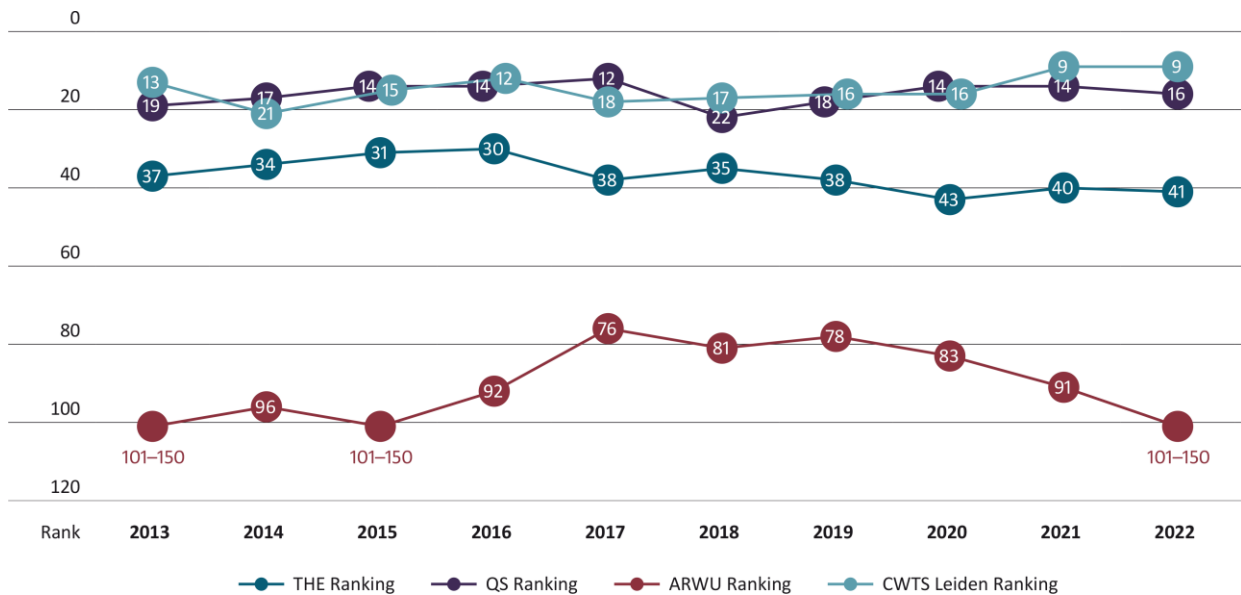


Figure 20: Ranking of EPFL in the World Rankings of THE, QS, ARWU and CWTS Leiden 2013–2022



University Rankings

The universities are assessed and ranked by institutions and businesses using various methods. **THE**⁹³ uses 13 key performance indicators for teaching (30% weighting), research (30%), citations (30%), international outlook (7.5%) and industry income (2.5%). **QS**⁹⁴ focuses mainly on reputation (with a 40% weighting on academic reputation and 10% on employer reputation), followed by faculty/student ratio (20%), citations per faculty (20%) and international faculty ratio/international student ratio (5% each). **ARWU**⁹⁵ makes use of performance indicators based on the academic performance or research output – in particular Nobel Prizes or Fields Medals – of graduates, staff and highly cited researchers from the institutions assessed. The publication activity of an institution is also judged based on the number of articles that have been published in a select group of the most respected journals, and the ratio between the number of publications and the number of researchers employed at an institution. **CWTS Leiden**⁹⁶ is based solely on the publication activity of the universities, using this to calculate the indicators to assess research performance. One commonly used indicator for ranking the universities in the CWTS Leiden ranking is the number and proportion of publications each university has among the top 10% of the most-cited publications in the relevant field (PP (top 10%)). The CWTS Leiden ranking of both Federal Institutes of Technology (cf. figures 19 and 20) are based on this indicator.

Key points

- The ETH Domain institutions use a wide range of tools to evaluate their positioning in education and research and are periodically evaluated according to the “Procedure of Evaluations in the ETH Domain” manual.
- Third-party rankings at international level, regular benchmarking, and alumni and employer surveys will remain important tools for evaluating the ETH Domain’s positioning in education and research.
- Special importance for the development of future excellence in education is attributed to guidance in new teaching techniques.
- To develop and improve excellence it is important to adapt HR procedures, implementing criteria that consider not only the achievements of candidates but also their future scientific potential.
- Excellence refers not only to academic criteria but also to a personal development vision, an entrepreneurial state of mind, societal engagement and leadership skills.
- Scientific integrity is an inherent dimension of excellence in research and education.
- Planning tools must remain flexible to adapt quickly to changing circumstances.

⁹³ [Times Higher Education World University Rankings](#)

⁹⁴ [QS World University Rankings](#)

⁹⁵ [Academic Ranking of World Universities of Shanghai Ranking Consultancy](#)

⁹⁶ [Centre for Science and Technology Studies Leiden Ranking](#)

C

Bibliometric Study 2009–2020 of the Institutions of the ETH Domain

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Introduction

As set out in the mandate for the present intermediate evaluation of the ETH Domain, the ETH Board has commissioned a bibliometric study of the institutions of the ETH Domain. For the fifth time in a row, the analysis has been carried out by the Center for Science and Technology Studies (CWTS) at Leiden University, the Netherlands. This chapter summarises the main results of this study by institutions and presents the main findings of CWTS for the ETH Domain as a whole. The full reports are made available to the members of the expert committee.

CWTS measured the bibliometric performance of the six institutions of the ETH Domain by analysing articles and reviews that were published between 2009 and 2020 and that are indexed in the Web of Science (WoS) database⁹⁷. Citations up to and including 2021 were taken into account⁹⁸. Compared to previous studies performed by CWTS, conference proceedings have also been included in the current study, as this type of publication represents an important form of output in certain fields of science. Due to this methodological improvement, the results may differ substantially from the previous studies conducted by CWTS, especially for institutions for which this type of publication represents a significant part of their output. Self-citations are excluded from the analysis.

While bibliometric measures provide objective evidence about production, collaboration and impact, they only do so for the research that is published in (international) journals and proceedings and therefore only give an incomplete picture of the research quality. Such a quantitative assessment should always be complemented with qualitative information (e.g. the mission and the research goals of an institution/department, etc.) and expert assessments.

⁹⁷ More precisely, the analysis focuses on publications in journals processed for the Web of Science's (WoS) database produced by Clarivate Analytics. The indexes used are the Science Citation Index Expanded (SCIE), Social Science Citation Index (SSCI), and the Arts & Humanities Citation Index (AHCI) and the Conference Proceedings Citation Index (CPCI).

⁹⁸ In this study, a fixed-length citation window of 4 years (if available) was used for the overall period of the analysis (2009–2020). This has the advantage of setting the same citation criteria for all publications, independently of the publication year. The most recent year for receiving citations is 2021.

Indicators and methodology

CWTS's methodology offers a variety of indicators aimed at measuring the scientific output of the institutions, as well as the impact of the publications they produce.

Output indicators take into account the total number of publications that were published during a given period and that are indexed in the reference database. Each publication is fully assigned to the institution, regardless of the number of authors and affiliations (P[full], i.e. “full counting”). Indicators of output are size-dependent, meaning they will scale with the size of the institution under consideration. **Impact indicators** are used to measure the impact of publications based on the number of citations they received. Two impact indicators are highlighted here: the “Mean Normalised Citation Score” (MNCS) and the proportion of the top 10% most cited publications (PP[top 10%]). MNCS is obtained by averaging the normalised citation scores of the institution's publications. The normalised citation score corresponds to the number of times a publication is cited, divided by the average number of citations for similar publications (in terms of research area⁹⁹, publication year and document type). This normalisation allows for a valid comparison between scientific fields, which all have very different citation characteristics. An MNCS score of 2 indicates that the institution's publications have been cited twice as often as the average in the database (1 would equal to the average). PP[top 10%] corresponds to the proportion of publications that, compared with other publications in the same research area and in the same year, belong to the top 10% most frequently cited. A PP[top 10%] of 20% indicates that the institution has twice as many publications in the top 10% (within their respective research area) as the average. MNCS is based on average citations and is sensitive to “outliers” (i.e. extreme values), whereas PP[top 10%] is not influenced by outliers but creates an arbitrary separation between what are considered “top publications” and the others. Thus, MNCS and PP[top 10%] have opposite strengths and weaknesses and are used in combination for assessing the impact of an institution.

In addition, CWTS has analysed whether the institution's research is positioned in research areas with an increasing or decreasing interest worldwide, by determining whether these areas have exhibited an average increase (or decrease) in number of publications in recent years. The indicator “field growth” is meant to understand this worldwide interest and is calculated based on the share of publications in recent years (2019–2020) in a given research area compared to the total number of publications in the same area during the period under study (2009–2020), normalised by a reference value.

Scientific collaborations are also assessed in this chapter based on the affiliation of co-authors. Three types of collaboration, which are mutually exclusive, are identified: (i) “no collaboration” refers to publications authored by a single institution; (ii) “national collaboration” to publications that are produced by different institutions in Switzerland exclusively; and (iii) “international collaboration” to publications that are co-authored by institutions from different countries. If publications involve both national and international research organisations, they are classified as international collaborations. Collaborations with industry were also analysed and correspond to publications for which at least one co-author is affiliated with a company.

⁹⁹ The research area to which a publication belongs is defined by a publication-level classification developed by CWTS. For more details, see Annex B of the full report of the Bibliometric Study of the ETH Domain.

The accessibility of publication was assessed using the Open Access (OA)/Closed Access nature of publications¹⁰⁰. In this study, CWTS distinguishes three types of OA models: (i) Gold (the journal publisher makes all articles and related content available for free, immediately on the journal's website); (ii) Hybrid (publication freely available under an open licence in a paid-access journal); (iii) Green (published in paid-access journals, self-archived by authors in repositories or researchers' websites, independently from publication by a publisher). OA publications are counted only as one type at the same time. If a paper is both Green and Gold, it is counted as Gold. Bronze OA publications are free to read only on the publisher page without a licence. As such, they were disregarded as OA and identified as Closed Access publications.

