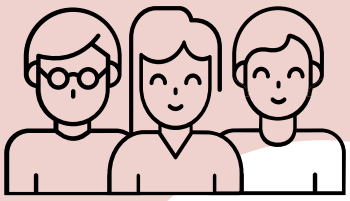
ETH BOARD

ANNUAL REPORT OF THE ETH BOARD ON THE ETH DOMAIN 2024

ETH Domain

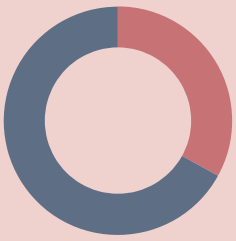
FACTS & FIGURES 2024

Students and doctoral students



39,820

students and doctoral students



32.9%

proportion of women

Employees

with employment contracts

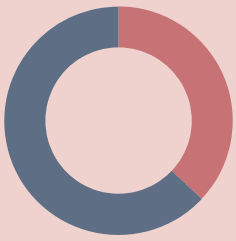
14,989 scientific personnel

4,350 technical personnel

4,265 administrative personnel

24,995

employees
including professors, doctoral students and apprentices



37.0%

proportion of women

475

apprentices

Professors

916

80 appointments, of which

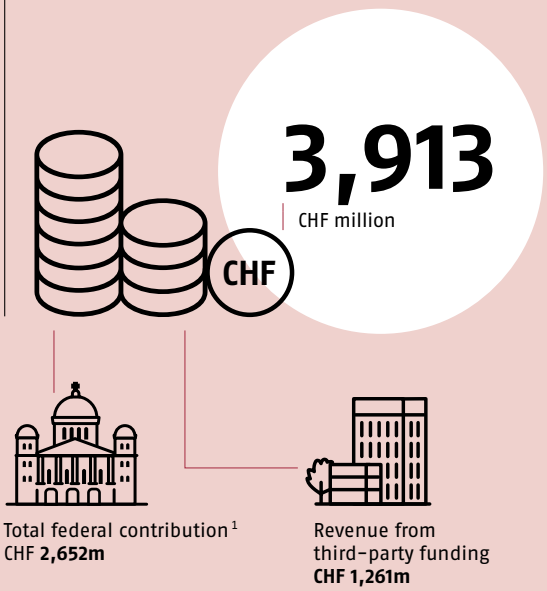
50 newly appointed persons

30 promotions

42%

proportion of women among new appointments

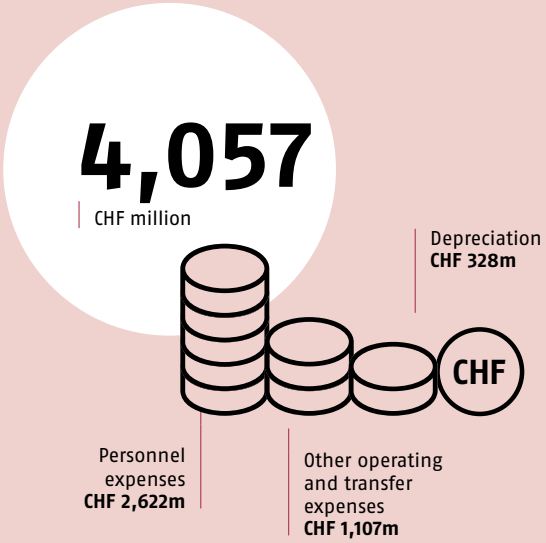
Total revenue



Total federal contribution[1]
CHF **2,652m**

Revenue from
third-party funding
CHF 1,261m

Expenses



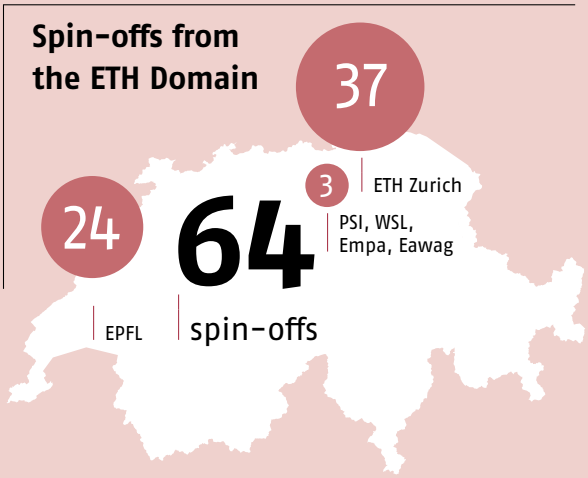
Personnel
expenses
CHF 2,622m

Other operating
and transfer
expenses
CHF 1,107m

Knowledge and technology transfer

282	invention disclosures
25	software notifications
222	patents
137	licences
64	spin-offs

Spin-offs from the ETH Domain



Number of cooperation agreements[2]

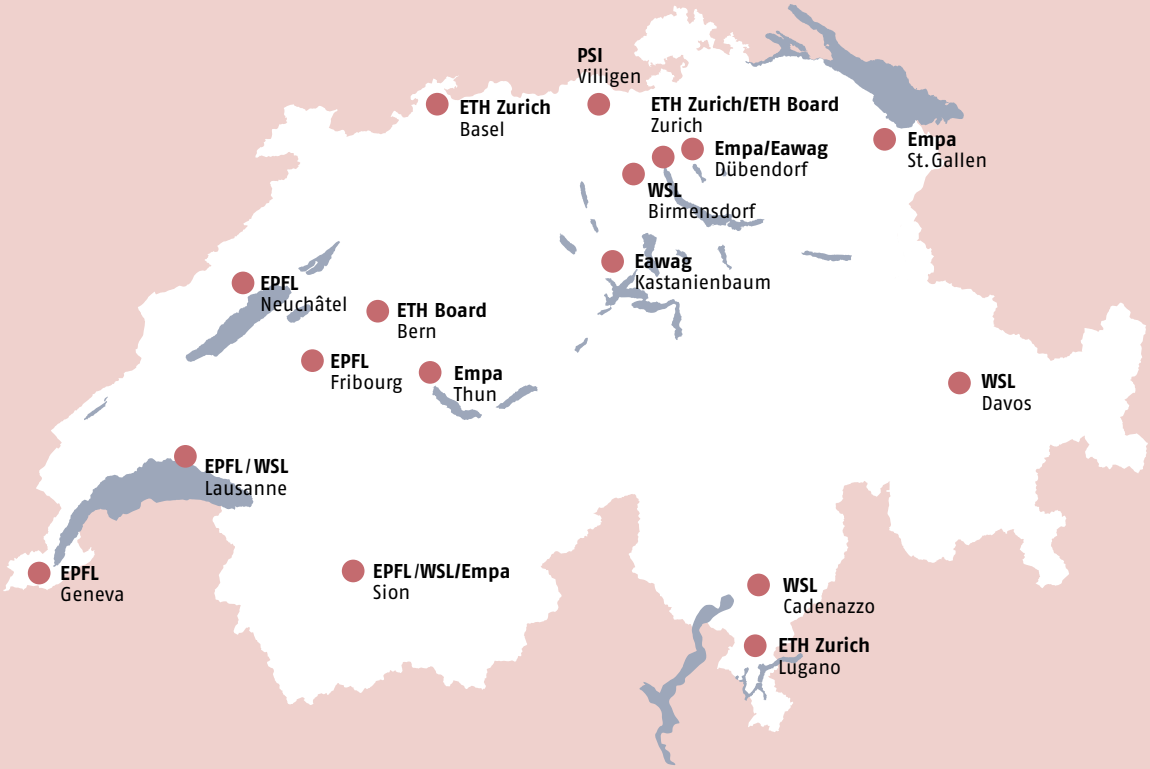
University rankings

THE World ranking	THE Europe ranking	QS World ranking	QS Europe ranking
ETH Zurich			
11	4	7	4
EPFL			
32	8	26	7

[1] Total federal contribution as per the consolidated financial statements for the ETH Domain.
[2] With a volume of at least CHF 50,000 each.

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 through scientific knowledge and technology transfer.



The ETH Domain and its institutions
Higher education, research and innovation at the highest level: the ETH Domain provides these services with just under 25,000 employees, nearly 40,000 students and doctoral students, and a pool of more than 900 professors.

The ETH Domain consists of the two Swiss Federal Institutes of Technology ETH Zurich and EPFL, and the four federal research institutes PSI, WSL, Empa and Eawag. The strategic leadership and supervisory body of the ETH Domain is the ETH Board.
www.ethdomain.ch I www.ethboard.ch

Annual Report of the ETH Board on the ETH Domain 2024

Financial report:
www.ethboard.ch/financialreport2024

Table of contents

PSI: Setting world records by nanometres

Breakthroughs in key industry of the future

In 2024, PSI reported two breakthroughs in connection with microchips: in semiconductor production with photolithography and when analysing microchips themselves.

Empa: AI and materials research

Speeding up materials research with robots

Researchers at Empa believe that it will be a case of working together, not against each other.

WSL: Next generation of debris flow warning

A geological anomaly as a stroke of luck for research

At the Illgraben debris-flow observation station, WSL researchers are developing early warning systems that combine seismology and artificial intelligence.

Eawag: Award-winning modern wastewater treatment

Using decades of experience to help the environment

Small quantities, big effect: micropollutants in wastewater are increasingly recognised as environmental problems. Eawag researchers played a key role in developing a globally pioneering strategy to ensure wastewater treatment plants are fit to deal with these residues as well.

FOREWORD

President of the ETH Board:
Michael O. Hengartner

Dear Readers

I know the word "historic" should be used very sparingly. But in 2024, the ETH Board did indeed reach certain decisions that could be described as historic. The aim of these decisions is to counter the growing pressure on the quality of teaching and on the funding of the ETH Domain – and to prepare it for the future.

Demand for degree programmes at ETH Zurich and EPFL remained high in 2024. On the one hand, this is very gratifying, because our country needs these specialists. And we are proud to train them. On the other hand, the gap between the funding of both Federal Institutes of Technology and the number of students continues to widen. To ensure the quality of training in the future, the ETH Board decided to place a limit on admissions to EPFL for Bachelor's students with foreign educational qualifications. It also tripled the tuition fees for foreign students who move to Switzerland to study.

Good, stable framework conditions are crucial for the success of the ETH Domain. However, this includes more than just reliable basic funding from the Federal Government and the international openness of Switzerland. The ETH Domain must also do its homework and position itself in such a way that it can continue to make a significant contribution to the prosperity of our country. We need to ensure that Switzerland remains an internationally recognised leader when it comes to innovation – despite dwindling resources.

For this reason, the ETH Board has launched an organisational development project together with the institutions of the ETH Domain, setting the course for this at the end of 2024. Based on the feedback from a consultation in the ETH Domain, the ETH Board decided to have a concrete proposal drawn up to combine the four research institutes under one roof as a single legal entity. The intention is to create a third pillar for the ETH Domain alongside ETH Zurich and EPFL.

This would increase the presence and visibility of the research institutes for politics, business and society and give our stakeholders and partners access to a comprehensive competence centre.

So, as you can see, historic decisions were made for the ETH Domain in 2024. I would like to thank all those who support the ETH Domain and work to ensure that it remains a driving force behind innovation in our country, trains urgently needed specialists and serves Switzerland's economy and society.

Zurich/Bern, January 2025

Michael O. Hengartner,
President of the ETH Board

THE ERI PERIOD 2021–2024:

HIGH DEMAND WITH INCREASING PRESSURE TO ECONOMISE

In order to maintain the quality of teaching in the face of increasing pressure to cut costs, the ETH Board made decisions on admission to degree programmes and tuition fees in the 2024 reporting period. The difficult financial situation also resulted in several research infrastructures and Joint Initiatives in the Strategic Areas 2021–2024 of the ETH Domain being suspended. Research in the field of artificial intelligence advanced strongly, and the ETH Board took a directional decision in December 2024 with regard to the organisational development of the ETH Domain.

Teaching: Student numbers on the rise

A degree programme at the ETH Zurich or EPFL is very popular. For the year 2024, ETH Zurich recorded 11.6% more new entrants at Bachelor's level than in the previous year, of which 80% came from Switzerland. The situation is similar for Master's students; even at EPFL, the growth rates are still high. However, this encouraging growth, coupled with the increasing pressure to economise at the federal level, saw the ETH Board make several ground-breaking decisions at the end of the ERI period 2021–2024. The ETH Board had to recognise that there was a growing discrepancy between the funding of the ETH Domain and the number of students. This was causing a deterioration in the supervision ratio and posed a considerable risk in terms of maintaining educational quality. The strategy for developing student numbers adopted by the ETH Board in 2023 was already dedicated to dealing with the strong demand for places at both Federal Institutes of Technology. It focussed on the high quality of teaching and defined various fields of action, including – as a final option – the possibility of restricting admissions. The ETH Board eventually had to resort to this measure in the reporting period at the request of the EPFL Executive Board. From the 2025 autumn semester and provisionally up to and including the 2028 autumn semester, foreign students with foreign educational qualifications will be admitted to Bachelor's programmes at EPFL until the total number of 3,000 places for Bachelor's students in the first year of study is reached. Admission will be determined by the applicants' aptitude. In the reporting period, the ETH Board took a further decision with regard to the challenging overall financial situation and the lack of capacity by tripling the tuition fees for foreign Bachelor's and Master's students who move to Switzerland to study at ETH Zurich or EPFL. With this decision, the ETH Board is also taking into account the clear votes and voting results on this topic in Parliament and is offering its support for a solution that can be implemented quickly.

The ETH Board recognises that the excellence of the institutions of the ETH Domain is largely based on attracting the best and brightest from Switzerland and around the world. Internationality as a characteristic feature of outstanding teaching and research conditions must be maintained, not least due to the high demand for skilled workers for Switzerland as a business location. The ETH Board is therefore keen to ensure that highly talented international students,

The institutions of the ETH Domain with notable guests and projects at the 2024 WEF in Davos: State Secretary Martina Hirayama and Federal Councillor Guy Parmelin with ETH Zurich President Joël Mesot in front of the "mythen" electric racing car, built by the Academic Motorsports Club of ETH Zurich.
› Luzia Schär

regardless of their financial background, can continue to study at the two Federal Institutes of Technology and that individual abilities remain at the centre of the selection process.

Participation in the European framework programmes for research and innovation is also of the utmost importance for competing at the highest international level and attracting the top minds. The ETH Board was very pleased with the European Commission's decision to re-authorise applications from Swiss researchers for various Horizon Europe funding instruments in the reporting period. It is particularly pleasing that Switzerland was admitted to almost all calls for proposals for 2025 from Horizon Europe, Digital Europe and the Euratom programme following the conclusion of the negotiations on the Bilateral Agreements III at the end of the year.

Research and infrastructures: Strategic Focus Areas and new Strategic Areas

The three Strategic Focus Areas (SFAs) which the ETH Board defined and funded as priorities for the years 2021–2024 will expire at the end of the ERI period 2021–2024. The three SFAs "Personalized Health", "Data Science" and "Advanced Manufacturing" dealt with societal challenges across institutions and are models for successful cooperation, not only between the various institutions of the ETH Domain and other partners among Swiss universities, but also with the Federal Administration, industry and hospitals.

In its strategic plan for the coming ERI period 2025–2028, the ETH Board has once again decided on funding, which also includes the achievements of the SFAs from the previous period. The Swiss Data Science Center (SDSC), which is funded via the Data Science SFA, will be further developed and supported in the new ERI period as the SDSC+ research infrastructure. There will also be substantial upgrades to existing research infrastructures such as the Sustained Scientific User Laboratory for Simulation and Data-based Science at ETH Zurich's Swiss National Supercomputing Centre CSCS (HPCN 28), EPFL's Swiss Fusion Hub and PSI's IMPACT (Isotope and Muon Production with Advanced Cyclotron and Target Technology).

Thematically, the SFAs are also linked to the five Strategic Areas defined by the ETH Board for the ERI period 2025–2028. In two of these Strategic Areas – "Energy, Climate and Environmental Sustainability"

and "Engagement and Dialogue with Society" – the ETH Board already funded Joint Initiatives of the institutions in the years 2022 to 2024. These addressed key challenges such as the effects of climate change on ecosystems, biodiversity and energy security or developed dialogue formats for mutual understanding between science and society. The ETH Board had to suspend further planned calls for Joint Initiatives in the Strategic Areas "Human Health", "Advanced Materials and Key Technologies" and "Responsible Digital Transformation" in March 2024. The cuts made at the federal level to low-commitment expenditure produce a reduction in the Confederation's financial contribution that cannot be offset with reserves in the long term. In addition to the cancellation of the Joint Initiatives, the establishment of two new research infrastructures in the fields of agriculture and electron microscopy, which were classified as being of national interest by the Swiss National Science Foundation (SNSF), was also abandoned.

Disruptive technologies: Swiss National AI Institute
The ETH Board has prioritised the Swiss AI Initiative, the launch of which was announced at the end of 2023. The ETH Board is convinced that the forces in the field of artificial intelligence (AI) must be pooled across Switzerland and that the necessary capacities for research, teaching and knowledge and technology transfer must be provided. In October 2024, ETH Zurich and EPFL launched the Swiss National AI Institute (SNAI), which builds on the expertise of various AI research disciplines and the two existing AI Centers at ETH Zurich and EPFL.

While SNAI aims to bring Swiss AI research to the forefront internationally, it is also dedicated to training specialists for universities and industry, thereby also supporting the Swiss economy. SNAI will work specifically with the Swiss National Supercomputing Centre CSCS and SDSC+. The new "Alps" supercomputer, which is one of the fastest computers in the world and will support SNAI in the development of the first Swiss AI basic language model, was inaugurated at the CSCS in the autumn of 2024. The model will be based on Swiss values such as trustworthiness, open source and transparency and will be tailored to the needs of Swiss reference groups.

The goal of developing AI technologies that benefit society as a whole and are sustainable is also propagated by ICAIN, the International Computation and AI Network. This was launched in 2024 at the World Economic Forum (WEF) in Davos by the Federal Department of Foreign Affairs (FDFA), ETH Zurich and EPFL in partnership with various stakeholders.

Framework conditions for a successful tomorrow: FIT for the Future
Good, stable framework conditions are crucial for the success of the ETH Domain. This includes not only reliable basic funding from the Federal Government, but also an effective, flexible organisation of the sector in order to be better equipped for current and future challenges. Cooperation within the ETH Domain is to be further strengthened and new strategic topics made easier to integrate. In the course of the reporting year, the ETH Board and the institutions of the ETH Domain defined eight objectives to be achieved as part of the "FIT for the Future" organisational development project and consulted on them internally. Based on these, the ETH Board took a directional decision in December. By combining the four existing research institutes of the ETH Domain and any new units in the future under one roof, the mission-oriented research area is to be further developed and strengthened as an important pillar and independent legal entity within the ETH Domain (see also Objective 5, p. 70).

FASCINATION ETH DOMAIN

Part of the "tracking interferometer", an invention that allows the sample position to be measured with nanometre resolution.

ETH Domain

BETTER PREVENTION AS THE KEY TO HEALTHY LIVING

For many people, the last few years of life are still shaped by illnesses and limitations. Healthy ageing could be promoted with effective prevention strategies and new treatment options. Researchers in the ETH Domain are working on this objective at all levels.

Remaining healthy while growing old, until shortly before death, is the goal of most people. In Switzerland, the prospects for this are relatively good. On average, residents of Switzerland live to the age of 84 years, which corresponds to the highest life expectancy in Europe. However, the healthy life expectancy ("healthy lifespan") measured from birth is much lower, at just 72 years. This means that the last 12 years of the life of an average Swiss person are shaped by health restrictions.

The aim of all public health efforts must therefore be to shorten the end-of-life period of illness and impairment, or to extend the healthy lifespan. The ETH Domain is also pursuing precisely this goal, with the Strategic Focus Area "Personalised Health", and in future as of 2025 with the new Strategic Area "Human Health". A better understanding of the mechanisms underlying health and disease should help develop new treatment options and prevention strategies.

Rejuvenating treatment for cells

A better understanding of such processes begins on a very small scale, with the cells. At **PSI**, Professor G.V. Shivashankar and his team want to understand how diseases develop in individual cells. For this purpose, the researchers have developed a method that uses light microscopy and AI to analyse the three-dimensional packaging of the genetic molecule DNA in the cells – the chromatin structure. It turned out that the packaging pattern of diseased cells differs significantly from that of healthy cells.

But that is not all: "Based on the pattern of the altered chromatin structure alone, we can now tell whether the diseased cells are cancer cells or brain cells from Alzheimer's or Parkinson's patients," says Shivashankar, Professor of Mecano-Genomics at ETH Zurich jointly with PSI.

A second development in Shivashankar's laboratory is even more revolutionary. The team was able to show that it is not only the genetic programme that determines the fate of a cell, as long believed, but that the geometry or architecture of the cell is also important. This refers to its embedding in the tissue and how it is pulled or compressed there by shear mechanical forces. "Depending on whether a cell is stretched or compressed, it produces different proteins," explains Shivashankar. The technical term for this process is mechano-genomics.

Shivashankar's team has now been able to show with ageing connective tissue cells (fibroblasts) that they revert to stem-cell-like cells when they grow and divide under confirmed mechanical constraints. When the researchers then turned them back into fibroblasts, using a dense scaffold of fibres, the stemlike cells appeared rejuvenated. Wounds treated with the rejuvenated fibroblasts healed much faster than wounds in which the original fibroblasts were transplanted. According to


Midjourney-generated image

Shivashankar, this method could open the door for novel cell-based therapies.

Probiotics against resistant bacteria
Researchers at **Empa** in St. Gallen are also working on improved wound healing. They have developed a portable sensor with which they can measure the acidity (pH), glucose content and the amount of the protein MMP directly in the wound fluid. "These three biomarkers can indicate when a wound becomes chronic," says Professor René Rossi, Co-Head of the Department Materials Meet Life at Empa. If the pH value remains elevated for too long, it is a sign of chronicity. "And if the glucose level drops too much, it indicates that the wound is infected with bacteria," adds Rossi.

An infection with bacteria is usually treated with antibiotics. Sometimes, however, the germs in the wound develop resistance to one or more of these remedies. As a result, the resistant pathogens can cause inflammation, suppuration and even blood poisoning. In Switzerland, an estimated 300 people die from infections with antibiotic-resistant bacteria every year.

Empa researchers are using a new strategy to combat resistant germs in wounds. They place lactobacilli into the wounds – probiotic bacteria such as those found in yoghurt – packed in a gelatine-based, porous hydrogel. The probiotics enclosed in the hydrogel then develop an antibacterial effect on site in the wound. In laboratory tests, the researchers were able to practically eliminate two of the most dangerous pathogens – Pseudomonas aeruginosa and Staphylococcus aureus – using this method. However, according to Rossi, it will probably be several years before this promising technology can be used on patients.

Protection against endometriosis
Professor Inge Herrmann works with her group at the Department of Mechanical and Process Engineering at **ETH Zurich** and Empa, on a hydrogel, but for a completely different application in the area of women's health. The engineer and her team have developed a hydrogel that can be inserted into the fallopian tubes, killing two birds with one stone. On the one hand, the very soft hydrogel, which is initially compact but swells considerably when implanted in the fallopian tube, could serve as a contraceptive. On the other hand, it could be used for the prophylaxis of endometriosis.

Endometriosis is one of the most common gynaecological diseases. Affected women have benign, usually very painful growths of endometrial tissue that settle outside the uterine cavity. The exact cause of endometriosis is still largely unexplained. According to Inge Herrmann, the most likely explanation is that menstrual blood, together with the cells of the uterine lining, flows backwards into the fallopian tubes and from there into the abdominal cavity.

If this theory is correct, the hydrogel used in the fallopian tubes could possibly prevent the formation of new endometriosis by blocking the reflux of menstrual blood. So far, Herrmann's team has tested the hydrogel in a model and for three weeks in a pig. "These trials have proven to be very promising," says Herrmann. Nevertheless, according to Herrmann, many tests are still needed before women can use the hydrogel. It must be absolutely certain that the implant is not toxic, that it does not damage the fallopian tubes, that it remains stable for a long time and that it can be removed without leaving any residue. "It will still take a few years before approval is granted," says Herrmann.

Noise also causes stress in green spaces
Such technological developments are immensely important for the goal of improved public health, but new prevention strategies are also needed on other levels. It has long been known that a green environment can reduce stress and that people can concentrate better after spending time in nature. Whether and how noise plays a role in this, however, is still largely unclear.

A team led by Nicole Bauer from **WSL** investigated this question. They took over 500 test subjects for a walk through noisy and quiet forests as well as noisy and quiet urban areas. It was found that the test subjects felt they recovered best after a walk in a quiet forest, better than in a noisy forest, a quiet urban environment or a noisy urban environment.

The researchers also measured the levels of the stress hormone cortisol in the test subjects. These went down after walks in all four situations and did not differ significantly. "That's the interesting thing!" says Nicole Bauer. "We believe that this has to do with movement itself." Exercise has a substantial effect on cortisol levels. At least where the perceived reduction in stress is concerned, however, she adds: "Noise is an important factor in relaxation."

AI for medical knowledge

A project at **EPFL** is focusing on human health in general. The artificial intelligence (AI) "Meditron" developed there is intended to simplify access to medical knowledge and assist doctors worldwide with diagnoses and treatment strategies. In a first step, the Meditron team led by physician and bioinformatics specialist Professor Mary-Anne Hartley and doctoral student Zeming Chen fed the existing general language model Llama-2 from the Meta group with a large amount of high-quality medical data.

To test the performance of the language model, the team then evaluated Meditron using three standard medical tests and compared its performance with existing language models. "Meditron performed better in these tests than all open-source models," says Chen. In order to further improve Meditron, the researchers had the AI evaluated by medical doctors in a next step. The result: Meditron is currently 80% accurate. "That's better than any previous models," says Chen. "But of course, we want to get close to 100%."

Meditron is what is known as an open-source language model. It is intended to be available free of charge to researchers for further development and to all physicians for use in medical practice. "Our goal is to democratise technology," explains Chen. Currently, however, Meditron is not yet ready for use in medical practice. At least one clinical trial is needed for the AI to be validated. Such a project is currently under way in several hospitals in West Africa as part of the Moove project. "It's about finding out whether Meditron is ready for use and whether doctors can integrate the AI into their work," says Chen (see also the report on p. 19).

Clean drinking water

Researchers at **Eawag** are looking into a global health problem. More than two billion people on this planet do not have access to safe drinking water. They are constantly exposed to the risk of ingesting the enteric pathogens that can cause severe diarrhoea. According to the WHO, 829,000 people die every year from diarrhoea, 60% of them due to contaminated drinking water, lack of sanitation or poor hygiene. What is particularly tragic is that this especially affects the most vulnerable, with around 800 children under the age of five dying each day due to diarrhoeal diseases.

That is why a team headed by Eawag environmental engineer Sara Marks is testing simple and affordable technologies in rural areas in Guatemala, Nepal and Uganda, in collaboration with local organisations, to improve the local population's access to safe drinking water. The researchers primarily rely on passive in-line chlorination, a promising technology for treating drinking water supplies in remote settings. In Guatemala, for example, the partner organisation Helvetas Guatemala has developed a PVC device that provides consistent chlorine dosing in water tanks, thus ridding the water of germs and eliminating the need for people to treat their water at home. While the project in Guatemala has ended, the research has informed improvements that Helvetas is carrying forward. Marks and her team are currently focusing on collaborations in Nepal and Uganda through action-research partnerships that have been running for over a decade. Marks believes that there is a large and growing global market for simple and affordable passive chlorination technologies. "In Nepal great progress is already being made in the commercial development and use of such systems." Regardless of whether globally, as in Nepal, or at the cellular level, as at PSI, efforts to improve human health are important at all levels and can make a difference everywhere. The challenge is to combine all the promising approaches and then put them into practice. In future, this could actually make it possible to extend the healthy lifespan of many people.

"The hopes of the women affected are huge."

– Inge Herrmann, professor at ETH Zurich and group leader at Empa, has developed a hydrogel that could also be used to prevent endometriosis.

ETH ZURICH

"A LITTLE PIONEERING SPIRIT WOULD NOT HARM US"

Gabriela Hug, Professor of Electric Power Transmission and Chair of the Energy Science Center at ETH Zurich, is convinced that the transformation to clean energy can succeed. However, it will take a little pioneering spirit and intelligent control of the power grids.

***Die Welt* recently reported on the "first dark doldrums". Is something like this also possible in Switzerland?** Switzerland also has days with little wind and sunlight, of course; however, around 60% of the electricity supply here comes from hydropower, which offsets this. Germany made the decision to switch off all nuclear power plants, although energy policy was not ready for this step. In Switzerland, we have also set the goal to phase out nuclear energy, but we have not set a binding deadline for it.

Ramping up climate-damaging power plants seems an unfortunate solution. Absolutely. In Switzerland, however, we do not have any of the coal power plants that still account for a significant share of the electricity mix in Germany. Of course, we too need to be able to compensate for seasonal fluctuations, as photovoltaics from the Swiss Plateau supply around 75% of the annual produced energy in summer and 25% in winter.

How does this compensation work? There are two main components. The reservoirs of our hydroelectric power plants are large energy storage systems and offer seasonal flexibility in the production of electricity. In addition, our connection to the international electricity grid allows us to import electricity in winter and export it in summer. Historically, this has come about because other countries have an excess of electrical energy during the winter. As our neighbouring countries will focus more on winter production in future, e.g. from wind farms that benefit from the stronger winds in winter, there will continue to be synergies.

What about more short-term fluctuations? Of course, these still exist – on the production and consumption side. We compensate for this mainly with hydropower, as it is relatively easy to change production. Nuclear power plants, on the other hand, supply so-called "base energy". These tend not to be run up and down because it also increases cost efficiency: high capacity utilisation means lower costs per kilowatt hour.

How does one identify the current electricity demand? Supply and demand are compared in advance on the basis of requirements predictions via the electricity market. This means that tomorrow's electricity production is already being planned today. During the day, these forecasts and schedules of the power plants are once again adapted via the electricity market. However, it also requires a real-time comparison, as forecasts are always flawed. Imbalance in consumption and production leads to a change in frequency due to physical circumstances. This can be measured anywhere in the grid and used as a signal to adapt production at short notice.

Your research also includes not-centralised approaches. At the highest voltage level, there is actually only one stakeholder responsible for the state of the transmission grid: Swissgrid. There are various operators at the lower voltage levels, but even there the grid is mainly operated centrally. In future, the grid will have to be regulated more dynamically due to the distributed resources. This also includes controlling the consumer side. If many larger devices could be integrated into the control of the electricity grid, there would be new room for manoeuvre: an electric car does not always need to be charged exactly when it is plugged in. Ideally, such control signals are determined in a decentralised manner.

Can grid operators control when electricity flows? Yes and no. It would actually be an opportunity to relinquish some control over certain flexible consumers such as electric cars. In return, they benefit from certain advantages, such as lower energy costs. Some third-party providers are already testing this. This is tricky in terms of data security and privacy, as data need to be exchanged in order to optimise the use of this flexibility.

What would be an alternative? Regulating consumption with finely adjusted electricity rates. The prices would reflect the current situation in the electricity grid and automated chargers would react dynamically to this without receiving direct control signals or sharing a lot of information.

So is it better to use electricity guzzlers on a low rate? Precisely. But always bearing in mind that electricity customers and grid operators have different motivations. The operators aim to minimise peak consumption so as to avoid having to expand their systems, while customers simply want to minimise their costs. Bringing together these "target functions" is not that easy.

You recently came to the conclusion that a fossil-free energy supply is technically feasible. We have modelled the resources required for a stable Swiss electricity grid, always looking at various scenarios and showing which alternatives are available. It turns out that we can do without fossil fuels and nuclear power plants. Providing a factual basis for the political debate was important to us. It goes without saying that this requires a strong expansion of renewable energy sources and that imports and exports are also important.