CWTS also introduced an indicator related to gender diversity of authors. For each publication, CWTS counted the *number* of female and male authors from the institution under study^{101,102} as well as the number of female and male authors overall (i.e. from all co-authoring institutions). For a given publication, the indicator of gender diversity (RPA(F)) corresponds to the ratio female/male ("share" of female authors) from the institution under study compared to the ratio female/male considering all co-authors in the publication (the benchmark). A value above 1 means that the institution under study has a higher share of female authors than all institutions involved in the same publication (or set of publications).

¹⁰⁰ The statistics concerning OA publications only include publications for which the open/closed access nature could be determined based on the Unpaywall database.

¹⁰¹ The gender analysis is limited to these two categories due to methodological limitations. This categorisation does not imply any judgement on the issue of gender diversity.

¹⁰² See section "Summary of method" of the full report of the Bibliometric Study of the ETH Domain and <https://www.leidenranking.com/information/indicators#gender-indicators>

Main results

ETH Domain

Overall output and impact of publications

Overall, researchers from the institutions of the ETH Domain were involved in 136,535 publications between 2009 and 2020. The impact of the ETH Domain publications has remained high over the years (MNCS>1.59, PP[top10%]>18%) although a slight decrease in MNCS values can be observed since 2015 (cf. figure 21). The fact that MNCS and PP[top10%] do not show the same trend may be explained by a few very highly cited publications in the first years of the analysis (as MNCS is influenced by “outliers”).

Collaboration and partners

During the period 2009–2020, 79% of the ETH Domain publications were published in collaboration with other organisations. In the same period, the share of publications performed in international collaboration increased from 60% to 72%. Overall, 67% of all publications involved international partners during this period. The share of publications performed in collaboration with industry increased from 8% to 10%. Figure 22 lists the countries in which the main institutions collaborating with the ETH Domain are based (with the USA, Switzerland and Germany on top).

The collaboration pattern within the ETH Domain (cf. figure 23) indicates that the highest number of co-publications is between PSI and ETH Zurich (4,294 co-publications). Output indicators being size-dependent figures, the absolute number of co-publications are thus dominated by ETH Zurich and EPFL. In terms of impact, all collaborations within the ETH Domain exhibit an MNCS higher than the world average (i.e. MNCS>1). Co-publications between ETH Zurich and EPFL show the highest impact on average (MNCS: 2.02) followed by publications between ETH Zurich and WSL (MNCS: 1.76).

Research accessibility

Most of ETH Domain research is published in OA (59%) and shows an increasing pattern over time towards more openness (cf. figure 24). The number (and share) of all three types of OA publications (Green, Bronze and Gold) grew steadily during the period 2009 up to 2020. Overall the impact of OA publications is higher (PP[Top10%]>20%) than Closed Access publications (PP[Top10%]<18%) over the entire period under consideration.

Gender diversity of authors

According to CWTS’ analysis, the share of female authors affiliated with the ETH Domain is 9% higher (RPA(F): 1.09) than the share of female authors involved in all ETH Domain publications (i.e. taking into account all the authors from the ETH Domain but also all the co-authoring institutions). The trend analysis shows a slight increase in the share of female authors in the ETH Domain over the years, from 18% (2009–2012) to 22% (2017–2020).

Figure 21: Evolution of impact indicators MNCS and PP[top10%] for the ETH Domain. The dashed line represents the world average (MNCS:1; PP[Top10%]:10%)

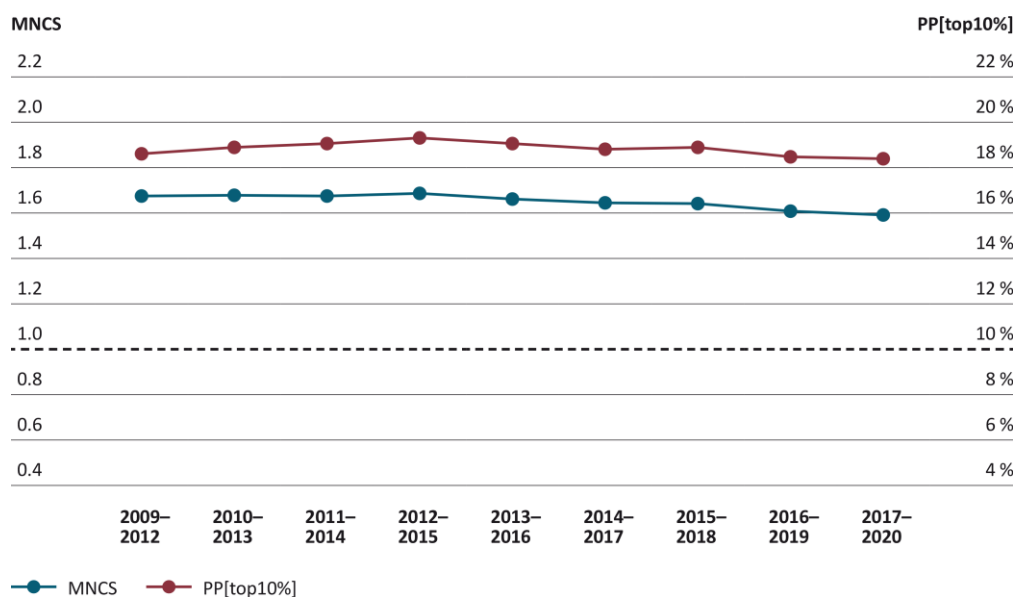


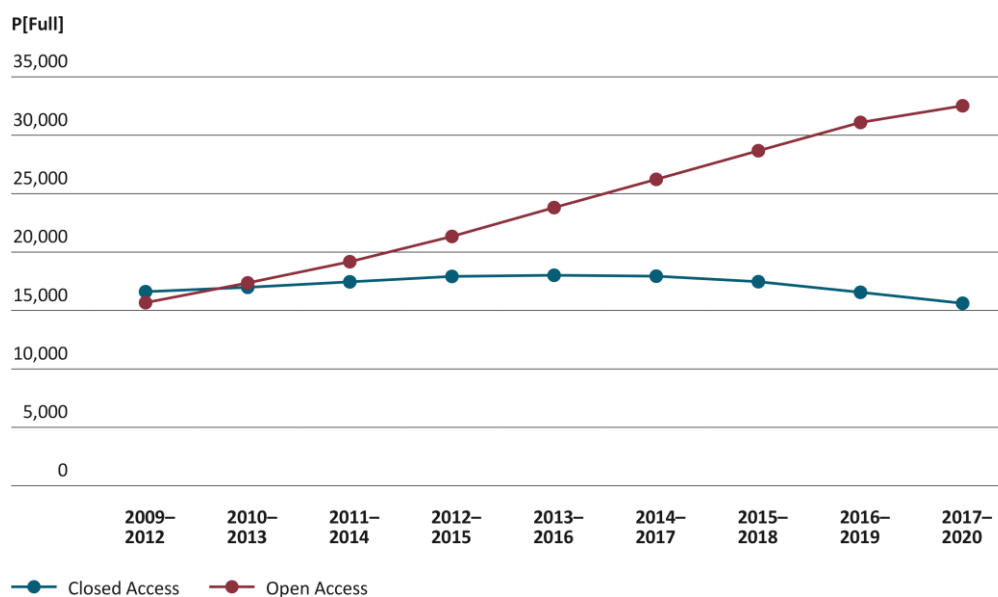
Figure 22: Main partner countries of institutions of the ETH Domain in terms of co-publications (co-publications between institutions of the ETH Domain are excluded)

Country	Number of co-publications	Share of total publications
United States	27,019	20 %
Switzerland	26,576	19 %
Germany	24,706	18 %
United Kingdom	16,113	12 %
France	15,403	11 %
Italy	12,392	9 %
Spain	8,344	6 %
China	8,139	6 %
Netherlands	6,992	5 %
Austria	5,502	4 %
Belgium	5,043	4 %
Japan	4,929	4 %

Figure 23: Number and impact of co-publications between institutions of the ETH Domain

	Indicator	ETH Zurich	EPFL	PSI	WSL	Empa	Eawag
ETH Zurich	P[full]	74,190	1,894	4,294	1,107	2,264	1,832
	MNCS	1.71	2.02	1.54	1.76	1.57	1.54
EPFL	P[full]	1,894	45,073	1,279	390	591	528
	MNCS	2.02	1.63	1.45	1.46	1.42	1.58
PSI	P[full]	4,294	1,279	14,191	125	512	27
	MNCS	1.54	1.45	1.34	1.47	1.64	1.50
WSL	P[full]	1,107	390	125	4,936	20	65
	MNCS	1.76	1.46	1.47	1.42	1.06	1.60
Empa	P[full]	2,264	591	512	20	7,575	121
	MNCS	1.57	1.42	1.64	1.06	1.44	1.54
Eawag	P[full]	1,832	528	27	65	121	4,497
	MNCS	1.54	1.58	1.50	1.60	1.54	1.62

Figure 24: Evolution of Open Access and Closed Access publication output of the ETH Domain between 2009–2020



ETH Zurich

Overall output and impact of publications

The overall output of ETH Zurich between 2009 and 2020 amounts to 74,190 publications. Over this period, ETH Zurich exhibits an overall high citation impact, with field-normalised impact substantially above the international reference values (MNCS>1.67, PP[top10%]>19%, cf. figure 25).