As a technical expert, what motivated you to take this position? In the past, I have mainly dealt with purely technical issues. After my return from the USA, part of my work focused on energy system modelling, i.e. what the electrical energy system could look like in 2050, for example, which automatically involves a political aspect. But is it not also the role of science to comment on such questions with facts? It was important for me to point out that a clean energy future for Switzerland in various ways is possible.

And where are we today? Even if the expansion on roofs is progressing well, wind energy and alpine photovoltaics in particular are struggling. Solar power in the mountains does not have to encroach on unspoilt landscapes. There needs to be a trade-off between energy production and landscape protection. Some pioneering spirit, like in the early 20th century, would not harm us.

What do you think of the "power supply gap"? The term is unfortunate because it implies a deficiency. Swiss energy policy has always been designed to ensure that we are integrated into the European grid and export in summer and import in winter. It makes sense to make the most of synergies with our neighbouring countries, also in future, in order to keep costs as low as possible. Importing in winter is therefore not bad per se, but makes economic sense.

So, no power outages? In complex power grids, power failures or blackouts can occur frequently, unfortunately. There have also been examples in Europe in recent years; however, this has more to do with the stability of the grids, as they are extremely dynamic systems. This is challenging and will certainly not get any easier with renewable energies, but it is also incredibly exciting.

Alps – one of the fastest computers in the world

"Alps" supercomputer at ETH Zurich's Swiss National Supercomputing Centre CSCS.
› ETH Zurich

ETH Zurich inaugurated the new "Alps" supercomputer at the Swiss National Supercomputing Centre (CSCS) on 14 September. "Alps is an expression of our vision of a future characterised by knowledge and progress," said Federal Councillor Guy Parmelin in his speech. Alps is one of the fastest computers in the world. It is equipped with 10,752 of the world-renowned NVIDIA Grace Hopper chips and was developed for the extreme data and computing requirements of science. Thanks to Alps, the possibilities of artificial intelligence (AI) can be fully utilised, making it a central element of the Swiss AI Initiative. One direct benefit of the supercomputer for the population is the new MeteoSwiss weather forecast model, which has a much higher resolution.

Seeing-eye canes and robotic guide dogs

The ETH Zurich Cybathlon is a competition for people with disabilities who use experimental assistive technologies. The third edition at the end of October 2024 was watched by around 6,000 spectators in the Swiss Arena and over 15,000 via live streaming. There were 67 teams from 24 countries competing against each other in eight categories. Two new disciplines were introduced: an obstacle course for vision assistive technologies and an Assistant Robot Race. Once again, the teams' technical solutions demonstrated just how different they were. The spectrum ranged from intelligent canes for the blind to robotic guide dogs. Pilot Samuel Kunz emphasised that there were no losers in the Cybathlon and that every participation advanced research and improved the lives of many.

Samuel Kunz from a team at ETH Zurich with his two assistants.
› Alessandro Della Bella / ETH Zurich

ETH Zurich continuing education to focus on ethics in AI

ETH Zurich offered the "CAS ETH Machine Learning in Finance and Insurance" continuing education programme for the first time, which combines the fundamentals of AI with ethical issues and practical applications. The main aim of the lecturers was to enable the CAS participants, who all work in the Swiss financial or insurance sector, to build bridges in their companies between the data scientists, software engineers, business experts and colleagues in the compliance department. For study director Bastian Bergmann, it was clear from the outset that the responsible use of AI technology must play an important role. It became apparent that discussions on ethical issues were largely uncharted territory for the participants. "They are more used to looking for a predefined set of rules in their day-to-day work. In the ethics part of the CAS, they had to develop their own point of view. What does 'moral' mean for me, for my company?" Bergmann noted, adding that he would like to expand the ethics module next year.

Students accelerate private sector innovation

ETH Zurich Professor Mirko Meboldt researches how companies can accelerate development and innovation processes while minimising risks. To this end, he runs the Feasibility Lab, in which students and postdocs work together with clients to develop simple prototypes that map the central functions of industrial processes. When building their "critical function prototypes", they omit everything that is not necessary for testing a certain hypothesis or innovation idea. In collaboration with the Bühler Group, eight students demonstrated that the methods from the lab also work in practice. Ian Roberts, CTO of the Bühler Group, praised the "lean de-risking" strategy: using usual development methods, the verification of some innovation ideas would have taken two years instead of two months.

Students build prototypes at the Bühler Group that lead to faster investment decisions.
› Alessandro Della Bella / ETH Zurich

New Space Master's degree launched in September

ETH Zurich launched a new Master's degree programme in Space Sciences in autumn 2024 to meet the growing demand for specialists in the space industry. The course of study, initiated by Thomas Zurbuchen, professor at ETH Zurich, teaches knowledge of space systems and the fundamentals of Earth and planetary sciences as well as astrophysics. Students can choose to specialise in space engineering, space communication, robotics, earth observation or planetary sciences. Zurbuchen explains: "The Master's programme is unique in Europe because it focuses very much on commercial space research, is consistently interdisciplinary and at the same time offers the in-depth knowledge in engineering disciplines and natural sciences for which ETH is renowned." Never before has a degree course been implemented so quickly at ETH Zurich. It took just eight months between the start of planning and registration. Günther Dissertori, Rector of ETH Zurich, is pleased: "Everyone immediately pulled together because it was clear to everyone that such training was urgently needed."

Lightning-fast algorithms for versatile networks

Researchers at ETH Zurich led by Rasmus Kyng have written the near-perfect network flow algorithm, which answers this question: "How can maximum flow in a network be achieved while simultaneously minimising transport costs?" This algorithm calculates so quickly that it presents the solution almost within the same time that it would take a computer just to read the data describing the network. Mathematically, this is unrivalled. The super-fast algorithm also provides a basis for efficiently calculating very large and dynamically versatile networks in the future.

The two brains behind the almost maximally fast flow algorithm: Rasmus Kyng (left) and Maximilian Probst Gutenberg.
› Nicola Pitaro / ETH Zurich

EPFL

WHERE AI MAKES A REAL DIFFERENCE

Language models are often not much more than toys; we are fascinated by their abilities, but do they really bring any benefit? A new model from EPFL illustrates the potential of chatbots with medical knowledge to close a disastrous information gap in Africa.

The right information in the right place at the right time – that's the key to efficient medical assistance, and AI can make a life-saving difference here.

The Meditron team was formed under the leadership of Professors Mary-Anne Hartley (see cover picture), Martin Jaggi and Antoine Bosselut (in picture, p. 19; see also report, p. 12 et sqq.).

The big dream? A chatbot that provides medical assistance to people in Africa in their own language. Be it to a young mother, an assistant in a hospital unit or a teacher: artificial intelligence (AI) would give advice on the best available medical knowledge. This is how Mary-Anne Hartley, Professor and Director of the Laboratory for Intelligent Global Health and Humanitarian Response Technologies (LiGHT) at EPFL, introduces it. The doctor with South African roots has already taken a major step towards this dream, together with EPFL specialists for AI. At the end of 2023, the team presented the MEDITRON-70B language model, which performs reasonably well when it comes to exam questions from medical studies. The real test, however, is how it performs in practice.

The AI is based on the Llama series of models, developed by Facebook parent group Meta. This large language model (LLM) is similar to OpenAI's GPT or Google's Gemini but has two key advantages in this regard: it is completely open source, and it is small enough to host privately within hospitals and low-resource settings. The Meditron team co-led by Professor Antoine Bosselut, Head of the Natural Language Processing Group at EPFL, has been working on LLMs for medical applications for some time. Here, too, a lot has happened regarding the successes of generative AI since 2022.

AI and medicine? The combination may be surprising – in this part of the world, the medical context is considered the *pièce de résistance* in terms of AI. What if it's way off the mark? We've heard the discussions: the language models "hallucinate", as it's called in technical jargon. If they do not know something, they confabulate, but make it sound very plausible – not really what we want when it comes to medical expertise.

Hartley and Bosselut both emphasise that this happens to people too: we also cover up uncertainty, and, of course, human experts can be wrong too. On the other hand, there is still a great potential benefit if such AI can provide vital information even if it's far from well-developed medical care. Building trust in AI works the same way as with any other medical intervention: any promising tool must show its effectiveness in studies, and good results in the laboratory do not necessarily equate to real success in everyday medical practice.

The "contaminations" are more crucial than the "hallucinations" anyway, says Hartley. This refers to distortions in the data the system is working with. "Not even three percent of the studies in the largest Pubmed medical database represent Africa." A recipe for biased and inequitable distribution of accuracy. "If we cannot represent the non-Western medical context, we will not be able to build a useful system for Africa." And because there is no time to wait for "perfect data", we must make do with iterations and gradually get the systems to do what they are supposed to do.

Not too long ago, chatting with GPT was a rather anarchic matter, and language outputs could also go in perplexing directions. The fact that GPT now holds very civilised conversations is partly due to an additional loop in the training process, what is known as "reinforcement learning from human feedback" (RLHF). People teach the system to a certain degree by evaluating answers. The EPFL researchers do something similar in their language model; Hartley calls it "nudging".

Numerous doctors across the world, from Lausanne to Bangkok and the African continent, are testing the AI and its answers. "Doctors love it. It's like a game between colleagues as part of a mentorship process: If you can mislead the novice, can you expose their lack of knowledge and then teach them?" As a result, the machine is getting better and better, especially when it comes to the special medical conditions which differ greatly from the typical exam questions at Western universities.

Hartley and Bosselut emphasise that a model like this can only be developed in academic settings, and "maybe only at EPFL", says Hartley, thanks to the corresponding technical resources and expertise, also in collaboration with superb and innovative university hospitals in the area like CHUV. When it came to the first language models speciaised in medicine, Bosselut thought especially of hospitals in our latitudes and pharmaceutical companies, i. e. "of people who can pay a lot of money for this kind of thing". It was only with Hartley that there was a shift to the "low resource context", to "users that are much closer to my heart". And Hartley adds: "We didn't just want to build a model and publish great results. We wanted to go into practice too. That's the hardest evidence you can get". The EPFL team will now launch a large-scale clinical trial across multiple countries in Africa to nudge these models toward reliable real-world impact.

Predictions of catastrophic warming are more plausible than we thought

Read more.

Researchers at EPFL have developed a rating system for the climate simulations in the latest Intergovernmental Panel on Climate Change (IPCC) report. They found that about a third of the models are not doing a good job at reproducing sea surface temperature data; a third of them are robust but not particularly sensitive to carbon emissions; the last third of the models is also robust but predicts a particularly hot future for our planet due to its high sensitivity to carbon emissions. "These carbon-sensitive models predict much greater warming than the estimates that the IPCC considers most likely. We show, however, that they are plausible and should be taken seriously," explains Athanasios Nenes, professor at EPFL's Laboratory of atmospheric processes and their impacts. "Sometimes, I think climate researchers are a bit like Cassandra in Greek mythology," he concludes. "She was granted the power of prophecy, but her curse meant that no one listened to her."

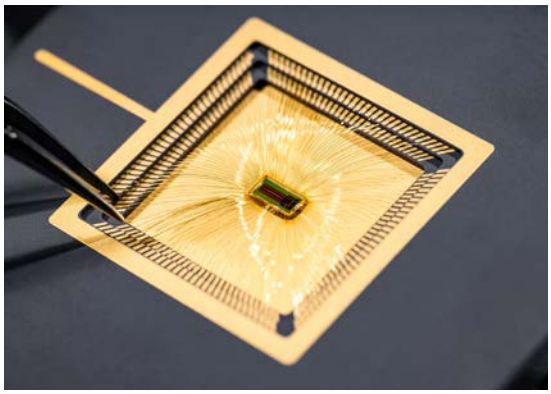
Complete brain-machine interface on a chip

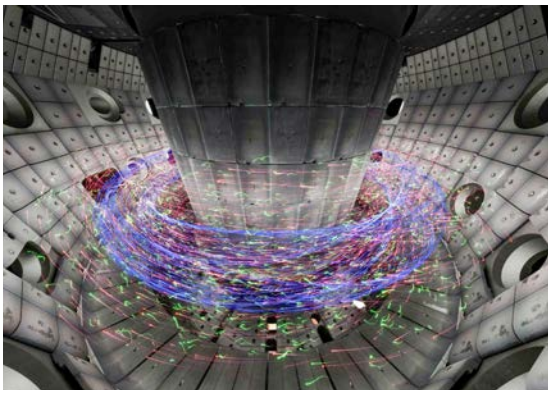
Read more.

Brain-machine interfaces (BMIs) have proven to be a promising solution for restoring communication and control in people with severe motor impairments. Traditionally, these systems have been bulky, power-intensive and limited in their practical applications. Researchers at EPFL have developed the first high-performance miniaturised brain-machine interface called MiBMI, which offers an extremely small, low-power, highly accurate and versatile solution. MiBMI not only enhances the efficiency and scalability of BMIs, but also paves the way for practical, fully implantable devices. This technology could significantly improve the quality of life of patients with diseases such as amyotrophic lateral sclerosis (ALS) and spinal cord injuries.

At the heart of a fusion reactor – just like in a video game

EPFL was selected by EUROfusion to develop a visualisation system for a preliminary process in nuclear fusion. EPFL's Laboratory for Experimental Museology (EM+), with expertise in 3D visualisation, has developed a program that can transform terabytes of data from experiments and simulations at EPFL's Swiss Plasma Center (SPC) into an immersive experience. For laypeople, it is a firework of particles that enables an initiation journey to understand what the energy of tomorrow could look like. For scientists, it is the concretisation of complex physical concepts and a tool for understanding the results of their calculations.





Conversion of brain activity into text on an extremely small integrated system (left photo).
› EPFL

3D visualisation brings nuclear fusion to life (right photo).
› EPFL

Boosting the synthesis of sustainable chemicals

EPFL chemical engineers have developed a new way to produce catalysts, motivated by the prospect of converting greenhouse gases such as carbon dioxide into high value chemicals such as methanol. In Nature Catalysis, they developed and described a way to build metal clusters on solid supports – with almost atomic precision – that can improve catalytic activity. "This technique is particularly interesting for complex reactions, such as that of carbon dioxide with hydrogen gas to produce renewable methanol," explains Jeremy Luterbacher, professor at EPFL's Laboratory of Sustainable and Catalytic Processing.

Unexpected immune response may hold key to long-term cancer remission

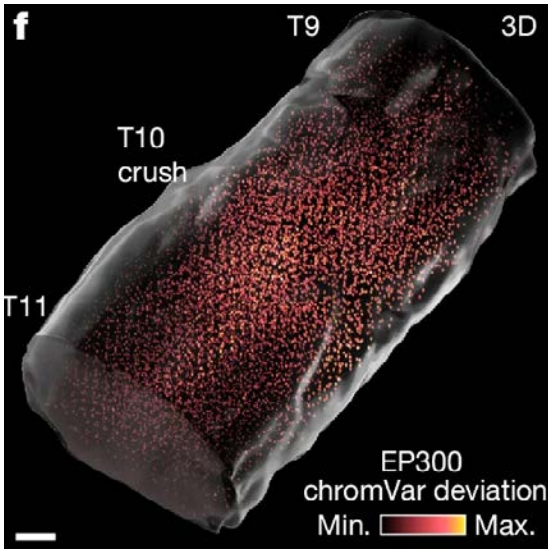
Samples from a 2012 clinical trial on the treatment of acute lymphoblastic leukaemia (ALL) in a 12-year-old girl (now in remission) with a chimeric antigen receptor (CAR-T) were used in a new study published by EPFL and three partners in the journal *Nature*. This work could signal a paradigm shift in cancer treatment. "For this study, the goal was to determine if the CAR-T cells of long-surviving ALL patients like this girl had a certain profile, or signature, that distinguished them from patients who relapsed," explains Li Tang, Head of the Laboratory of Biomaterials for Immunoengineering at EPFL. Based on 700,000 cells from 82 patients, the researchers created a gene expression atlas that shows that the cells of people who have survived ALL in the long term contain, among other things, the cytokine IL-4 – usually associated with something called a type 2 immune response. Their remission could be explained by a stimulating effect of IL-4 on T lymphocytes.