Research profile

The most important subjects for ETH Zurich in terms of output (cf. figure 26) include *Multidisciplinary Sciences* (MNCS: 2.86); *Engineering, Electrical & Electronic* (MNCS: 2.10); *Chemistry, Multidisciplinary* (MNCS: 1.80); *Astronomy & Astrophysics* (MNCS: 1.40); *Geochemistry & Geophysics* (MNCS: 1.55); *Geosciences, Multidisciplinary* (MNCS: 1.72); *Materials Science, Multidisciplinary* (MNCS: 1.48); and *Environmental Sciences and Physics, Applied* (MNCS: 1.63). The impact of these subject categories of activity is high. Most of these categories have shown worldwide growth in terms of output during the last two years, except for *Astronomy & Astrophysics*.

Collaboration and partners

ETH Zurich's publications are predominantly performed in collaboration (79%), with an important role played by international collaboration (65%). Collaboration with industry represents about 9% of ETH Zurich's output. Between 2009 and 2020, the proportion of publications performed in collaboration increased from 72% (2009–2012) to 84% (2017–2020). The proportion of international collaboration increased from 58% to 70% over the same period. There is also a slight upward trend for industry collaboration. Besides Switzerland, ETH Zurich's main partners are located in the USA and the EU (Germany, Italy, France). The UK and China are also important partners (cf. figure 27). Out of all the ETH institutions, ETH Zurich collaborates most with PSI (4,294 co-publications), yet has the highest impact with EPFL (MNCS: 2.02).

Research accessibility

The scientific production of ETH Zurich is mostly published Open Access (57%), showing an increasing pattern over time towards more openness (cf. figure 28). The number (and share) of all three types of OA publications (Green, Bronze and Gold) grew steadily during the period 2009 up to 2020. Overall, over the period 2009–2020, the impact of OA publications was higher (PP[Top10%]>20%) than the impact of Closed Access publications. Moreover, the impact of the latter subsequently decreased to 16% in 2017–2020.

Gender diversity of authors

Overall, the share of female authors at ETH Zurich is 15% more (RPA(F): 1.15) than the share of female authors involved in all of ETH Zurich's publications, i.e. including all co-authors (benchmark). Compared to the benchmark, the share of female authors is highest in *Astronomy & Astrophysics* (RPA(F): 1.42), while in other subject categories, it is close to the benchmark or slightly below.

Figure 25: Evolution of ETH Zurich's impact indicators MNCS and PP[top10%]. The dashed line represents the world average (MNCS:1; PP[Top10%]:10%)

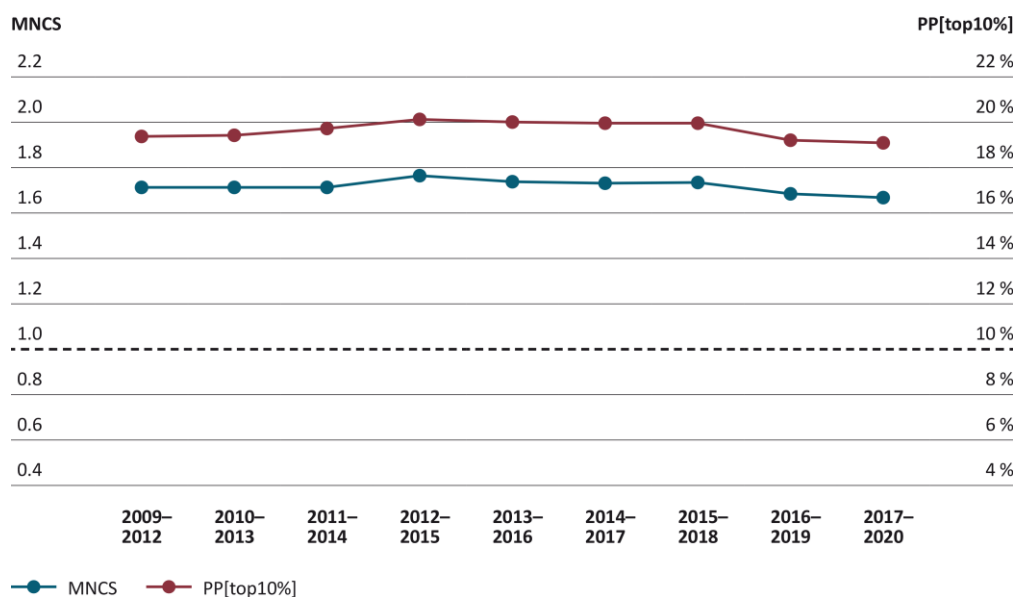


Figure 26: Research profile of ETH Zurich. The numbers adjacent to the blue bars correspond to the mean normalised citation score (MNCS).

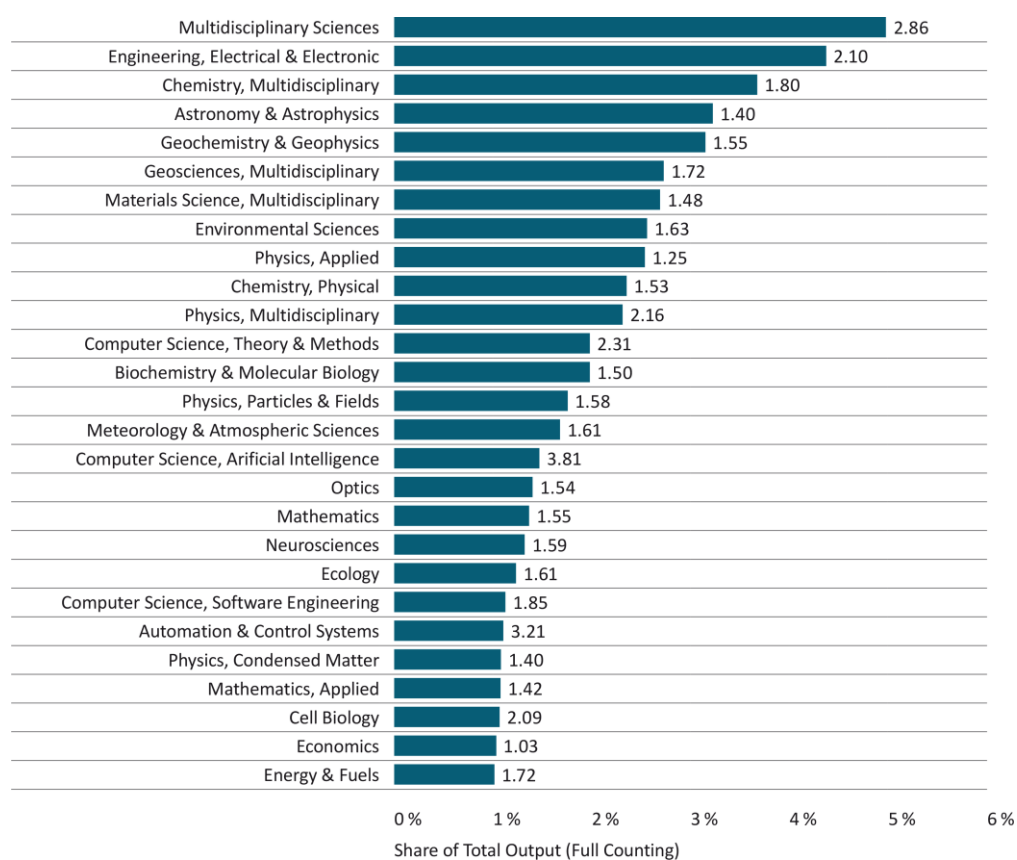
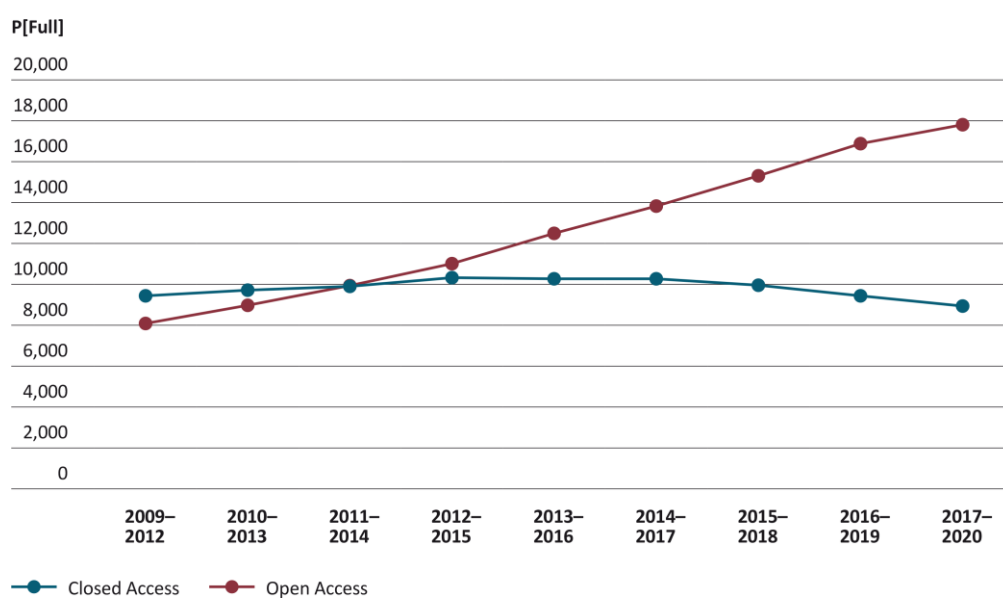


Figure 27: ETH Zurich's main partner countries in terms of co-publications (co-publications between institutions of the ETH Domain are excluded)

Country	Number of co-publications	Share of total publications
Switzerland	15,678	21 %
United States	15,334	21 %
Germany	14,272	19 %
United Kingdom	9,041	12 %
France	7,237	10 %
Italy	6,099	8 %
Spain	3,992	5 %
China	3,807	5 %
Netherlands	3,425	5 %
Austria	3,336	4 %
Belgium	2,944	4 %
Australia	2,719	4 %

Figure 28: Evolution of ETH Zurich's Open Access and Closed Access publication output between 2009–2020



EPFL

Overall output and impact of publications

The overall output of EPFL between 2009 and 2020 amounts to 45,073 publications. Over this period, EPFL exhibits an overall high citation impact, with field-normalised impact substantially above the international reference values (MNCS>1.56, PP[top10%]>18%, cf. figure 29).

Research profile

The most important subjects for EPFL in terms of output (cf. figure 30) include *Engineering, Electrical & Electronics* (MNCS: 1.50); *Physics, Applied* (MNCS: 1.41); *Materials Science, Multidisciplinary* (MNCS: 1.68); *Chemistry, Multidisciplinary* (MNCS: 2.22); *Multidisciplinary Science* (MNCS: 2.95); *Optics* (MNCS: 1.40); *Chemistry, Physical* (MNCS: 1.49); and *Physics, Multidisciplinary* (MNCS: 1.95). The impact of these subject categories of activity is high. Most of these categories have shown worldwide growth in terms of output during the last two years.

Collaboration and partners

EPFL's publications are primarily performed in collaboration (76%), with a prevailing role played by international collaboration (65%). Collaboration with industry represents about 10% of EPFL's output. Between 2009 and 2020, the proportion of publications performed in collaboration increased from 71% (2009–2012) to 81% (2017–2020). The proportion of international collaboration increased from 59% to 70% over the same period. There is also a slight upward trend for industry collaboration. Besides Switzerland, EPFL's main partners are located in the USA and the EU (Germany, Italy, France). The UK and China are also important partners (cf. figure 31). Out of all the ETH institutions, EPFL collaborates most with ETH Zurich (1,894 co-publications) with an overall MNCS of 2.02.

Research accessibility

The scientific production of EPFL is mostly published Open Access (64%), showing an increasing pattern over time towards more openness (cf. figure 32). The number (and share) of all three types of OA publications (Green, Bronze and Gold) grew steadily during the period 2009 up to 2020. The number of top 10% most cited publications of all three types grew steadily. Moreover, the impact of OA publications remained at a high level throughout the whole period while that of Closed Access publications decreased in the most recent years.

Gender diversity of authors

Overall, the share of female authors is just above (RPA(F): 1.03) the share of female authors involved in all of EPFL's publications, i.e. including all co-authors (benchmark). Compared to the benchmark, the share of female authors is highest in Mathematics (RPA(F): 1.30), while in other subject categories it is close to or below the benchmark.

Figure 29: Evolution of EPFL's impact indicators MNCS and PP[top10%]. The dashed line represents the world average (MNCS:1; PP[Top10%]:10%)

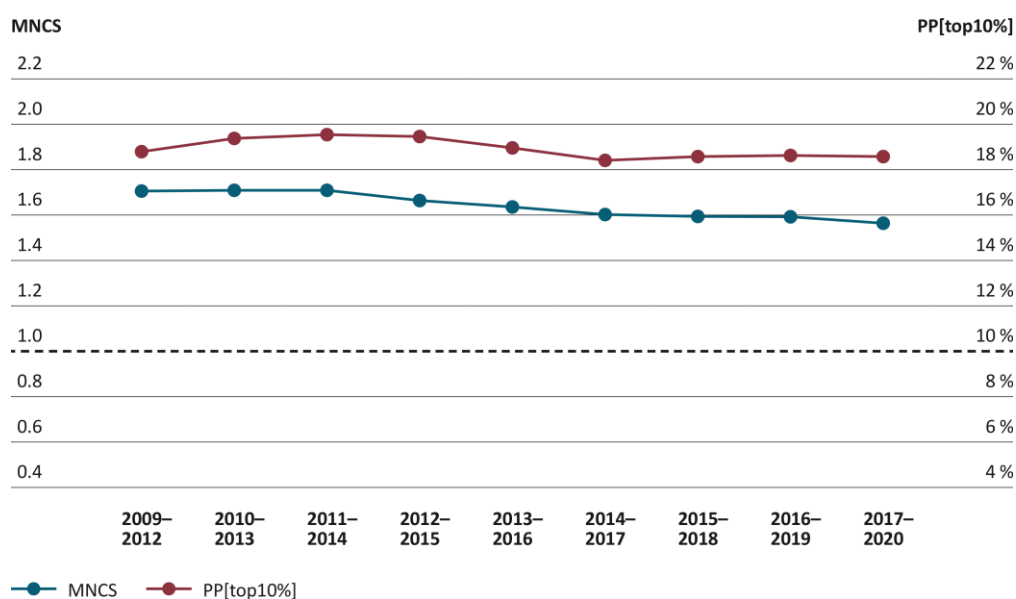


Figure 30: Research profile of EPFL. The numbers adjacent to the blue bars correspond to the mean normalised citation score (MNCS).

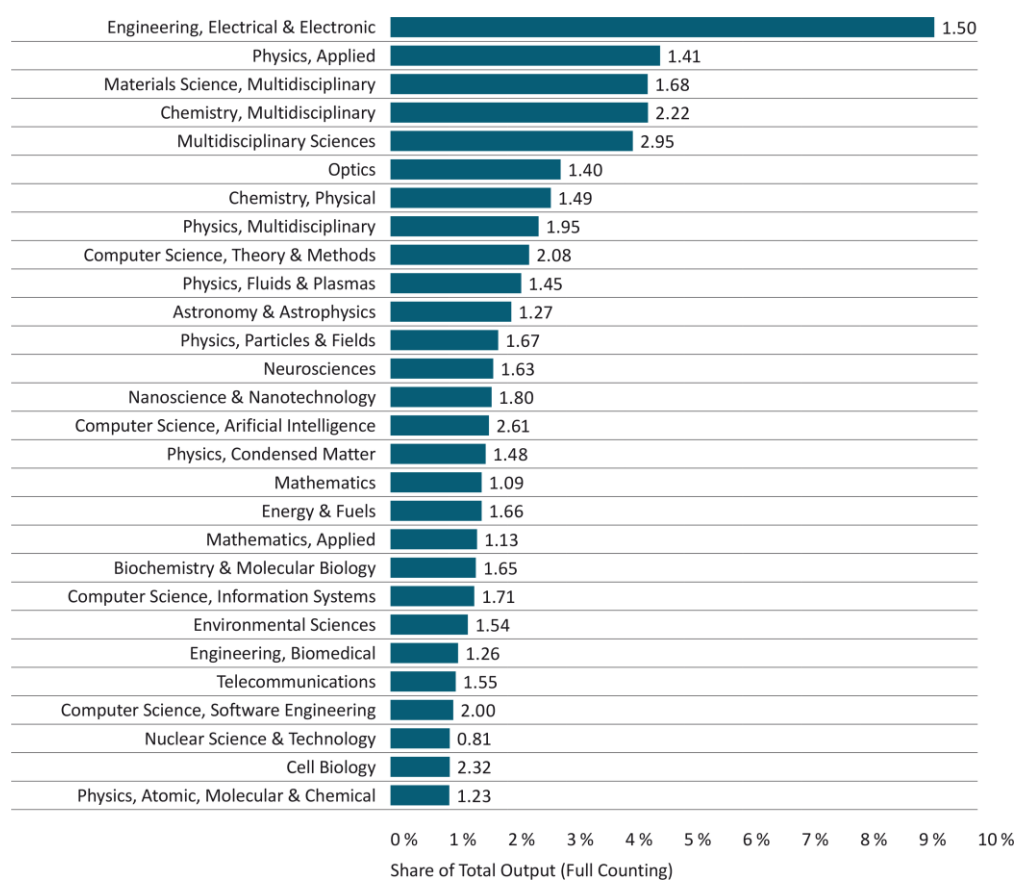
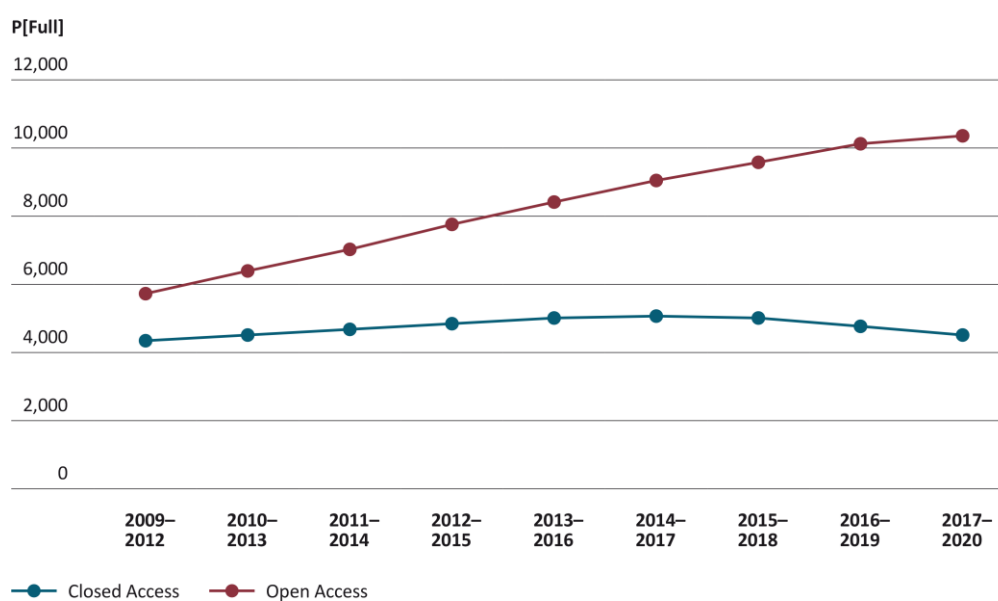


Figure 31: EPFL's main partner countries in terms of co-publications (co-publications between institutions of the ETH Domain are excluded)

Country	Number of co-publications	Share of total publications
United States	8,639	19 %
Switzerland	7,617	17 %
Germany	6,153	14 %
France	5,959	13 %
Italy	5,000	11 %
United Kingdom	4,801	11 %
Spain	3,208	7 %
China	3,090	7 %
Netherlands	2,578	6 %
Russian Federation	2,039	5 %
Poland	1,845	4 %
Japan	1,816	4 %

Figure 32: Evolution of EPFL's Open Access and Closed Access publication output between 2009-2020



PSI

Overall output and impact of publications

The overall output of PSI between 2009 and 2020 amounts to 14,191 publications. Over this period, PSI exhibits an overall high citation impact, with field-normalised impact substantially above the international reference values (MNCS>1.22, PP[top10%]>13%, cf. figure 33).