Click here for the journal *Nature*.

Precise mapping of spinal cord injuries

The *Tabulae Paralytica*, published as open access, is the result of a combination of artificial intelligence and state-of-the-art cell and molecular mapping technologies, representing the complex molecular processes that unfold in each cell following a spinal cord injury (SCI). This fundamental work on mice, conducted by the laboratory of neuroscientist Gregoire Courtine, professor at EPFL, and the Neuro-X Institute, not only identifies a specific group of neurons and genes that play a key role in healing, but also proposes an effective gene therapy derived from these discoveries."The *Tabulae Paralytica* closes a historical knowledge gap, paving the way for targeted treatments and enhanced recovery," Courtine explains. Research has identified, in particular, the crucial role of Vsx2-like neurons in the repair of lesions.

See more on YouTube.



PSI

BREAKTHROUGHS IN KEY INDUSTRY OF THE FUTURE

In 2024, PSI reported two breakthroughs in connection with microchips, both on a similar scale. Single-digit nanometre ranges can now be achieved in semiconductor production with photolithography and when analysing microchips – record levels of precision!

The Swiss Light Source (SLS), the circular architectural landmark of PSI in Villigen, is known as a state-of-the-art measuring and reading device. It uses X-rays to make crystal structures or other minute structures visible in high resolution. Amazingly, it is also possible to write or engrave with this light source.

According to Mirko Holler, researcher at the Laboratory for Macromolecules and Bioimaging, using photolithography in chip production is essentially the same concept as the traditional printing process with stone plates, "except the stone is now pure silicon." However, there is a big difference. In conventional printing, you cannot go beyond the limits of what is visible to the naked eye, whereas chip production has long since moved into dimensions that are barely imaginable and perhaps even impossible to produce.

This is because orders of magnitude in the low nanometre range cannot be achieved with visible light, as its wavelengths are too long for this. And the trend is towards even shorter wavelengths. In recent years, chip production has reached the extreme UV (EUV) range of the light spectrum, which ultimately merges into X-rays. The chip industry has already "invested billions" in EUV lithography, and scanners, which transfer chip patterns to silicon, can currently achieve a resolution of up to 13 nanometres. However, newer machines will be able to reach 8 nanometres.

Yasin Ekinci, Head of the Laboratory for X-ray Nanoscience and Technologies, and his team at PSI have developed a method that uses EUV to advance into physically "impossible" orders of magnitude. The team has taken conventional EUV lithography a step further for this purpose. In EUV mirror interference lithography (MIL), two coherent beams generate an interference pattern that allows structural resolutions of five nanometres – with a single exposure.

The process is not practical for engraving conductor paths, but it is nevertheless attracting great interest in the industry, for example for the development of ultra-fine resolution photoresists, which will be required for future chip production. "Modern chips require 10 to 15 write processes, plus additional production steps, totalling up to 100 process steps until a microcircuit is built," explains Ekinci. He and Holler are both full of praise for the opportunities for collaboration and the technical expertise at PSI. "You can't write unless you can read; you have to be able to measure, monitor and control how the process is progressing precisely at all times," says Ekinci.

The team from Villigen became world champions in measuring last year: no-one has ever looked inside a microchip using X-rays with a resolution of 4 nanometres before. Holler says, with a hint of modesty, that the SLS is "ultimately just a big microscope, and our method does not require imaging optics such as lenses, which are used in conventional cases and limit the resolution to the 100 nanometre range." Instead, their method utilises the coherent X-ray radiation of the SLS. With a few tricks, it is possible to achieve far better resolutions.

Back in 2014, Holler's team advanced to dimensions of 16 nanometres in 3D. Microchips were the perfect subjects; until then, these had been analysed using electron microscopes, but this involved the laborious process of planing the chips layer by layer to obtain a three-dimensional image of the chip architecture. SLS radiation offers a much better solution, and the chips being analysed are not destroyed.

The trick that the PSI researchers use for their "X-ray images" to improve the resolution to 4 nanometres is as simple as it is ingenious. Instead of trying to eliminate any instabilities in the beam, they register them precisely and include them in their calculations. The result is a process that works in a similar way to image stabilisation in mobile phone cameras. In practical terms, however, this is still a challenge; as Holler puts it, "pretty much everything wobbles in the nanometre range." The beauty of the software solution developed at PSI is that the algorithm has the potential to provide much better resolution for other light source devices as well. In any case, the method will certainly benefit from the considerable improvements regarding coherence that the current SLS 2.0 upgrade will provide.

Ekinci is convinced that the density of high-precision companies means that Switzerland is actually well positioned in terms of the chip industry. He calls on policymakers to do more to support research: "You don't have to be at the forefront of everything, and of course we can't keep up with the current chip initiatives in the USA and China." But he would like to see semiconductor research receive a similar level of funding as AI and green energy. Chips are already the third most important commodity in the world, after oil and cars, and Ekinci's prediction that they will be number one in 10 years' time doesn't seem all that far-fetched.

X-ray light saves music

See and read more about the saving light.

PSI researchers are developing a synchrotron-based technique to non-destructively digitise highly valuable historical audio tapes that are no longer playable due to physical and chemical decay. The technique employs X-rays from the Swiss Light Source (SLS) and is now being used to recover a recording of B.B. King's 1980 performance at the Montreux Jazz Festival, in partnership with the Montreux Jazz Digital Project at EPFL.

Audio tapes store information in a layer of magnetic particles that act like tiny compass needles. When the tape is recorded, the magnetic orientation of these particles is set and the audio information is stored in the magnetic pattern.

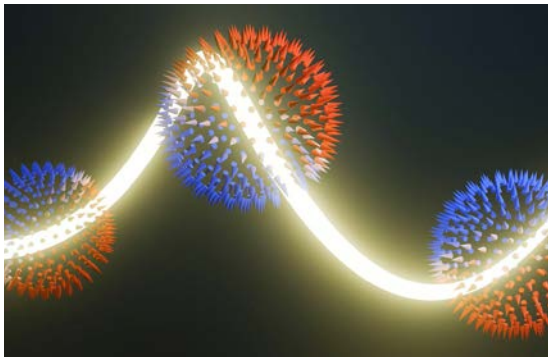
Using X-rays, the researchers can read the magnetisation state of almost every individual particle and convert this information into a high-quality digital audio.

Digitisation of valuable images: the X-ray light of the SLS makes it possible to read the magnetisation state of almost every particle on historical tapes.
› PSI

Orbitronics for energy-efficient tech

See and read more about orbitronic.

Whereas electronics uses charge to transfer information, technology of the future with less environmental impact might make use of a different property of the electrons: their orbital angular momentum (OAM). In this emerging field known as orbitronics, OAM monopoles are particularly interesting: points from which the OAM radiate outwards like the spikes of a hedgehog. Now, for the first time, researchers have succeeded in demonstrating the existence of OAM monopoles. The key was to correctly interpret the complex experimental data taken at the SLS at PSI by implementing new theoretical considerations. Their findings bring orbitronics a significant step closer to implementation.

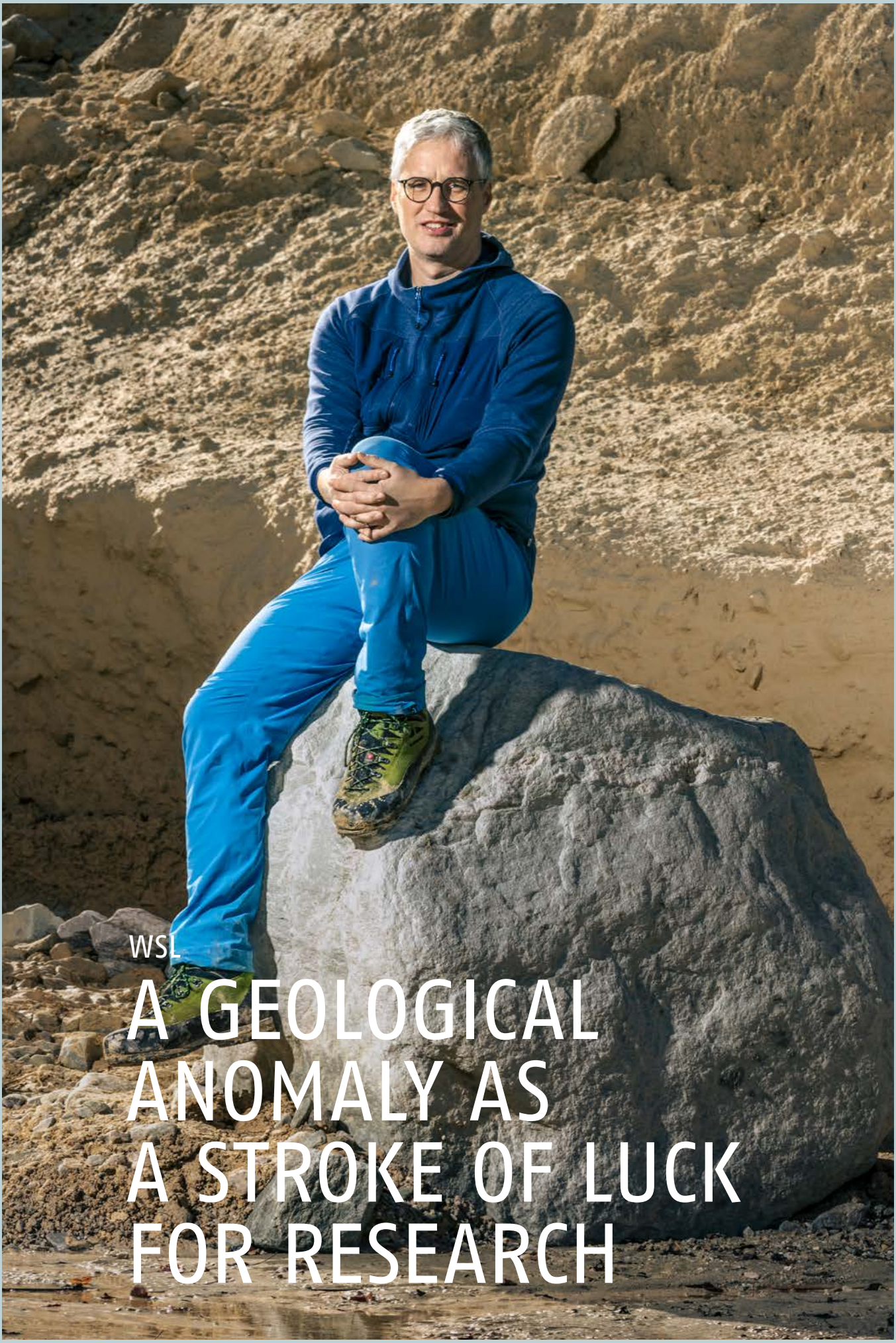


Artist's impression of OAM monopoles: points from which the orbital angular momenta of electrons point outwards
› PSI

Where should hydrogen be produced in the future?

Switzerland needs to change its energy landscape to become climate-neutral by 2050. The aim is to switch to renewable sources of electricity such as water, wind and solar power. However, electricity is not an option for everything. This is where hydrogen comes in. Sustainably produced hydrogen could significantly reduce the climate impact in aviation, agriculture and the steel industry, among others, if it were used, for example, to produce fertilisers or synthetic hydrocarbons. Researchers at the Laboratory for Energy Systems Analysis at PSI have now compiled geographical and economic data and forecasts to describe the development of a hydrogen economy in four scenarios. According to these, global hydrogen demand in 2050 could range from 111 to 614 megatonnes per year. Currently, around 90 megatonnes of hydrogen are produced worldwide each year. The researchers have also identified the most economically suitable regions for large-scale and environmentally friendly hydrogen production. It could take place in large parts of Canada, in central parts of the USA, as well as in parts of Australia, the Sahara, northern China and northwestern Europe.

See and read more



WSL

A GEOLOGICAL ANOMALY AS A STROKE OF LUCK FOR RESEARCH

At the Illgraben debris-flow observation station, WSL researchers are developing early warning systems that combine seismology and artificial intelligence. A trip to the perhaps most hostile place in Switzerland.

It is like a wound in the countryside. The Illgraben. It runs south from the Rhône Valley, not far from Sierre. One moment you have nature alternating with urban sprawl, the next a lunar landscape. Geology leaves no room for the vegetation to spread here. The slopes slide far too often, and the rocks are far too loose. This area is dominated by rock and scree. Trees only grow on the southern flank of the gorge. As a result, the bare rock is mostly exposed and constantly impacted by the weather, which does its job very diligently. Downstream, the Illbach transports the material into the Rhône, which regularly causes the river to become cloudy when it rains. Hiking trails? Not a chance. "The Illgraben is one of the most inhospitable places I know," says WSL seismologist Fabian Walter.

It may be hostile, but it is conducive to research. The geological anomalies are a stroke of luck for WSL. One could also say that if the Illgraben did not exist, it would have to be recreated as a test site. After all, natural hazards that otherwise only occur sporadically and are unpredictable can be studied here almost by appointment. "There are up to a dozen debris flows per year, or rather, per summer in the Illgraben," says Walter. For this reason, WSL has been operating the "Illgraben debris-flow observation station" since 2000 in order to gain a better understanding of debris flows with various research projects. Measuring devices in the area of the streambed record the passage times, pressure and discharge height of each debris flow. Walter, however, has placed his devices all over the terrain, even in places far from the valley floor. As a seismologist, he is particularly interested in the tremors caused by debris flows.

The special thing about debris flows is that they carry a lot of sediment, mud and stones. "Water alone can also be dangerous, but only debris flows can carry away rocks the size of a car." This is one of the reasons why debris flows are "seismologically very loud", as the expert puts it. They can therefore be detected very well with the usual sensors used by seismologists, which allows for completely new approaches for alarm systems. The seismographs also measure in areas that are difficult to access and register debris flows extremely quickly.

But debris flows can also be detected using simpler methods. It could be a wire that breaks or a pendulum that hangs over the streambed and triggers an alarm as soon as it is moved. However, installing this type of sensor would be a challenge, as is evident from the lunar landscape in the Illgraben. Where everything is slippery, fixed installations close to the mud flow are a contradiction in terms. By contrast, seismographs distributed throughout the Illgraben can detect the debris flow much further up. This buys valuable time in the event of an alarm. It can take a good 20 minutes to several hours for such a debris flow to reach inhabited areas. Intelligent algorithms analyse the seismic data in real time and issue an immediate warning if something is brewing high up in the gorge or if the rumbling begins.

However, these algorithms must first learn to isolate and correctly interpret the signals from the debris flows. This is where artificial intelligence comes in. Walter's team is in the process of training corresponding models with data from measured debris flows. For this purpose, 100 sample data sets are sufficient, which the experts can extract from 10 to 20 events. The software thus learns to identify debris flows as an anomaly in everyday seismic noise. This means that the alarm can no longer be triggered by trampling cattle, traffic and industrial noise in the ground.

They are currently working on simplifying the seismographs in order to make the system suitable for everyday use and also commercially interesting. "We don't need professional measuring devices for this application, which can cost around CHF 15,000 to CHF 20,000," says Walter. The magic lies mainly in the algorithm. What it has learned in the Illgraben will hopefully soon be very useful in other Alpine valleys too. In this respect, the at times wet summer of 2024 provided important measurements for research and for future debris flow predictions, says Walter.

Optical fibres
State-of-the-art data processing also means that signals can suddenly be found in unexpected places. Thanks to close collaboration with ETH Zurich and Swisscom Broadcast Ltd, WSL is currently investigating whether optical fibres can be used as vibration sensors for monitoring natural hazards. "It may well be that we never have to install a seismometer again," says Fabian Walter. This is because if an earthquake pulls on the fibre-optic cable, it shows up as the smallest disturbance in the signal. These disturbances can be spatially resolved, meaning that virtual measuring devices are available every metre or decimetre along a fibre-optic cable without any additional infrastructure costs. In this respect, there are already "millions of seismometers" across the country, even over mountain passes. Initial test runs at the Flüela Pass have shown that the system can reliably detect avalanches. The method is to be continuously refined over the next few years.