Research profile

The most important subjects for PSI in terms of output (cf. figure 34) include *Physics, Applied* (MNCS: 1.33); *Materials Science, Multidisciplinary* (MNCS: 1.15); *Physics, Particles & Fields* (MNCS: 1.32); *Physics, Multidisciplinary* (MNCS: 2.31); *Physics, Condensed Matter* (MNCS: 1.32); *Chemistry, Physical* (MNCS: 1.05); *Nuclear Science & Technology* (MNCS: 0.98); and *Multidisciplinary Sciences* (MNCS: 2.97). The impact of these subject categories of activity is high or around average. Most of these categories have shown worldwide growth in terms of output during the last two years.

Collaboration and partners

PSI's publications are predominantly performed in collaboration (90%), with a prevailing role played by international collaboration (76%). Collaboration with industry represents about 9% of PSI's output. Between 2009 and 2020, the proportion of publications performed in collaboration increased from 85% (2009–2012) to 94% (2017–2020). The proportion of international collaboration increased from 71% to 80% over the same period, whereas collaboration with industry remained stable (around 9%). Outside of Switzerland, PSI's main partners are located in the EU (Germany, France, Italy), in the USA and in the UK. China and the Russian Federation are also important partners (cf. figure 35). Out of all the ETH Domain institutions, PSI collaborates most with ETH Zurich (4,294 co-publications) with an overall MNCS of 1.54. It is interesting to note that publications co-authored in collaboration with Empa have the highest impact (MNCS: 1.64).

Research accessibility

The scientific production of PSI is mostly published Open Access (63%), with an increasing pattern over time towards more openness (cf. figure 36). The number (and share) of all three types of OA publications (Green, Bronze and Gold) grew steadily during the period 2009 up to 2020. In particular, Gold OA publications are now the preferred type, meaning that most publications are now published in OA journals. The number of top 10% most cited publications of Gold OA publications increased significantly (about 3-fold) between 2010 and 2018.

Gender diversity of authors

Overall, the share of female authors at PSI is 45% above (RPA(F): 1.45) the share of female authors involved in all of PSI's publications, i.e. including all co-authors (benchmark). Compared to the benchmark, the share of female authors is highest in *Physics, Nuclear* (RPA(F): 1.77), *Physics, Particles & Fields* (RPA(F): 1.47) and *Astronomy & Astrophysics* (RPA(F): 1.47) while in other subject categories it is closer to or below the benchmark.

Figure 33: Evolution of PSI's impact indicators MNCS and PP[top10%]. The dashed line represents the world average (MNCS:1; PP[Top10%]:10%)

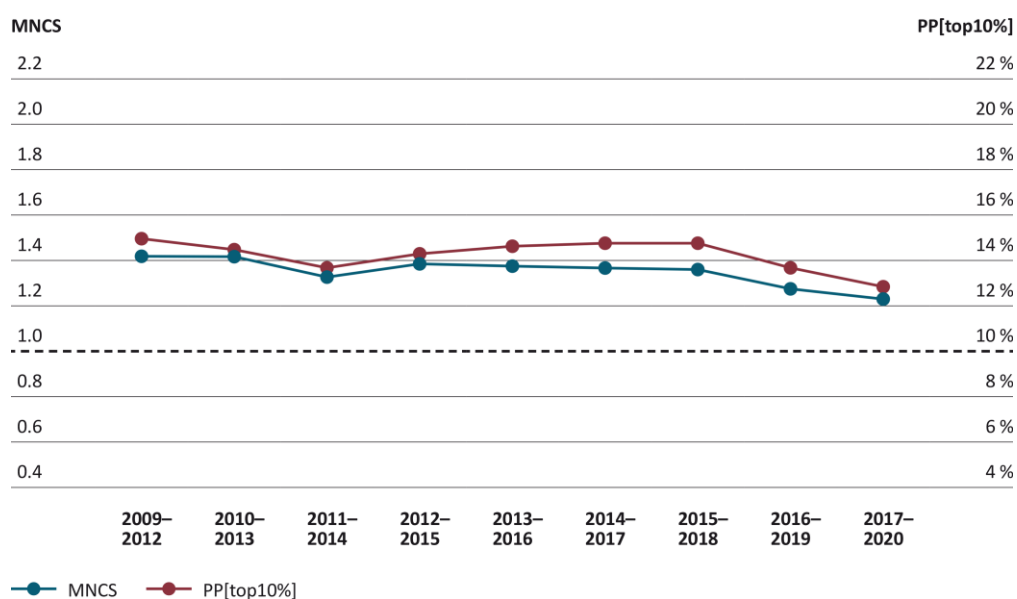


Figure 34: Research profile of PSI. The numbers adjacent to the blue bars correspond to the mean normalised citation score (MNCS).

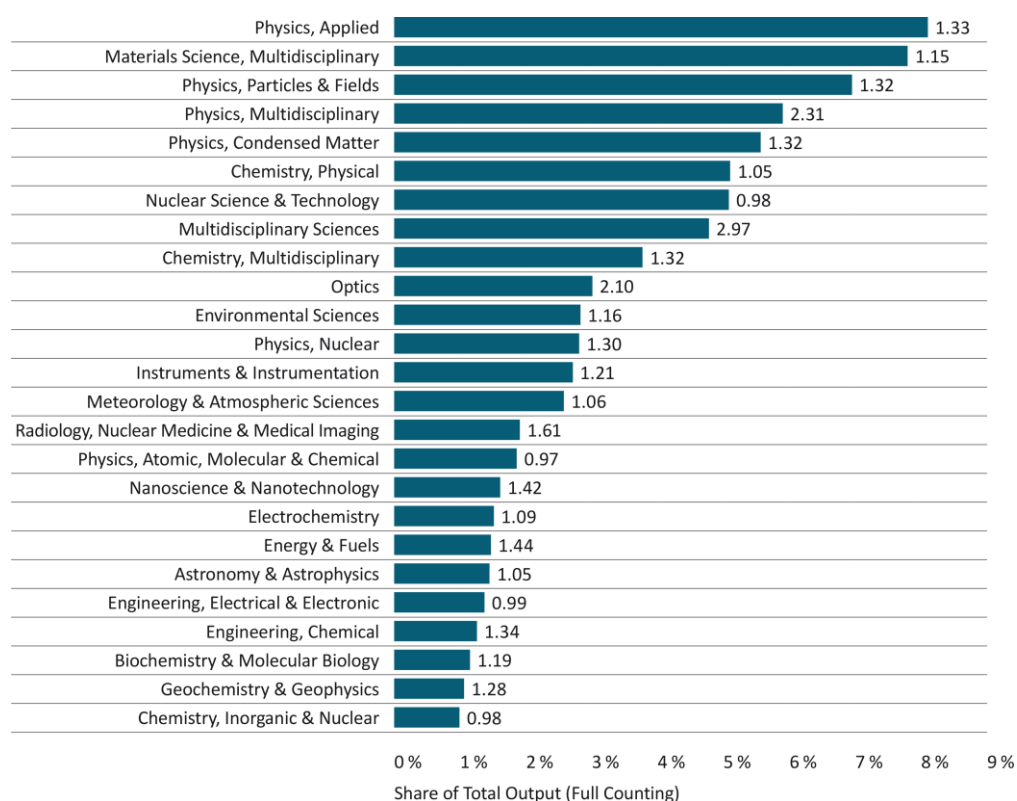
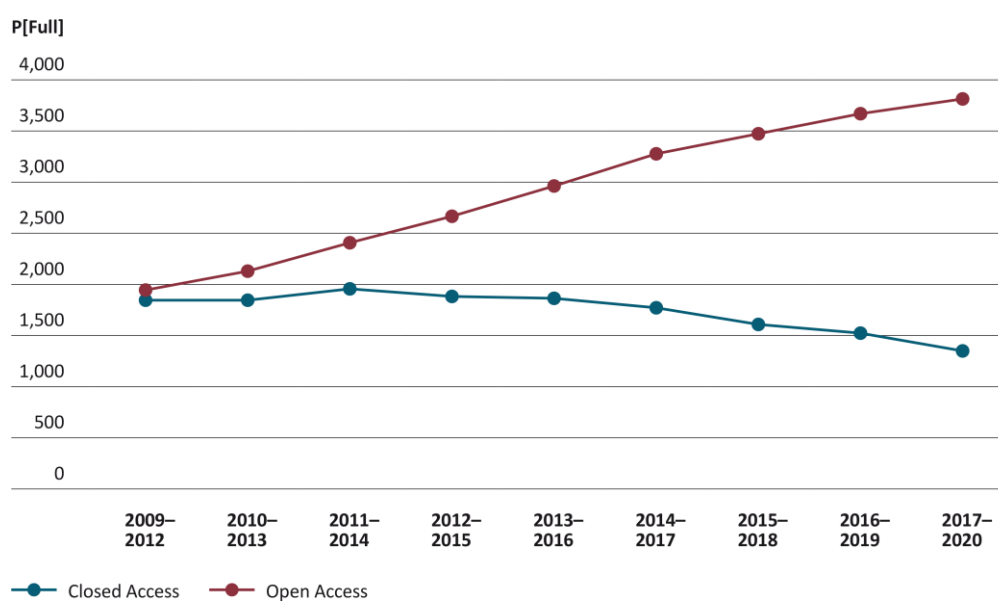


Figure 35: PSI's main partner countries in terms of co-publications (co-publications within the ETH Domain are excluded)

Country	Number of co-publications	Share of total publications
Germany	4,392	31 %
Switzerland	3,623	26 %
United States	3,435	24 %
France	3,160	22 %
United Kingdom	2,787	20 %
Italy	2,167	15 %
China	1,809	13 %
Spain	1,689	12 %
Russian Federation	1,677	12 %
Poland	1,554	11 %
Belgium	1,553	11 %
Austria	1,484	10 %

Figure 36: Evolution of PSI's Open Access and Closed Access publication output between 2009–2020



WSL

Overall output and impact of publications

The overall output of WSL between 2009 and 2020 amounts to 4,936 publications. Over this period, WSL exhibits an overall high citation impact, with field-normalised impact above the international reference values (MNCS>1.37, PP[top10%]>14%, cf. figure 37).