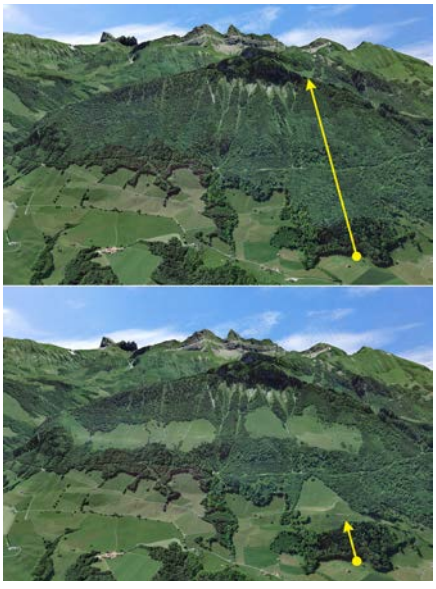
How disturbances influence carbon sequestration in forest soils

The forest soil stores large quantities of organic carbon. However, this is released as CO_2 in the event of natural or man-made disturbances. A team of WSL researchers was able to show that the most carbon is released after forest fires, followed by wind throw, timber harvesting and harmful insects. More important than the type of damage event, however, is the amount of organic carbon present in the soil.

However, the type of forest also influences how much carbon is released during disturbances. The loss is greatest in forests in cold regions in the far north and in the mountains. This is where the topsoil stores large quantities of humus. Researchers argue in favour of taking disturbance-related losses into account for robust estimates of the carbon sink capacity of forests. Especially in forests with a cold climate, these losses can jeopardise the efforts of forestry to bind CO_2 through afforestation.

How a well-tended landscape protects against major fires

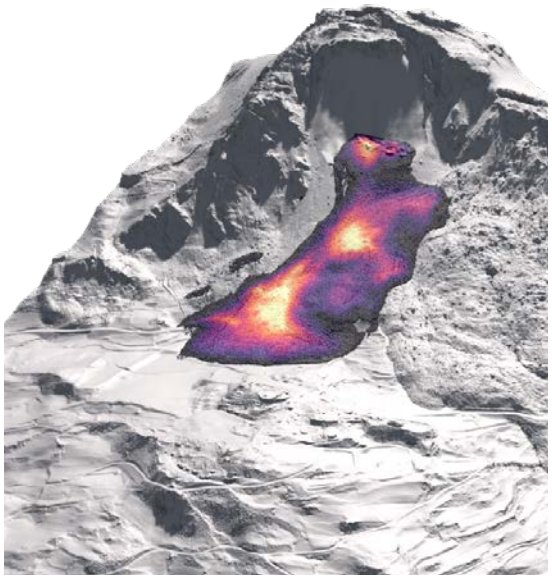
As climate change advances, extreme weather situations that facilitate forest fires will also increase. The probability of such fires becoming large depends heavily on the speed at which they spread and the intensity of the flame front. Researchers at the WSL Cadenazzo field station in Ticino have shown that steep slopes and continuous forest cover, which occurs after agricultural use is abandoned, strongly facilitate the spread of fires. In the absence of clearings that slow down the spread of fire and make it easier to extinguish, large fires could start or increase significantly anywhere in Switzerland except on the Swiss Plateau.



Potential path of a fire in a typical Swiss mountain landscape (below) and with complete forest cover on the slope.
› WSL / Cadenazzo

Predicting the path of landslides

In June 2023, over a million cubic metres of rock thundered down into the valley in Brienz, Graubünden, only coming to a halt just before the first houses. Johan Gaume, Professor of Alpine Mass Movements at ETH Zurich and the WSL Institute for Snow and Avalanche Research SLF in Davos, used his newly developed software to simulate the most likely scenario of the expected event and predicted quite accurately how far the rock avalanche would travel. Gaume and his colleagues are integrating the results from the modelling into a GIS framework and developing a graphical user interface so that this simulation model can soon be used in practice.



Simulation of the Brienz landslide.
› WSL

EMPA

SPEEDING UP MATERIALS RESEARCH WITH ROBOTS

Will there still be a need for human researchers when automation enters the laboratory? Battery researcher Corsin Battaglia and materials scientist Johann Michler from Empa believe that it will be a case of working together, not against each other.

Even in an era of big data and AI, researchers' intuition remains indispensable – only by working directly with materials and processes can an understanding emerge that no algorithm can replace.

Professor Corsin Battaglia and Professor Johann Michler (right)

In 2008, Chris Anderson proclaimed "The end of theory" in *Wired* magazine and claimed in the subtitle that the coming "data deluge" would make the scientific method obsolete. When battery researcher Corsin Battaglia, professor at ETH Zurich and EPFL, shows us his Materials for Energy Conversion laboratory in the new "co-operate" building on the Empa-Eawag research campus in Dübendorf, we immediately realise that the prophecy has not come true – good old science is still being practised. However, it is obvious that big data and artificial intelligence (AI) are changing the practice of research in a lasting way.

People are still to be found in the spacious premises of the Materials for Energy Conversion lab. However, one of the rooms is dominated by a robot: AURORA. AURORA does not look quite like a robot, but more like complex laboratory equipment, with a transparent box that takes up half the room and contains a lot of mechanics, not to mention manipulation gloves. The robot now works very reliably, but at the beginning it needed a lot of attention, according to Battaglia. When it is working without quirks, it patiently goes through various constellations of materials, assembles them into test batteries and records the basic functions of the cells. This is not much different from what Battaglia and his team have already done, just a lot faster. The result is a tenfold acceleration of the test series for material selection, assembly and analysis. It also has significant advantages, as the global race is on for new battery materials that are inexpensive, readily available and have no technical disadvantages.

The example of battery research shows a fundamental dilemma of materials science. "If you start with just ten different chemical elements, you end up with more than a trillion possible combinations as a basis for developing new materials," explains materials scientist Johann Michler, Head of the Mechanics of Materials and Nanostructures laboratory at Empa and professor at EPFL. As if the whole thing was not already complex enough, he also mentions the example of steel. Although it consists primarily of "just" iron and carbon, he says, there are still a large number of steel variants with different properties, "depending on how the steel is heat-treated". It is therefore not necessarily difficult to find new materials – the crux is to pick out the really interesting ones from the jumble of possible materials.

Michler is convinced that the focus of materials science must also be on analytics: "We need to speed up the experimental examination of the material properties: the screening." He is therefore developing high-throughput analytical instruments that can analyse the internal structure and application-relevant properties of a large number of new materials very quickly. "We don't measure with the utmost precision, but we do it orders of magnitude faster." Once you have identified promising candidates, it is sufficient to take a more precise look during the second step. Simple questions and characteristics are of interest in Michler's work: What colour does a material have and why? And does it possibly have other interesting properties besides a beautiful colour – for example, scratch resistance? If so, the watch industry may well prick up its ears.

What if one could predict all of this? What if AI acquires so much "basic understanding" of solid-state physics that it suggests suitable material combinations and it is no longer necessary to carry out test series after test series more or less "blindly" in search of the needle in the material haystack? Both experts are rather cautious about this. Development is definitely moving in the direction of "physics-informed AI", but the models are limited, says Battaglia. Even supposedly simple things – such as the voltage generated by a specific battery cell – often prove to be a tough nut to crack. Nevertheless, the battery robot AURORA is expected to gradually learn to work more autonomously. The researchers hope that AURORA will identify patterns and thus the most interesting materials and components depending on the desired battery application.

So, was Chris Anderson right after all, regarding the long-term outlook? Battaglia does not believe that the work of a researcher will soon consist solely of data handling and programming, alone in front of a screen. He believes that it is still good to "have a little hands-on experience". And Michler adds: "The intuition of the materials researcher comes from working with the material – from having done all the process steps and analyses themselves."

A tandem solar cell based on perovskite

Light, flexible, super-efficient: tandem solar cells based on perovskite can capture sunlight better than conventional silicon solar cells. The underlying idea is simple: two layers catch more sunlight than one. Lab tests have already proven the cells' worth. Empa researchers are now working on scaling it up and making it suitable for everyday use. As part of an EU project with 15 research institutions and companies from all over Europe, Empa researchers want to develop flexible perovskite tandem modules with an efficiency of over 30% that can be produced on a large scale using cost-effective processes. Furthermore, a spin-off from Empa, Perovskia Solar, received more than CHF 2 million in venture capital as recently as September. The company is developing a printing technology to customise small perovskite solar cells for almost any electronic device. This comes with a clear advantage: the printed solar cells are inexpensive – and even work indoors.

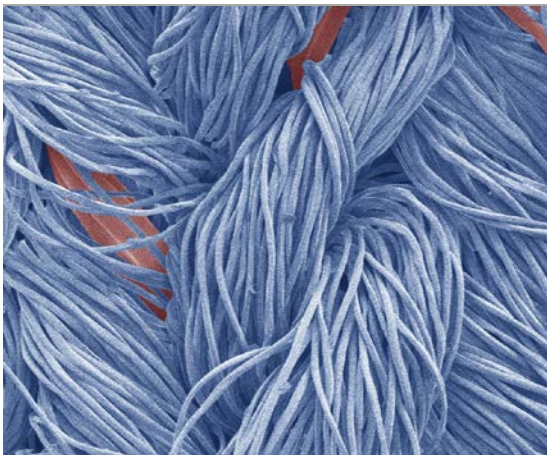
Versatile cellulose materials from the 3D printer

Ultralight, thermally insulating, biodegradable: cellulose aero-gel is extremely versatile. As part of an SNSF project, Empa researchers have succeeded in 3D printing the natural material into complex shapes. Even though the original focus was on thermal insulation – for precision insulation in microelectronics, for example – the researchers see great potential for medical applications: the aero-gel is biocompatible and, thanks to its porous structure, is able to release medication over a longer period of time. What is more, 3D printing could be used to produce personalised implants, for example. In another project, researchers have produced cellulose aero-gel from spent grains, a waste product from beer brewing, which could be used as biodegradable food packaging.

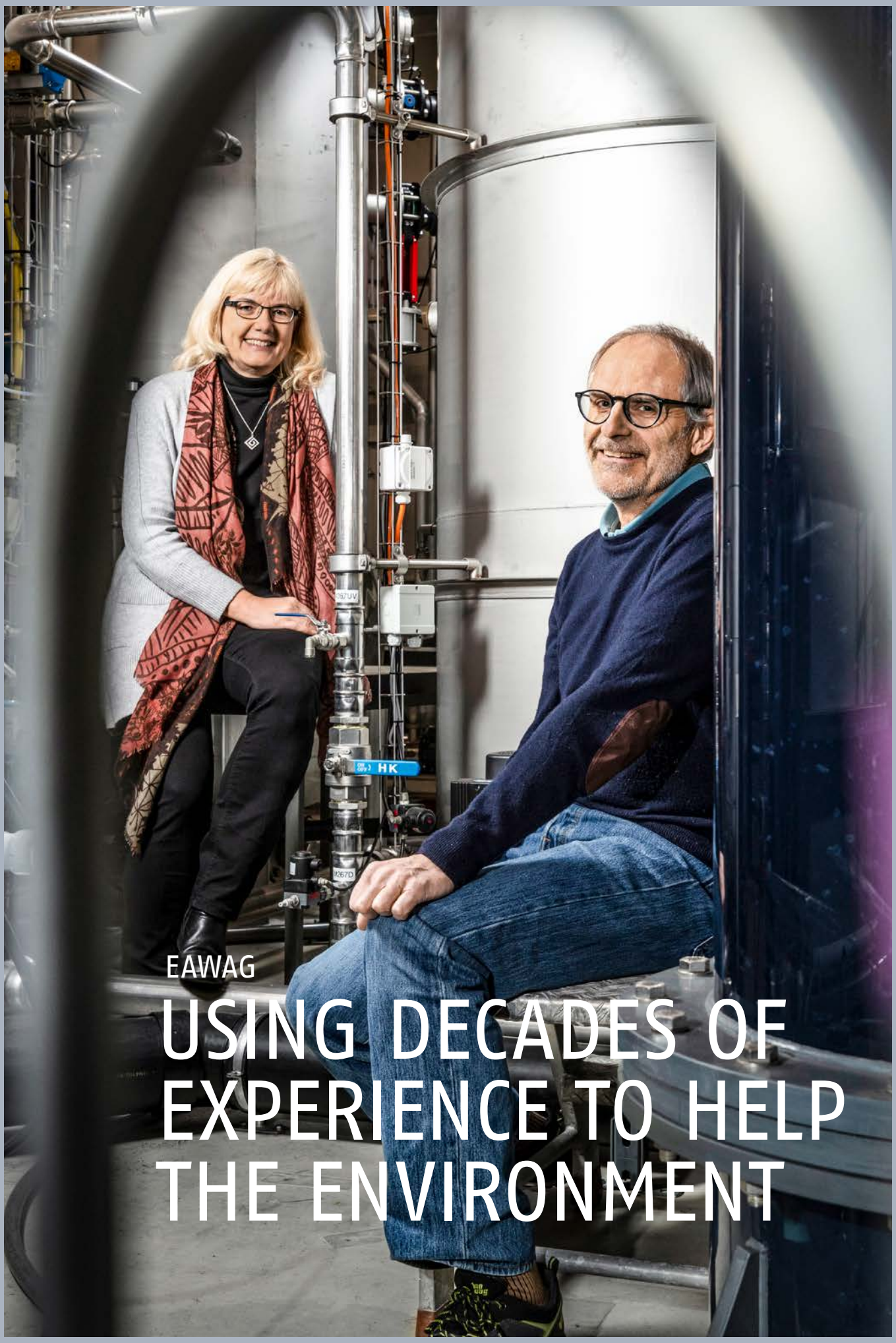
Finally environmentally friendly: water-repellent fibres without PFAS

Rain jacket, swimming trunks, padded fabric: textiles with water-repellent properties require impregnation, often with fluorine-containing PFAS chemicals (perfluorinated and polyfluorinated alkyl compounds). However, the substances have a harmful effect on health and accumulate in the environment. Empa researchers have therefore developed a new plasma coating process for alternative substances as part of an Innosuisse project with Swiss textile companies. Initial tests show that, thanks to their nano-thin, silicone-like coating, the environmentally friendly fibres repel water more effectively, are more durable and dry faster than conventional products. The new process ensures seamless impregnation even with complex structured textiles.

Empa researchers developed a 3D printing process for biodegradable cellulose aero-gel.
› Empa



Plasma-coated textile (blue) and elastic fibres (red) are water-repellent (REM, coloured).
› Empa



EAWAG

USING DECADES OF EXPERIENCE TO HELP THE ENVIRONMENT

Small quantities, big effect: micropollutants in wastewater are increasingly recognised as environmental problems. Eawag researchers played a key role in developing a globally pioneering strategy to ensure wastewater treatment plants are fit to deal with these residues as well.

One of the great success stories of the 20th century in terms of environmental protection is the treatment of wastewater – or more specifically, the wastewater treatment plant. In the 1950s, pollution of lakes and rivers by residential, commercial and industrial wastewater was commonplace. Foaming, stinking streams, dying fish and waste in bodies of water were the order of the day. Swimming was largely forbidden for health reasons, and no wonder, since most of the wastewater entered these bodies of water untreated.

By comparison, we have a much firmer grip on the situation today, but more knowledge also brings more complexity – and that includes our approach to wastewater. Modern analysis shows that wastewater treatment plants cannot completely remove many micropollutants, such as endocrine disruptors, household chemicals, cosmetics and pharmaceuticals. These continue to enter our waters, as do substances from commercial and industrial processes.

What to do? Wastewater treatment plants must be retrofitted so that micropollutants can also be removed from wastewater. That's where Eawag's expertise can help, and not just on the technical side. Environmental chemist Urs von Gunten, Eawag group leader in the Water Resources and Drinking Water department, has decades of experience in treating drinking water with ozone. When applying "ozonation", which is now also used in wastewater, two questions were key: Are the problematic chemicals reliably "defused", and does the ozone really not produce any unwanted substances? This is important to consider, since the "organic matrix" naturally also reacts with the ozone.