Research profile

The most important subjects for WSL in terms of output (cf. figure 38) include *Ecology* (MNCS: 1.52); *Forestry* (MNCS: 1.27); *Geosciences, Multidisciplinary* (MNCS: 1.39); *Environmental Sciences* (MNCS: 1.29); *Plant Sciences* (MNCS: 1.78); *Multidisciplinary Sciences* (MNCS: 2.55); *Geography, Physical* (MNCS: 1.39); and *Meteorology & Atmospheric Sciences* (MNCS: 1.36). The impact of these subject categories of activity is high. These categories have shown worldwide growth in terms of output during the last two years.

Collaboration and partners

WSL's publications are primarily performed in collaboration (91%), with a prevailing role played by international collaboration (74%). Collaboration with industry represents about 5% of WSL's output. Between 2009 and 2020, the proportion of publications performed in collaboration increased from 83% (2009–2012) to 94% (2017–2020). The proportion of international collaboration increased from 61% to 81% over the same period, whereas collaboration with industry remained stable (around 4–5%). Outside of Switzerland, WSL's main partners are located in the EU (Germany, France, Italy), in the USA and in the UK (cf. figure 39). Out of all the ETH Domain institutions, WSL has both the highest output and impact for co-publications with ETH Zurich (1,107 co-publications, MNCS: 1.76).

Research accessibility

The scientific production of WSL is mostly published Open Access (61%), with an increasing pattern over time towards more openness (cf. figure 40). The number (and share) of all three types of OA publications (Green, Bronze and Gold) grew steadily during the period 2009 up to 2020, especially Gold OA.

Gender diversity of authors

Overall, the share of female authors at WSL is below (RPA(F): 0.90) the share of female authors involved in all of WSL's publications, i.e. including all co-authors (benchmark). Compared to the benchmark, the share of female authors is highest in *Mycology* (RPA(F): 1.36), while in other subject categories it is close to or below the benchmark.

Figure 37: Evolution of WSL's impact indicators MNCS and PP[top10%]. The dashed line represents the world average (MNCS:1; PP[Top10%]:10%)

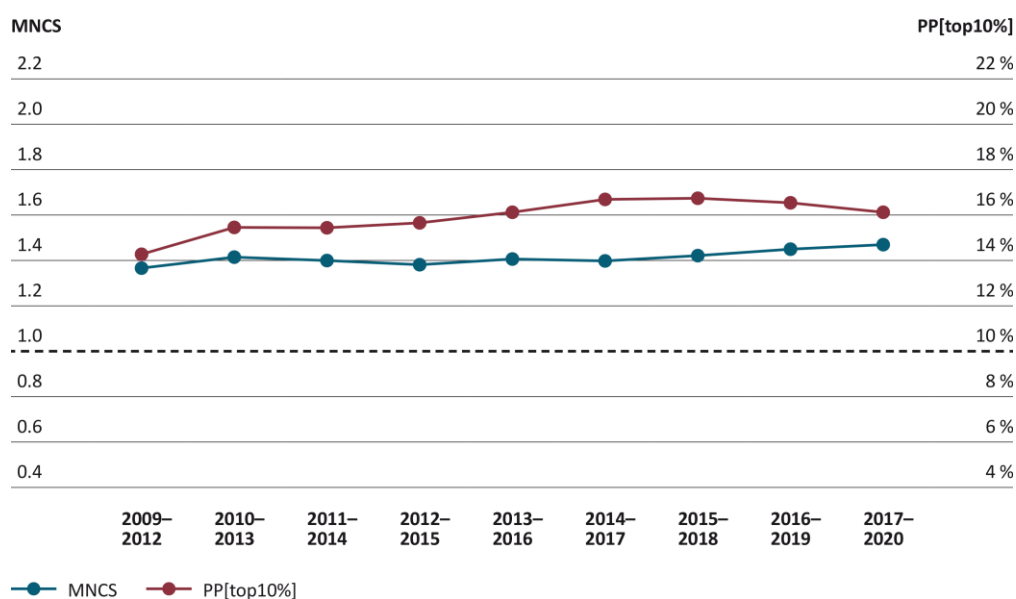


Figure 38: Research profile of WSL. The numbers adjacent to the blue bars correspond the mean normalised citation score (MNCS).

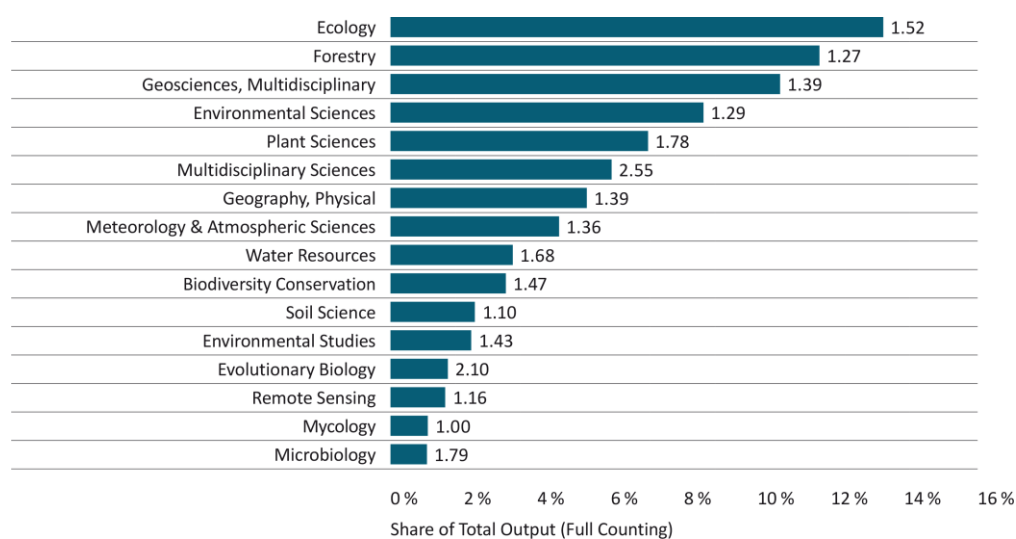
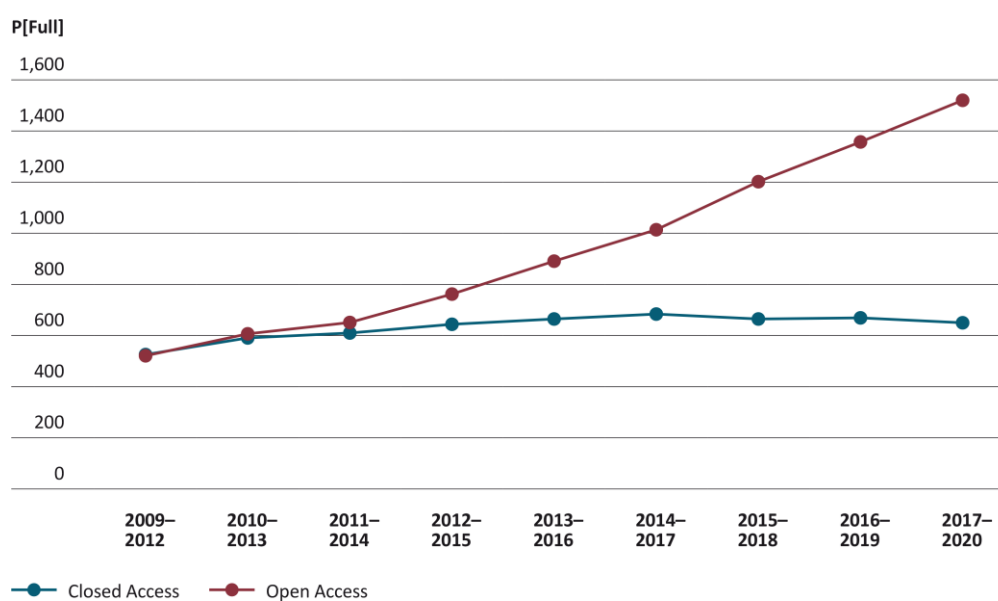


Figure 39: WSL's main partner countries in terms of co-publications (co-publications within the ETH Domain are excluded)

Country	Number of co-publications	Share of total publications
Switzerland	1,270	26 %
Germany	1,228	25 %
United States	1,019	21 %
France	777	16 %
United Kingdom	712	14 %
Italy	514	10 %
Spain	445	9 %
Netherlands	408	8 %
Czech Republic	386	8 %
Austria	379	8 %
Sweden	366	7 %
Canada	355	7 %

Figure 40: Evolution of WSL's Open Access and Closed Access publication output between 2009–2020



Empa

Overall output and impact of publications

The overall output of Empa between 2009 and 2020 amounts to 7,575 publications. Over this period, Empa exhibits an overall high citation impact, with field-normalised impact substantially above the international reference values (MNCS>1.35, PP[top10%]>16%, cf. figure 41).