Process engineering and analytics were important in this context. It is at this point that the expertise of chemist Christa McArdell, group leader in the Environmental Chemistry department, comes into play. She calls it "back-breaking work to find out what is in the wastewater and what exactly is produced in the ozonation process". However, it is impossible to capture everything that occurs in the complex reaction of ozone with various substances and the matrix. Ecotoxicology tests are used to assess the effects: Can the known effects of micropollutants be minimised or might new, unexpected ones emerge? It has been shown that ozone is a very reliable oxidising agent for rendering a large number of micropollutants "harmless". The ozone causes small changes in their chemical structure, which means that the molecules lose their biological effect. Moreover, there is also a solution for what is produced from the matrix during ozonation (e.g. aldehydes): biological post-treatment also purifies these, as they are usually broken down easily by microorganisms.

Process and analytical aspects were immediately convincing; the challenge then was putting the process into practice. "To implement something like this, you need additional expertise," says McArdell, adding that an interdisciplinary approach, such as that cultivated at Eawag, is crucial. In collaboration with engineers, ozonation and activated carbon treatment, another method for removing micropollutants, and combinations thereof were tested in pilot plants and later in a large-scale operation. The methods were evaluated by means of tests in co-operation with the Environmental Toxicology department. Finally, the costs of retrofitting plants must also be kept in mind if the aim is not only to prove the theoretical effectiveness, but also to implement it in wastewater treatment plants.

For a viable proposal, politicians also need to be on board early on. The Federal Office for the Environment (FOEN) and the traditionally well-functioning network of Eawag researchers with authorities and practitioners played an important role here. Social sciences were also involved in order to assess the economic benefits and acceptance among the population. The strategy is now considered exemplary, has been enshrined in the Waters Protection Act since 2016 and is known as the "Swiss model". It is also being followed with interest internationally and has already been implemented in some cases, for example by the EU and in the USA, where some of the wastewater is recycled into drinking water.

As the retrofitting of all 700 or so wastewater treatment plants was originally estimated to be too expensive, it was agreed that the aim should be to halve the residues. This is possible with the retrofitting of around 120 plants at the most critical locations. The Federal Government is currently working on an amendment to the law on behalf of Parliament, according to which all wastewater treatment plants whose discharges currently lead to limit values being exceeded must be retrofitted. According to initial estimates, this would affect a further 300 or so wastewater treatment plants.

The two Eawag experts are justifiably proud of what they have achieved in such a short time. Their efforts were also recognised by the Swiss Chemical Society, which presented them and other team members with the Sandmeyer Award.

Ten years after the start of the pilot trials, the new Waters Protection Act came into force, and more and more plants are being upgraded. The political will to make further improvements remains a key factor, although micropollutants are less of a problem for people. "Very few of these wastewater-borne substances are found in drinking water," says von Gunten. The aim is to protect the aquatic environment. In future, residues from commercial and industrial processes are likely to become more of a focus again. Often, however, we first have to develop an awareness of this type of environmental pollution. Here, too, advances in analytics play a major role. After all, you can't clean what you can't see.

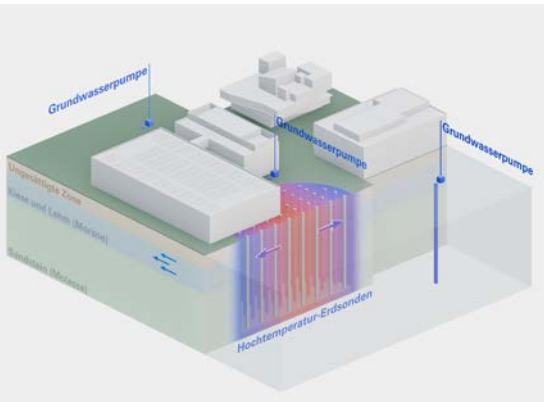
Reusing wastewater in dry summers

Switzerland is often referred to as Europe's water reservoir. However, the hot and dry summers of recent years have shown that water can also become scarce in our region. At the same time, demand for water is increasing, for example, for irrigation in agriculture or as cooling water. The reuse of treated wastewater has the potential to contribute to solving this problem, as Eawag shows in a study. A total of 19 cantons express a need for water reuse. In order for this to be unproblematic for people and the environment, water quality requirements must first be defined.

Dry riverbed of the Rein da Sumvitg.
› Jan Ryser / BAFU

What effect do heat storages facilities have on the subsurface?

The heat storage facility, which was newly installed on the Empa-Eawag campus in Dübendorf, stores the summer heat in the ground and brings it back to the surface for heating in winter. Temperatures of up to 65 degrees Celsius can be supplied to the ground – a record in Switzerland. So far, however, little is known about the reaction of the subsurface to such high-temperature storage facilities. Over a period of three years, Eawag is therefore investigating how deep-dwelling microorganisms react to warming and to what extent the chemical composition of the groundwater is affected.



The influence of invasive species extends further than expected

Interactions between ecosystems are widespread in nature and connect, for example, forests and lakes or grasslands and rivers. An Eawag study shows that invasive species can influence these interactions and thus have ecological effects that extend up to 100 kilometres beyond the ecosystem they invade. Himalayan balsam, for example, introduces new chemical substances into the forests, which leach into ponds, where they reduce the growth rate of zooplankton. When managing ecosystems, it is therefore advisable to consider the impact of invasive species in a broader spatial context.

Three pumps extract groundwater samples at various points.
› Eawag

Himalayan balsam is displacing the native flora in Switzerland.
› Marsupium Photography/ Wikimedia (CC BY-SA 2.0)

GOVERNANCE

Legal basis and structure of the ETH Domain

The Federal Government operates the Federal Institutes of Technology in accordance with the Federal Constitution (Art. 63*a* para. 1). The Federal Act on the Federal Institutes of Technology (ETH Act) defines this mission, as this law governs the ETH Domain. Together with Art. 64 para. 3 of the Federal Constitution, it also forms the legal foundation for operating the four research institutes of the ETH Domain and for the ETH Board as the strategic governing and supervisory body of the ETH Domain.

The ETH Act defines the status, structure and mission of the ETH Domain. The ETH Domain is autonomous within the framework of the law. The ETH Act also defines the autonomy of both Federal Institutes of Technology and the four research institutes. The ETH Domain is allocated to the Federal Department of Economic Affairs, Education and Research (EAER).

Tasks
According to the purpose set out in Art. 2 ETH Act, both Federal Institutes of Technology and the four research institutes (institutions of the ETH Domain) must educate students and specialists in scientific and technical fields and ensure continuing education, expand scientific knowledge through research, foster the development of junior scientific staff, provide scientific and technical services, perform public relations work, and make use of their research results. The institutions of the ETH Domain discharge their mission in observance of internationally recognised standards. They take account of Switzerland's needs and promote national as well as international cooperation.

Strategic objectives and expenditure ceiling
The political leadership of the ETH Domain rests with the Federal Council and the Federal Parliament. The central leadership tools are the Dispatch on the Promotion of Education, Research and Innovation (ERI Dispatch) and the associated strategic objectives set by the Federal Council for the ETH Domain. The political tools are supplemented by the ETH Board's strategic controlling, which provides information on financial reporting and mission fulfilment. In accordance with Art. 34*b* ETH Act, the Federal Assembly determines an expenditure ceiling for each four-year period to cover the operational and investment needs of the ETH Domain. The Federal Assembly then decides on the annual financial contribution with the budget.

Reporting
The ETH Board reports annually to the Federal Council and shows the degree to which the strategic objectives have been met and how the ETH Domain has used the total federal contribution. The Federal Council, in turn, reports to Parliament on the achievement of the strategic objectives, drawing on the ETH Board's reporting, among other things. In each half of the Promotion of Education, Research and Innovation Policy (ERI) period, the ETH Board compiles a self-evaluation report which comments on issues specified by the competent Federal Councillor. This self-evaluation report serves as the basis for the evaluation of the ETH Domain by a group of international experts (peer review), which is to be carried out by the Federal Department of EAER. The last evaluation took place in 2023.

Discussions are held twice a year between the proprietor, represented by the EAER and the Federal Department of Finance (FDF), and the ETH Board, represented by its President.

Managing and supervisory body ETH Board: mission and operating principles
The ETH Board is responsible for the strategic leadership of the ETH Domain; it defines the strategy of the ETH Domain within the framework of the strategic objectives of the Federal Council, represents the ETH Domain when dealing with policymakers and government authorities at federal level, issues directives about financial controlling, and carries out strategic controlling. It also approves the development plans of the institutions of the ETH Domain, oversees their implementation and supervises the ETH Domain

(Art. 25 ETH Act). It agrees targets with the institutions and allocates federal funds, specifically on the basis of the institutions' budget requests (Art. 33*a* ETH Act). It submits requests to the Federal Council for the election or re-election of the Presidents of both Federal Institutes of Technology and of the Directors of the four research institutes (Art. 28 para. 1 and 7 ETH Act). It also appoints the other members of the Executive Boards of both Federal Institutes of Technology and of the Directorates of the four research institutes (Art. 28 para. 4 and 7 ETH Act). Finally, the ETH Board appoints professors at the request of the Presidents of both Federal Institutes of Technology (Art. 14 para. 2 and 3 ETH Act).

The Executive Boards of both Federal Institutes and the Directorates of the four research institutes are responsible for the operational leadership of the individual institutions of the ETH Domain. In accordance with Art. 4 para. 3 of the ETH Act, the institutions of the ETH Domain assume all responsibilities which are not expressly assigned to the ETH Board by the ETH Act.

The rules of procedure of the ETH Board are published in the Official Compilation of Federal Legislation. The ETH Board usually meets five times a year for two days at a time, and arranges additional meeting days for dialogues with the institutions of the ETH Domain. The President of the ETH Board is responsible for holding periodic individual discussions with the Presidents of both Federal Institutes of Technology and with the Directors of the research institutes.

The ETH Board performs its supervisory function through the use of the following tools: periodic reporting by the institutions on resources (finances, personnel, real estate), annual reporting by the institutions on the extent to which they have fulfilled their duties with regard to target agreements, annual discussions (known as dialogues) between the ETH Board and the institutions of the ETH Domain within the scope of strategic controlling, handling supervisory complaints addressed to it while observing subsidiarity and institutional autonomy, as well as reports by the institutions within the scope of their risk management systems. Moreover, the ETH Board's Internal Audit department evaluates the risk management processes, internal control system (ICS) and governance processes of the institutions and reports on them to the ETH Board.

Structure of the ETH Domain

* Employment contracts incl. doctoral students, as of: 31 December 2024

ETH Domain

ETH Board
11 members
59 employees (staff, Internal Audit, Appeals Commission)

Federal Institutes of Technology

ETH Zurich
25,808 students and doctoral students
13,895 employees*

EPFL
14,012 students and doctoral students
6,469 employees*

Research institutes

PSI
2,258
employees*

WSL
660
employees*

Empa
1,097
employees*

Eawag
536
employees*

Vested interests and awareness-raising activities

In keeping with expectations for good governance, vested interests are regulated extensively.[1] The legal requirements are consistently implemented by the ETH Board within its area of responsibility: all vested interests and secondary employment of members of the ETH Board and of members of the Executive Boards and Directorates of the ETH Domain's institutions are examined once a year by the Audit Committee and then approved by the ETH Board – subject to the proviso that the Federal Council is responsible – provided that the requirements are met in accordance with the applicable legal basis. Regular treatment by the ETH Board also serves to raise the awareness of members.

New vested interests and secondary employment are reported to the ETH Board during the year on an ongoing basis and examined to ensure compliance with the provisions of the Management Salaries Ordinance (no reputational risks or conflicts of interest; maximum workload of 10% of a workload; surrender of the part of the income from secondary employment which exceeds 30% of the salary). In addition, the secondary employment of members of the ETH Board and the Directors of the research institutes is published on the websites of the Swiss Confederation[2] and the ETH Board[3]; the institutions are responsible for publishing the secondary employment of members of the Executive Board and of the research institutes' Directorates.

Audit and Executive Committee

The Audit Committee assists the ETH Board in financial supervision and in the monitoring of risk management, of the ICS, and of financial auditing activities. As a rule, it is composed of two to three "external" members of the ETH Board who are independent of the executive leadership, but may also involve additional people in a consultative capacity. The President of the ETH Board, the Head of the Internal Audit department and the Head of the Finance section of the ETH Board's staff attend the meetings in an advisory capacity.

The Executive Committee assists the ETH Board in preparing for and following up on meetings, in filling management positions of institutions in the ETH Domain and in fulfilling its duties as an employer. It also liaises with the social partners. It is composed of the President of the ETH Board (chair), the Presidents of both Federal Institutes of Technology, the representative of the research institutes and the delegates of the University Assemblies. The Executive Director and, if necessary, other members of the ETH Board's staff attend the meetings.

[1] The key legal bases can be found on the website of the ETH Board: www.ethboard.ch/legalbasis: Art. 24c ETH Act; Art. 2a and 7a Ordinance on the ETH Domain; Art. 11, 13 and 14 Management Salaries Ordinance; Guidelines of the ETH Board on secondary employment of members of the Executive Boards of the Federal Institutes of Technology and of the Directorates of the research institutes; Directives of the ETH Board on secondary employment of professors in the ETH Domain; Art. 6 ETH Ordinance Concerning Professors; Art. 56*a* Personnel Ordinance for the ETH Domain (PersO-FIT); Guidelines of both Federal Institutes of Technology on conflicts of interest and secondary employment.

[2] www.admin.ch/ch/d/cf/ko/Gremien_interessenbindung_79.html

[3] www.ethboard.ch/vested-interests

Remuneration of the ETH Board

In 2024, the President of the ETH Board received for 0.8 FTE a gross salary of CHF 304,942 (with an annual salary of CHF 381,177 for 1.0 FTE). In addition, the employer paid social security contributions of CHF 96,551. The President is insured by the Swiss Federal Pension Fund, the rules of which determine the employer contributions.

Based on the decision of the Federal Council of 24 June 2020 regarding the fees of external members of the ETH Board who do not have an employment contract with an institution of the ETH Domain, the Vice President of the ETH Board and the President of the Audit Committee received in 2024 a lump-sum payment of CHF 32,000 each. In 2024, the other four external members of the ETH Board each received a lump sum of CHF 20,000. In addition, external members of the ETH Board were paid a total of CHF 66,500 for dialogue meetings, the Election Preparation Committees, etc. Additionally, their expenses were refunded in accordance with federal personnel law in the total amount of CHF 13,479.70. "Institutional" members of the ETH Board who are employees of one of the institutions of the ETH Domain do not receive additional fees for their activities on the ETH Board. For the 0.7 FTE position, the ETH Board covered 40% of the wage and social security costs (including compensation for expenses) incurred by EPFL for the delegates of the University Assemblies of both Federal Institutes of Technology, in order to guarantee the delegates' independence.

Executive bodies of the ETH Domain

Presidency and Members of the ETH Board
- Prof. Dr Michael O. Hengartner[1], President
- Pascale Bruderer[1], Vice President
- Cornelia Ritz Bossicard[2], President of the Audit Committee
- Prof. Dr Joël Mesot[1]
- Prof. Dr Martin Vetterli[1]
- Prof. Dr Christian Rüegg[1]
- Dr Kristin Becker van Slooten[1]
- Marc Bürki[2]
- Beatrice Fasana[2]
- Prof. Dr sc. nat., Dr h. c. mult. Susan Gasser
- Christiane Leister*

Executive Board of ETH Zurich
- Prof. Dr Joël Mesot, President
- Prof. Dr Günther Dissertori, Rector
- Dr Julia Dannath, Vice President for Personnel Development and Leadership
- Stefan Spiegel, Vice President for Finance and Controlling
- Prof. Dr Ulrich Weidmann, Vice President for Infrastructure
- Prof. Dr Christian Wolfrum, Vice President for Research
- Prof. Dr Vanessa Wood, Vice President for Knowledge Transfer and Corporate Relations

Executive Board of EPFL until 31 December 2024
- Prof. Dr Martin Vetterli, President
- Prof. Dr Jan Hesthaven, Vice President for Academic Matters and Provost (until August 2024)
- Prof. Pierre Dillenbourg, Vice President for Academic Matters and Provost a.i. (September to December 2024)
- Françoise Bommensatt, Vice President for Finance
- Dr Matthias Gäumann, Vice President for Operations
- Prof. Dr Gisou van der Goot, Vice President for Responsible Transformation
- Dr Ursula Oesterle, Vice President for Innovation

Executive Board of EPFL since 1 January 2025
- Prof. Dr Anna Fontcuberta i Morral, President
- Prof. Dr Ambrogio Fasoli, Vice President for Academic Matters and Provost
- Françoise Bommensatt, Vice President for Finance (since March 2021)
- Prof. Dr Edouard Bugnion, Vice President for Innovation
- Dr Matthias Gäumann, Vice President for Operations (since August 2020)
- Prof. Dr Stéphanie P. Lacour, Vice President for Support to Strategic Initiatives
- Marianne Wannier, Vice President for Personnel Development

Directorate of PSI
- Prof. Dr Christian Rüegg, Director
- Prof. Dr Gabriel Aeppli, Deputy Director
- Dr Thierry Strässle, Deputy Director
- Dr Peter Allenspach, Member
- Prof. Dr Andreas Pautz, Member
- Prof. Dr Gebhard F. X. Schertler, Member (until January 2024)
- Prof. Dr Thomas J. Schmidt, Member
- Prof. Dr Mike Seidel, Member

Directorate of WSL
- Prof. Dr Rolf Holderegger, Director (since October 2024)
- Dr Christoph Hegg, Acting Director (until September 2024), Deputy Director (since October 2024)
- Prof. Dr h.c. Anna Hersperger, Member
- Birgit Ottmer, Member
- PD Dr Anita Risch, Member
- Prof. Dr Jürg Schweizer, Member (until September 2024 Acting Deputy Director)
- Dr Thomas Wohlgemuth, Member

Directorate of Empa
- Prof. Dr Tanja Zimmermann, Director
- Dr Peter Richner, Deputy Director
- Dr Nathalie Casas, Member (since June 2024)
- Dr Lorenz Herrmann, Member
- Prof. Dr Manfred Heuberger, Member (since June 2024)
- Dr Urs Leemann, Member
- Prof. Dr René Rossi, Member (since June 2024)

Directorate of Eawag
- Prof. Dr Martin Ackermann, Director
- Dr Christian Stamm, Deputy Director
- Prof. Dr Florian Altermatt, Member
- Dr Sara Marks, Member
- Gabriele Mayer, Member
- Prof. Dr Carsten Schubert, Member
- Prof. Dr Lenny Winkel, Member

* † 1 March 2025, Member of the ETH Board since 2017; deceased in office.

Appeal body

ETH Appeals Commission
The Internal Appeals Commission of the Federal Institutes of Technology decides on appeals against rulings made by bodies of the institutions of the ETH Domain (Art. 37 para. 3 ETH Act). It is an independent internal appeal body with its registered office in Bern and is administratively assigned to the ETH Board, to which it reports (Art. 37*a* ETH Act). Since 2022, the Federal Council elects the members of the ETH Appeals Commission.
Appeals mainly relate to matters arising from legislation on higher education and human resources. The Commission is assisted by a secretariat (Art. 11 et seq. of the Ordinance on the ETH Appeals Commission). Appeals against the rulings of the ETH Appeals Commission can be made to the Federal Administrative Court.

- Lawyer Barbara Gmür Wenger, President
- Lawyer Yvonne Wampfler Rohrer, Vice President
- Prof. Dr Simone Deparis, Member
- Nils Jensen, Member
- Dr Mathias Kaufmann, Member
- Dr Eva Klok-Lermann, Member
- Prof. Dr Christina Spengler Walder, Member

ETH Board support

Staff of the ETH Board
The ETH Board's staff support the ETH Board in fulfilling its legal mandate, particularly regarding strategic leadership, supervision, promotion of cooperation in the ETH Domain and liaising with the Federal authorities (Art. 26*b* ETH Act).

Executive Team
- Dr Michael Käppeli, Executive Director
- Dr Monique Weber-Mandrin, Deputy Executive Director and Head of Legal Services
- Dr Ines Egli, Head of Science (since January 2024)
- Gian-Andri Casutt, Head of Communications
- Dr Dieter Künzli, Head of Finance and Personnel (until March 2024)
- Daniela Oehy, Head of Finance and Personnel (since March 2024)
- Michael Quetting, Head of Real Estate

Internal Audit
The ETH Board employs Internal Audit staff, as per Art. 35*a*[ter] ETH Act.
The department conducts internal audits for the institutions of the ETH Domain.
- Patrick Graber, Chief Audit Executive

[1] Member of the Executive Committee
[2] Member of the Audit Committee

Status as of 31 December 2024
(reference is also made to changes agreed upon in 2024 which will become effective in 2025)

Ombuds Office

Ombuds Office
The Ombuds Office of the ETH Board is an independent body responsible in a subsidiary capacity for dealing with reports of illegal and unethical conduct observed by members of the ETH Domain in the course of ETH Domain-related activity. Subsidiary capacity means that, whenever possible, reports must initially be made inside both Federal Institutes of Technology or the four research institutes, first to senior bodies or, if this is deemed unreasonable, to the bodies responsible for dealing with such reports in the institutions concerned.

This applies without prejudice to Art. 22*a* of the Federal Personnel Act (FPA): employees are obliged to report all officially prosecutable crimes or offences which they have discovered during their official work or which have been reported to them, to the criminal prosecution authorities, their line managers or the SFAO.

The Ombuds Office consists of:
- Dr Michael Daphinoff, LL.M., external lawyer in Bern
- Cendrine Rouvinez, MLaw, external lawyer in Lausanne and Sion

Conciliation Commission

Conciliation Commission under the Gender Equality Act for the ETH Domain
The Conciliation Commission under the Gender Equality Act for the ETH Domain provides information and advice in the event of disputes which fall under the Gender Equality Act that involve employment relationships in the ETH Domain. The aim of the conciliation process is to achieve a mutually acceptable solution to the dispute in verbal negotiations, with the assistance of the parties (employer and employee), in order to avoid court proceedings. The Conciliation Commission does not issue any judgements. It handles cases confidentially, but not anonymously.

President's Office:
- Dr Anne-Catherine Hahn, President

Employer representatives:
- Dr Patrick O. Dilger (Member, since April 2024)
- Hélène Fueger, EPFL (Member)
- Andreas Kirstein, ETH Zurich (Member, until March 2024)
- David Heusser, Empa / WSL (substitute Member)
- Beatrice Lamprecht, PSI / Eawag (substitute Member)

Employee representatives:
- Gregor Spuhler, ETH Zurich (Member)
- Prof. Dr Sabine Süsstrunk, EPFL (Member)
- Dr Rowena Crockett, Empa / WSL (substitute Member)
- Dario Marty, PSI / Eawag (substitute Member)

Monitoring and auditing

Internal control system
The institutions of the ETH Domain each have an ICS (Art. 35*a*^{bis} ETH Act) introduced which is operated within the framework of the Federal Council's guidelines. Its objectives are to protect the assets of the ETH Domain, to prevent errors and irregularities in accounting, and to ensure proper accounting and reliable reporting. It is an integral part of the audit by the Swiss Federal Audit Office (SFAO) or the auditors appointed by it. The focus is on financially relevant business processes.

Internal Audit
The Internal Audit department conducts internal revision for the institutions of the ETH Domain (Art. 35*a*^{ter} para. 1 ETH Act). This department reports directly to the President of the ETH Board and its activities are supervised by the Audit Committee. The Internal Audit department provides independent and objective auditing services. It is also responsible for coordinating and supporting the external audits of the ETH Domain.

Auditors
The SFAO performs external auditing duties for the ETH Domain (Art. 35*a*^{ter} para. 3 ETH Act). In 2024, it audited the consolidated financial statements of both Federal Institutes of Technology and the consolidated financial statements of the ETH Domain and it conducted interim audits. The audits of the research institutes are performed by the SFAO jointly with PricewaterhouseCoopers AG (PwC). The SFAO's audit report on the consolidated financial statements of the ETH Domain comprises an audit report and a "comprehensive report". These reports are discussed with representatives of the SFAO in the Audit Committee every year. In 2024, the SFAO invoiced the ETH Board for the total amount of CHF 577,401 (CHF 358,717 for the 2023 annual audit and CHF 218,684 for the 2024 interim audit).

Information policy
Its legal mandate makes the ETH Board an interface between academia, policymakers and society. Within its rules of procedure, the ETH Board undertakes to ensure honest, appropriate and transparent communication for the benefit of society with the aim of explaining its decisions and reinforcing the role and reputation of the ETH Domain. Responsibility for this rests with the President. The key communication tools are the ETH Board's Annual Report to the Federal Government, the website www.ethboard.ch, targeted media relations work and the case-by-case illumination of relevant facts and positions, particularly regarding policies on education, research and innovation.

Participations and cooperations

In accordance with Art. 3a of the ETH Act, both Federal Institutes of Technology and the four research institutes may found or invest in companies, or cooperate with third parties in any other way within the framework of the Federal Council's strategic objectives and the ETH Board's directives, for the purpose of fulfilling their duties. The investments and relationships with controlled and associated entities are listed in sections 20 and 35 of the annual financial statements in the ETH Board's Annual Report and Financial Report respectively. These mainly involve investments in foundations and simple partnerships which meet accounting standards. The controlled entities Société pour le Quartier de l'Innovation (SQIE) and Société pour le Quartier Nord de l'EPFL (SQNE), which maintain buildings on a finance lease basis with contracts over a lease term of up to 40 years, generate cash outflows therefrom of about CHF 8m per year. The associated entities have significant investments in the ETH Zurich Foundation. The contribution to the annual result of the ETH Domain amounted to CHF 13m.

Michael O. Hengartner
* 1966, Swiss/Canadian, Prof. Dr

President of the ETH Board since February 2020.

Michael O. Hengartner served as President of the University of Zurich (UZH) from 2014 to 2020, and as President of swissuniversities from 2016 to 2020. He has dual Swiss and Canadian citizenship and grew up in Quebec City, where he studied biochemistry at the Université Laval. In 1994, he was awarded his doctorate at the Massachusetts Institute of Technology in the laboratory of Nobel Laureate H. Robert Horvitz. He then headed a research group at the Cold Spring Harbor Laboratory (New York, USA). In 2001, he was appointed Professor at the Institute of Molecular Biology at UZH, and Dean of the Faculty of Science at UZH from 2009 to 2014. Hengartner has an Executive MBA from IMD Lausanne and multiple awards for his research and teaching.

Pascale Bruderer
* 1977, Swiss, lic. phil.

Vice President and member of the ETH Board since 2024.

Pascale Bruderer completed her studies in political science, constitutional law and social and economic history with a Master's degree in political science. From 2002 to 2011, she was a member of the National Council and a member of the Science, Education and Culture Committee. In 2009/2010, she was the President of the National Council, and, from 2011 to 2019, a member of the Council of States. Today she is an entrepreneur and a member of several boards of directors. She is the Founder and President of the Board of Directors of Swiss Stablecoin AG and, among other things, a member of the Board of Directors of the Galenica Group and the TX Group.

Joël Mesot
* 1964, Swiss, Prof. Dr sc. nat.

Member of the ETH Board and of the Executive Committee since 2010. President of ETH Zurich since 2019.

Joël Mesot studied Physics at ETH Zurich, obtaining a doctorate in Solid State Physics in 1992. He was awarded the Swiss Physical Society (SPG) IBM Prize in 1995 and the ETH Zurich Latsis Prize in 2002. After research residencies in France and the US, he came to ETH Zurich and joined the Paul Scherrer Institute (PSI), where he became Head of the Laboratory for Neutron Scattering in 2004. He was director of PSI from 2008 to 2018, and he has been a full professor of physics at ETH Zurich since 2008. Mesot is part of various national and international advisory bodies, including the Foundation Board of the "Switzerland Innovation" Park and the Governing Board CREATE (Singapore).
› Markus Bertschi / ETH Zurich

Marc Bürki
* 1961, Swiss, Dipl. El.-Ing.

Member of the ETH Board since 2017 and of the Audit Committee since 2018. CEO of Swissquote Group Holding Ltd since 1999 and of Swissquote Bank Ltd since 2002.

Marc Bürki obtained a degree in Electrical Engineering from EPFL. After gaining his initial professional experience with the European Space Agency in the Netherlands, he formed Marvel Communications S.A. in Gland in 1990, a company that specialised in the development of financial information software. Swissquote Group Holding Ltd, which specialises in online trading, was formed in 1999 and was floated on the stock market in 2000. In 2001, Swissquote Bank Ltd received a banking licence. Bürki is the CEO of both companies. Furthermore, he is President of the Board of Directors of Swissquote MEA Ltd, Dubai, UAE (since 2012), of Swissquote Ltd, London, UK, of Swissquote Asia Ltd, Hong Kong (both since 2014), of Swissquote Pte. Ltd, Singapore, and of Swissquote Bank Europe SA, Luxembourg (both since 2019). Since 2021, he has been President of the Board of Directors of YUH Ltd, a joint venture between Swissquote and PostFinance. He has also been a member of the Board of Directors of Swissquote Capital Markets Ltd in Cyprus since 2022.
› Swissquote

Beatrice Fasana
* 1969, Swiss, Dipl. Ing. Lm

Member of the ETH Board since 2012 and of the Audit Committee since 2024. Managing Director at Sandro Vanini SA since 2013.

Beatrice Fasana studied Food Science at ETH Zurich. After a traineeship at the "Nestlé Research and Development Center" in New Milford (Connecticut, USA), she worked in various leadership roles for several large food and beverage production companies in Switzerland, including manager of Chocolat Frey's "Chewing Gum" Profit Center and as a marketing manager for Coca-Cola. Until the end of 2012, she ran her own company, BeFood Consulting SA. Since 2013, she has held the position of Managing Director at Sandro Vanini SA, a company of the Haecky Group. Fasana is also a member of the Board and Chair of the Management Committee of the University of Applied Sciences and Arts of Southern Switzerland (SUPSI, Scuola universitaria professionale della Svizzera italiana), and has been a member of the Board of Directors of Raiffeisen Bank del Basso Mendrisiotto since 2018.

Susan Gasser
* 1955, Swiss, Prof. Dr sc. nat., Dr h. c. mult.

Member of the ETH Board since 2018. Director of the ISREC Foundation at the AGORA Research Centre and visiting professor at the University of Lausanne since 2021.

Susan Gasser studied biology and biophysics at the University of Chicago and obtained a doctorate at the University of Basel. She was group leader at the Swiss Institute for Experimental Cancer Research (ISREC) from 1986 until she was appointed professor at the University of Geneva in 2001. Between 2004 and 2019, she was Director of the Friedrich Miescher Institute for Biomedical Research (FMI) in Basel, and professor of Molecular Biology at the University of Basel from 2005 to 2021. Since 2021, she has been a visiting professor at the University of Lausanne and the ISREC Foundation Director at the AGORA Research Centre. Gasser chairs the strategic advisory board of the Helmholtz Association Health Centres, is a director of the UCB Pharmaceutical company, and serves on a number of scientific advisory boards across Europe, e.g. of the Francis Crick Institute in London. She represents Switzerland on the European Molecular Biology Laboratory (EMBL) Council in Heidelberg. From 2014 to 2019, she chaired the Gender Equality Commission of the SNSF.
› Nestlé Nutrition Council

Martin Vetterli

* 1957, Swiss, Prof. Dr sc.

Member of the ETH Board and of the Executive Committee since 2017. President of EPFL from 2017 until the end of 2024.