Research profile

The most important subjects for Empa in terms of output (cf. figure 42) include *Materials Science, Multidisciplinary* (MNCS: 1.46); *Chemistry, Multidisciplinary* (MNCS: 1.56); *Physics, Applied* (MNCS: 1.32); *Chemistry, Physical* (MNCS: 1.50); and *Environmental Sciences* (MNCS: 1.64). The impact of these subject categories of activity is high. All of these categories have shown worldwide growth in terms of output during the last two years.

Collaboration and partners

Empa's publications are primarily performed in collaboration (87%), with a prevailing role played by international collaboration (62%). Collaboration with industry represents about 11% of Empa's output. Between 2009 and 2020, the proportion of publications performed in collaboration increased from 80% (2009–2012) to 91% (2017–2020). The proportion of international collaboration increased from 56% to 65% over the same period, whereas collaboration with industry has remained stable (around 10–11%). Besides Switzerland, Empa's main partners are located in the EU (in particular Germany), in the USA and in the UK. China is also a significant partner (cf. figure 43). Out of all the ETH Domain institutions, Empa collaborates most with ETH Zurich (2,264 co-publications) with an overall MNCS of 1.57. It is interesting to note that publications co-authored in collaboration with PSI have the highest impact (MNCS: 1.64).

Research accessibility

About 49% of Empa's output is published in Open Access, showing an increasing pattern over time towards more openness (cf. figure 44). The number (and share) of all three types of OA publications (Green, Bronze and Gold) grew steadily during the period 2009 up to 2020. The number of top 10% most cited publications of all three types of OA publications has increased steeply since 2015, while that of Closed Access publications has decreased dramatically.

Gender diversity of authors

Overall, the share of female authors at Empa is just below (RPA(F): 0.97) the share of female authors involved in all of Empa's publications, i.e. including all co-authors (benchmark). Compared to the benchmark, the share of female authors at Empa is highest in Engineering, Chemical (RPA(F): 1.13), while in other subject categories it is closer to or below the benchmark.

Figure 41: Evolution of Empa's impact indicators MNCS and PP[top10%]. The dashed line represents the world average (MNCS:1; PP[Top10%]:10%)

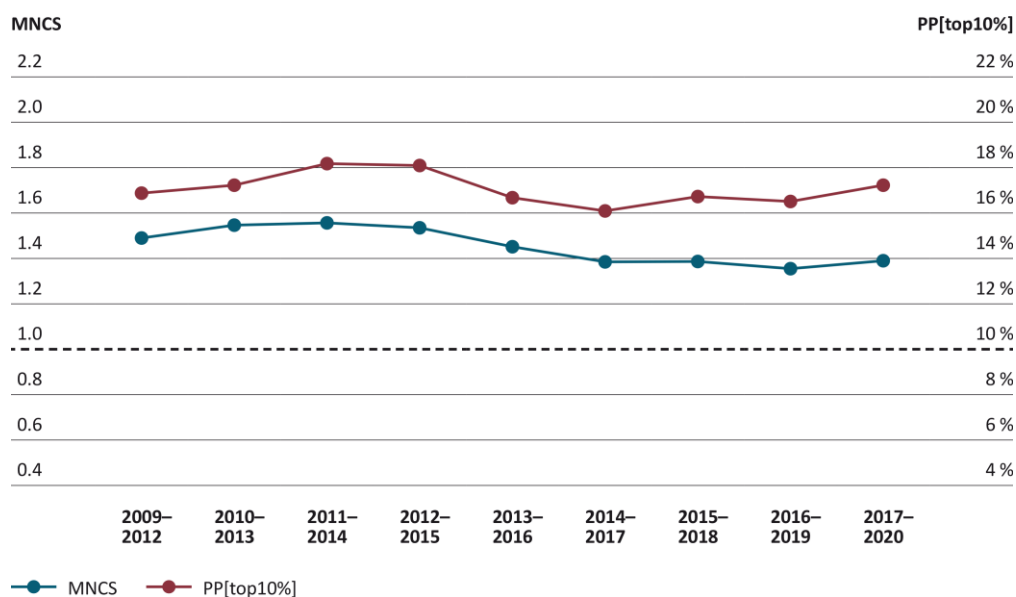


Figure 42: Research profile of Empa. The numbers adjacent to the blue bars correspond to the mean normalised citation score (MNCS).

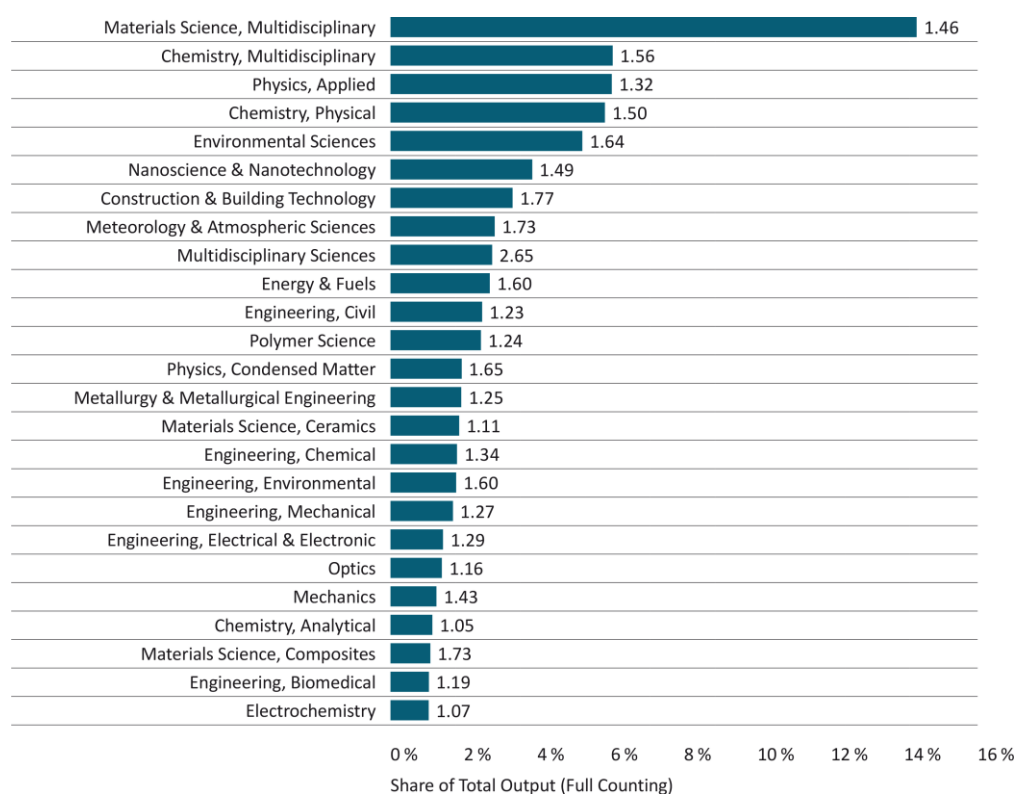
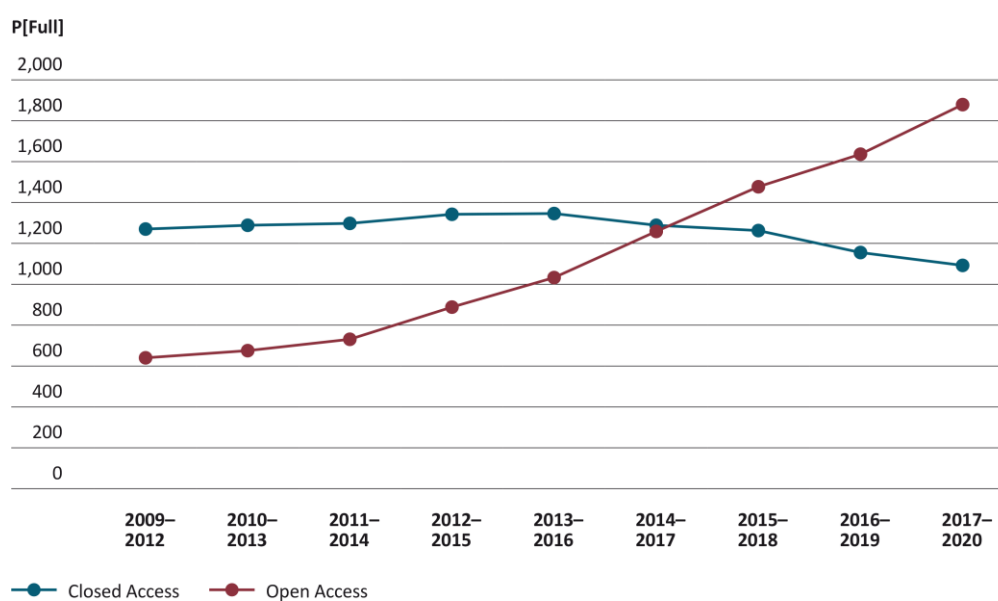


Figure 43: Empa's main partner countries in terms of co-publications (co-publications within the ETH Domain are excluded)

Country	Number of co-publications	Share of total publications
Germany	1,198	16 %
Switzerland	1,111	15 %
United States	803	11 %
United Kingdom	610	8 %
France	493	7 %
Italy	391	5 %
China	365	5 %
Spain	331	4 %
Netherlands	282	4 %
Belgium	261	3 %
Austria	236	3 %
Poland	233	3 %

Figure 44: Evolution of Empa's Open Access and Closed Access publication output between 2009–2020



Eawag

Overall output and impact of publications

The overall output of Eawag between 2009 and 2020 amounts to 4,497 publications. Over this period, Eawag exhibits a high citation impact overall, with field-normalised impact substantially above the international reference values (MNCS > 1.50, PP[top10%] > 16%, cf. figure 45). A steady decrease of Eawag's MNCS during most of the period under consideration can be observed. A potential explanation for this decrease is the very high impact of Eawag during the earliest years of the period, which may have made it difficult for Eawag to sustain the increase in its impact. In a worldwide comparison, however, Eawag's MNCS is still high (> 1.4 over the whole period 2009–2020). A similar observation can be made for the indicator PP[top10%], which also shows a decline over time. However, as for MNCS, Eawag presents a very high level of production of highly cited publications, with about 20% of such publications in the period 2009–2012 and still with over 16% of highly cited publications in the last period, 2017–2020.

Research profile

The most important subjects for Eawag in terms of output (cf. figure 46) include *Environmental Sciences* (MNCS: 1.57); *Ecology* (MNCS: 1.75); *Engineering, Environmental* (MNCS: 1.92); *Water Resources* (MNCS: 1.37), and *Multidisciplinary Sciences* (MNCS: 2.69). The impact of these subject categories is high, and all of them have shown worldwide growth in terms of output during the last two years.

Collaboration and partners

Eawag's publications are primarily performed in collaboration (95%), with a prevailing role played by international collaboration (72%). Collaboration with industry represents about 6% of Eawag's output. Between 2009 and 2020, the proportion of publications performed in collaboration increased from 91% (2009–2012) to 97% (2017–2020). The proportion of international collaboration increased from 66% to 76% over the same period while collaboration with industry remained stable (around 6%). Besides Switzerland, Eawag's main partners are located in the USA and EU (in particular in Germany, the Netherlands and France) and in the UK. China is also an important partner (cf. figure 47). Out of all the ETH Domain institutions, Eawag collaborates most with ETH Zurich (1,832 co-publications) with an overall MNCS of 1.54.

Research accessibility

The scientific production of Eawag is mostly published Open Access (61%), showing an increasing pattern over time towards more openness (cf. figure 48). The number (and share) of all three types of OA publications (Green, Bronze and Gold) grew steadily during the period 2009 up to 2020, with a preference for Green OA. The number of top 10% most cited publications of Green OA publications increased significantly (over 2-fold) between 2009 and 2020.

Gender diversity of authors

Overall, the share of female authors at Eawag is very close (RPA(F): 0.99) to the share of female authors involved in all of Eawag's publications, i.e. including all co-authors (benchmark). Compared to the benchmark, the share of female authors is highest in Toxicology (RPA(F)=1.25) while in other subject categories it is closer to or below the benchmark.

Figure 45: Evolution of Eawag's impact indicators MNCS and PP[top10%]. The dashed line represents the world average (MNCS:1; PP[Top10%]:10%)

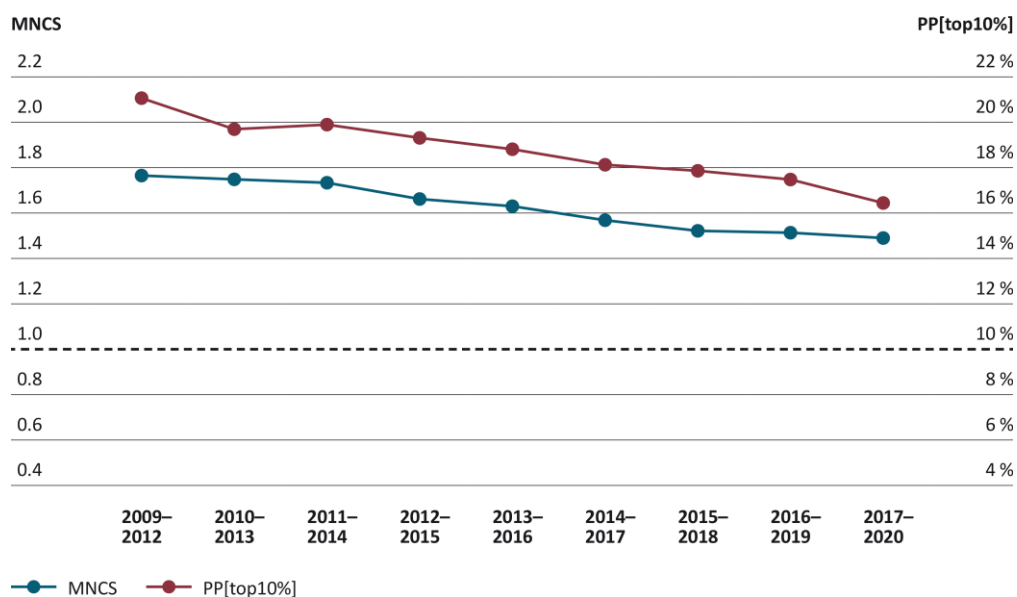


Figure 46: Research profile of Eawag. The numbers adjacent to the blue bars correspond to the mean normalised citation score (MNCS).

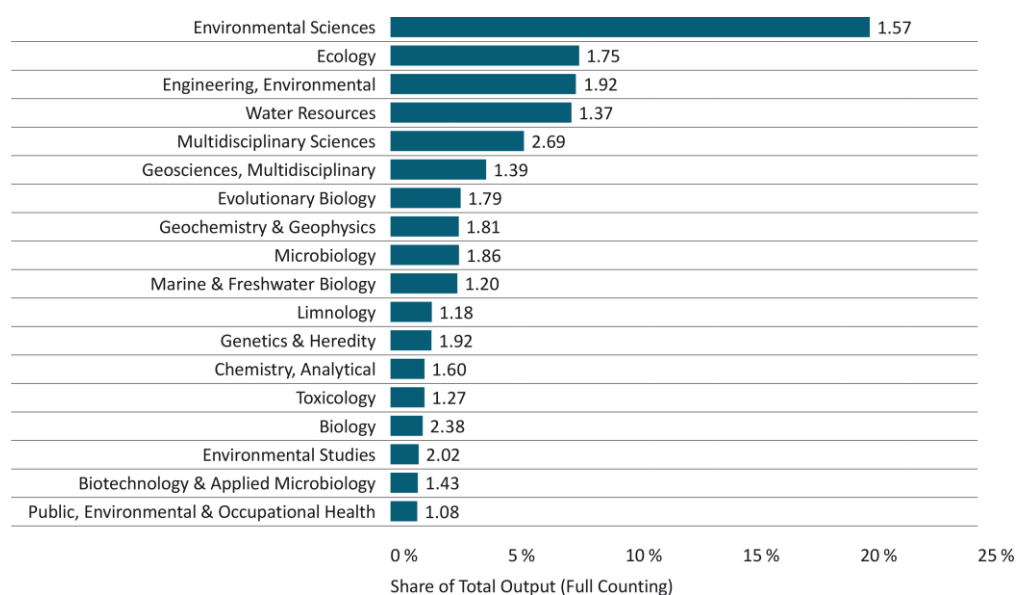
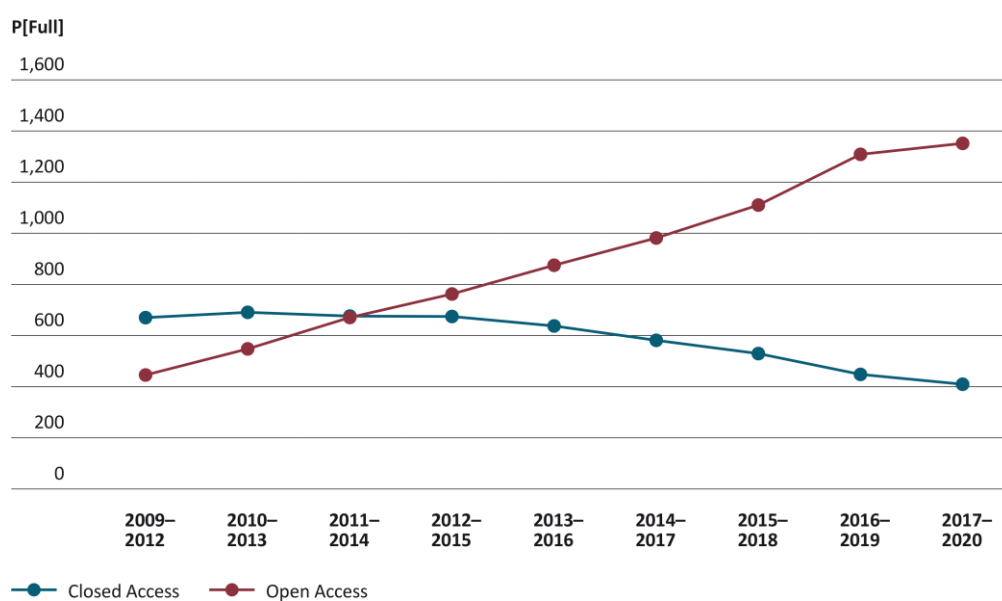


Figure 47: Eawag's main partner countries in terms of co-publications (co-publications within the ETH Domain are excluded)

Country	Number of co-publications	Share of total publications
Switzerland	1,156	26 %
United States	894	20 %
Germany	823	18 %
United Kingdom	518	12 %
Netherlands	393	9 %
France	364	8 %
Sweden	303	7 %
Australia	272	6 %
Canada	255	6 %
Spain	246	5 %
China	237	5 %
Italy	182	4 %

Figure 48: Evolution of Eawag's Open Access and Closed Access publication output between 2009–2020



Publication data

Publisher: ETH Board, Zurich and Bern, Switzerland, www.ethboard.ch

Project management, content and graphic realisations:
ETH Board staff, Science, Communications and Finance
in collaboration with the ETH Domain institutions

Picture credit: Daniel Kellenberger/ETH Board, p. 5

Translation and proofreading:
ETH Board translation services and BMP Translation AG, Basel, Switzerland

Layout and printing:
atelier MUY, Zurich, mediaviso AG, Zurich and cube media AG, Zurich, Switzerland

©ETH Board, January 2023

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Institutes of Technology

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