Martin Vetterli received his degree in Electrical Engineering from ETH Zurich in 1981, his Master of Science at Stanford University in 1982, and obtained his doctorate at EPFL in 1986. Following professorships at Columbia University and at the University of California, Berkeley, he returned to EPFL as full professor of Communication Systems in 1995. From 2000 to 2003, Vetterli was a member of the Swiss Science Council (SSC). From 2004 to 2011, he was Vice President of EPFL, and Dean of the School of Computer and Communication Sciences at EPFL from 2011 to 2012. From 2013 to the end of 2016, he was President of the National Research Council of the Swiss National Science Foundation (SNSF).

› Nik Hunger/EPFL

Christian Rüegg

* 1976, Swiss, Prof. Dr sc. nat.

Member of the ETH Board since June 2022 and representative of the research institutes. Director of PSI since 2020. Dual professorship at ETH Zurich/EPFL and professor at the University of Geneva.

Christian Rüegg studied Physics at ETH Zurich, obtaining his doctorate in 2005 at the Laboratory for Neutron Scattering at ETH Zurich and PSI. From 2005 to 2011, he worked at the Centre for Nanotechnology at University College London (UCL) and Imperial College London. He was a Royal Society University Research Fellow and Assistant and Associate Professor at UCL. From 2011 to 2016, he headed the PSI Laboratory for Neutron Scattering and Imaging in the Research Division Neutrons and Muons, and from 2017 to 2020, he was the head of this Research Division. Rüegg represents PSI on numerous international committees for largescale research facilities and as part of important cantonal/national initiatives for the promotion of innovation, such as Switzerland Innovation.

› PSI

Kristin Becker van Slooten

* 1962, Swiss/German, Dr

Member of the ETH Board and of the Executive Committee since 2017. Representative of the university assemblies of ETH Zurich/EPFL on the ETH Board. Project head of equal opportunities at EPFL since 2017. Maître d'enseignement et de recherche (MER).

Environmental scientist Kristin Becker van Slooten studied Biology at the University of Geneva and obtained her doctorate in Environmental Chemistry and Ecotoxicology at EPFL. From 1995 to 2002, she was employed as a scientist at the Laboratory for Environmental Chemistry and Ecotoxicology, where she headed up the Experimental Ecotoxicology research group from 2002, obtaining the title of MER in 2005. From 2006 to 2016, she was an advisor to the President and General Secretary of EPFL. Becker van Slooten has been the project manager for equal opportunities at EPFL since 2017 and has reprised her role as a delegate on the ETH Board, representing the university assemblies of ETH Zurich and of EPFL as she did from 2004 to 2006.

Christiane Leister

* 1955, Swiss/German, Graduate economist Dipl.-Vw.

Member of the ETH Board since 2017. Owner and President of the Board of Directors of the Leister Group since 1993. Christiane Leister died in office on 1 March 2025.

After graduating from Christian Albrecht University of Kiel with a degree in Economics, Christiane Leister started her career at Jungheinrich (floor-level conveyors and warehousing systems). She then headed the Controlling and Finance departments of Vereinigte Papierwerke AG and Milupa AG. She took over strategic and operational duties within the Leister family business in 1989. She has been the owner of the Leister companies since 1993, where she also acted as operations manager until 2014. During that time, Leister diversified the companies with new technologies and expanded them internationally to create the Leister Group.

› Leister Ltd

Cornelia Ritz Bossicard

* 1972, Swiss, Business economist, CPA

Member of the ETH Board and President of the Audit Committee since 2021. Independent board member.

Cornelia Ritz Bossicard studied Business Administration at HEC Lausanne and Freie Universität Berlin, and obtained a Master of Science in Business Administration. In addition, she is qualified as both a Swiss Certified Accountant and a US Certified Public Accountant (CPA). From 1995 to 2014, she worked as an auditor with PwC, both in Switzerland and Silicon Valley, USA. Since 2014, she has been a sparring partner for strategy, corporate governance and finance and served on a variety of boards of multinational companies as an independent board member. She is the founder of 2bridge Ltd and, among other things, President of IVF HARTMANN and the César Ritz Foundation Niederwald, and a member of the administration of the Federation of Migros Cooperatives and of the Board of Directors of Läderach. Having chaired various audit committees for many years, Ritz Bossicard is a recognised expert in financial supervision.

› Cornelia Ritz Bossicard

New President of EPFL since 2025: Anna Fontcuberta i Morral

Anna Fontcuberta i Morral (*1975, Swiss/Spanish) studied Physics at the University of Barcelona, followed by a PhD in Materials Science at the Ecole Polytechnique Palaiseau, France. Between 2001 and 2005, she conducted research as a visiting researcher at the California Institute of Technology, Pasadena, USA, and as a CNRS researcher in France. During this time, she was co-founder of the successful start-up Aonex Technologies in the USA. She received her post-doctoral degree in Experimental Physics at the Technical University of Munich, Germany, in 2009. Since 2008, she has been working at EPFL, where she was promoted to Associate Professor of Materials Science and Engineering in 2014 before being promoted to Full Professor in September 2019. The renowned researcher has established her Laboratory of Semiconductor Materials as the world leader in sustainable nanotechnologies. She has also been an active member of various scientific advisory boards, committees and expert committees.

› Nicolas Righetti

A complete overview of the vested interests of the members of the ETH Board can be found at www.ethboardt.ch/vestedinterests.

Personnel matters

Personnel matters of the Federal Council

Election of the new EPFL President
The Federal Council elected Professor Anna Fontcuberta i Morral as the new President of EPFL on 27 March 2024. She is a professor of Materials Science and Engineering at EPFL and took over from Martin Vetterli on 1 January 2025. During his tenure, Vetterli succeeded in strengthening EPFL's reputation for the long term, establishing it as one of the most innovative universities in the world. Fontcuberta has been working at EPFL since 2008 and has been a full professor since 2019. A renowned researcher, she has established her Laboratory of Semiconductor Materials as a world leader in sustainable nanotechnologies.

Election of the new Director of WSL
On 14 June 2024, the Federal Council elected Professor Rolf Holderegger as the new Director of WSL. Until his appointment, he was Head of the Biodiversity and Conservation Biology research unit at WSL and adjunct professor at ETH Zurich. Holderegger assumed his new position on 1 October 2024, taking over from Deputy Director Christoph Hegg, who had been running the institution since July 2023 temporarily as Acting Director. He has been working at WSL since 2001 and has led one of WSL's largest research units, since 2011, with a strong focus on activities in applied research and implementation. From 2011 to 2023, Holderegger was a member of the Board of Directors of WSL.

Re-election of the members of the ETH Board
On 26 June 2024, the Federal Council elected the President of the ETH Board, Professor Michael Hengartner, the Vice President, Pascale Bruderer, and the current members Marc Bürki, Beatrice Fasana and Cornelia Ritz Bossicard for the 2025–2028 term of office. Professor Susan Gasser and Christiane Leister were re-elected for one year. Gasser will step down at the end of 2025. Christiane Leister died in office on 1 March 2025. The EAER will advertise the positions publicly for the election of successors. The representative of the research institutes, Professor Christian Rüegg, was re-elected until the end of 2028. The representative of the University Assemblies, Kristin Becker van Slooten, was re-elected until the end of 2026, when she will step down. The President of ETH Zurich, Joël Mesot, and the designated President of EPFL, Anna Fontcuberta i Morral, are members of the ETH Board ex officio.

Personnel matters of the ETH Board

Appointments to the Executive Board of EPFL
The ETH Board was informed of the resignation of Professor Jan Hesthaven on 23 May 2024 and appointed Professor Pierre Dillenbourg. He took up this position on an interim basis from September to December 2024. A professor of educational technologies, he has extensive knowledge of the organisation and culture at EPFL.

On 19 September 2024, the ETH Board appointed four new members, who will join the Executive Board on 1 January 2025: Professor Ambrogio Fasoli, Vice President for Academic Matters and Provost, Professor Stéphanie P. Lacour, Vice President for Support to Strategic Initiatives, Professor Edouard Bugnion, Vice President for Innovation, and Marianne Wannier, Vice President for Personnel Development. Vice President for Finance Françoise Bommensatt and Vice President for Operations Matthias Gäumann will continue their tasks. The appointments of the new Executive Board members are in connection with the inauguration of the new President, Professor Fontcuberta.

Fasoli is a full professor at the School of Basic Sciences (SB), former Director of the SPC at EPFL and CEO of EUROfusion. Lacour is a full professor at the School of Engineering (STI) at EPFL. Bugnion is a full professor at the School of Computer and Communication Sciences (IC) at EPFL. Wannier was Head of Human Resources at EPFL.

Appointments of new members to the Empa Directorate
At the request of Empa Director Tanja Zimmermann, the ETH Board appointed Dr Nathalie Casas to the Empa Directorate, along with Professor René Rossi and Professor Manfred Heuberger, who will share the position. Casas worked as Head of Development and Engineering at the ETH spin-off Climeworks. Heuberger is Head of Advanced Fibers and has been at Empa since 2005. He has also been an adjunct professor at the Department of Materials at ETH Zurich since 2021. Rossi is Head of Biomimetic Membranes and Textiles. He has been at Empa since 1992 and has been an adjunct professor at ETH Zurich since 2020.

Professorial matters
Refer to the right-hand side of page 47 for information about the appointment of professors.

Professorial matters

Appointment of professors
In 2024, the ETH Board dealt with 181 professorial matters at its meetings. It appointed a total of 80 professors, 50 of whom were newly appointed persons and 30 were internal promotions. At ETH Zurich 21 women and 29 men were appointed, and 7 women and 22 men were appointed at EPFL. In addition, the new director of WSL was appointed a full professor at both at ETH Zurich and EPFL.

Out of the 27 full professor appointments, 16 involved promotions of associate professors. Of the 28 associate professor appointments, 14 were promotions of associate professors with tenure track.

Women accounted for 21 (42%) of the 50 newly appointed professors in 2024. Over the past four years, the average proportion of women among newly appointed professors has been 44.4%.

The ETH Board awarded the title of professor (adjunct professor) to 23 researchers, including 6 women. In addition, it awarded the title of "Professor of Practice" to 4 women and 6 men.

Retirements and resignations
In 2024, the ETH Board was informed of 22 retirements for reasons of age: 16 from ETH Zurich and 6 from EPFL. In addition, ETH Zurich and EPFL advised the ETH Board of a total of 5 resignations for other reasons.

Appointments

80

professors,
21 of whom were women and 30 men at ETH Zurich, as well as 7 women and 23 men at EPFL

Proportion of women

42%

of newly appointed persons

The total of 80 appointments comprised:

Full professors	Associate professors	Associate professors with tenure track	Associate professors without tenure track
27	28	17	8
6 of whom were women	8 of whom were women	8 of whom were women	6 of whom were women

Risk situation and risk management

As the managing and supervisory body, the ETH Board sets out the risk policy for the ETH Domain. In this capacity, it has set targets for the two Federal Institutes of Technology and the research institutes. On the one hand, this serves to ensure that the tasks are performed effectively, cost-efficiently and with foresight, and that functional and innovative capabilities are maintained. On the other hand, this must guarantee personal safety and the security of property and other assets to the greatest possible extent. The leadership of the institutions of the ETH Domain is intended to be supported by comprehensive, transparent and up-to-date risk information and risk awareness among students and employees, and the good reputation of the ETH Domain is to be safeguarded.

The presidents of the two Federal Institutes of Technology and the directors of the research institutes are responsible for risk management. All institutions have their own procedures for risk management, which serve to identify and evaluate the individual risks, as well as strategies for coping with them and for monitoring them appropriately. The risk management activities and supervision of risk management procedures at each institution are coordinated by a risk manager and/or a risk committee. Each institution keeps its own risk catalogue in which the identified risks are described in detail with an assessment on the basis of probability of occurrence and extent of the potential damage. Here, consideration is given to the possible effect a risk could have on reputation. The individual profile, specific focus and size of each institution are reflected in its risk catalogue. Thus, the two Federal Institutes of Technology have partly different core risks to the four research institutes, and the assessment of the same risks can vary.

As part of their annual reporting to the ETH Board, the institutions provide information about their core risks, in particular their current status, extent and possible consequences. Core risks are those with a potentially very high degree of damage as well as those with a high or significant degree of damage depending on their probability of occurrence. The reports on the core risks are then submitted to the department responsible for the ETH Domain (EAER). Moreover, the institutions are obliged to inform the ETH Board directly about any extraordinary changes in risk or damaging events.

The effects of an inhibiting political, economic and legal environment, the significant loss of financial resources (budget cuts, uncertainty in terms of funding developments), cyberattacks and major damage to the real estate used by the Federal Government, which should be financed via the ETH budget, represent four of the most important risks for the ETH Domain. A deterioration in the framework conditions also harbours the risk of a loss of competitiveness, difficulties with recruitment and retention of top researchers and a decline in the quality of teaching. Other important core risks of the ETH Domain include a significant impairment of an institution's operations due to major events (e.g. pandemics, geopolitical conflicts or extreme weather events), possible infringements of scientific integrity and good scientific practice, violence/threats against persons and the loss of key personnel, taking on excessive financial obligations, space infrastructure risks and a possible failure of infrastructure.

Despite careful risk management, it cannot be ruled out that an institution may be affected by a damaging event which endangers the fulfilment of its duties enshrined in law. In this case, the ETH Board would submit a request to the Federal Department of Economic Affairs, Education and Research (EAER), for the attention of the Federal Council, to adapt the strategic goals or increase the federal financial contribution in accordance with Art. 30(2) of the Ordinance on Finance and Accounting of the ETH Domain following consultation with the Federal Finance Administration (FFA).

The insurance policies taken out by the institutions are of great importance. The institutions must take out insurance against possible losses, subsidiary to other measures, where such insurance is feasible and the funding is sufficient for it. Each institution is responsible for taking out insurance cover and administering its own insurance portfolio. When doing this, they must take into account their specific risk situation, strive for an appropriate cost/benefit ratio and ensure compliance with the federal regulations governing public sector procurement. The insurance cover must meet the standards which are customary in the Swiss insurance market and be concluded with an insurance institution that is licensed in Switzerland. The institutions have taken out property and employers' liability insurance policies, as well as smaller insurance policies for specific risks. The real estate owned by the Federal Government but used by the ETH Domain is not insured, because the Confederation follows a strategy of self-insurance. This category includes the damage caused to the cooling water pipes on the EPFL campus in Ecublens by the very rapid spread of quagga mussels in Lake Geneva.

STRATEGIC OBJECTIVES

Details of the Federal Council's strategic objectives for the ETH Domain can be found on the SERI website www.sbfi.admin.ch under Higher Education/ETH Domain.

Strategic objective

TEACHING

1

The number of students continued to grow with a similar dynamic to the previous year. ETH Zurich and EPFL have adopted initiatives and measures to ensure the quality of teaching in the long term. Both Federal Institutes of Technology are still improving their quality control tools.

Excellence in research-based and competency-based education

In 2024, the student and doctoral student population at ETH Zurich and EPFL numbered 39,820 representing a year-on-year increase of 3.6% (+3.3% for ETH Zurich and +4.2% for EPFL). The proportion of women in the student and doctoral community continued to increase slightly (2024: 32.9%; 2023: 32.7%). This corresponds to an increase from 32.1% in 2023 to 32.3% in 2024 at Bachelor's and Master's level. The proportion of foreign nationals increased from 50.5% to 50.9% (39.0% at Bachelor's level, 53.0% at Master's level and 79.9% at PhD level; for detailed figures on students and doctoral students, see p. 92 et sqq.)

One of the highlights in 2024 was the start of the Master's degree programme in Space Systems at ETH Zurich. This new course of study is part of the ETH Zurich|Space initiative launched at the end of 2022, which aims to expand research and teaching in the field of aerospace. In the reporting period, the Master's degree programme accepted an initial group of 28 students, with a total of 95 applications received. EPFL is preparing to launch a Master's degree in Urban Systems at the beginning of 2025 and a minor subject in sustainable construction. In the autumn semester 2024/2025, EPFL launched a course dedicated to teaching sustainable development at Master's level. The aim is to teach students of the various Master's programmes a range of transversal skills essential for learning and solving complex problems in the context of sustainability.

With a total of 24,550 hours of tuition at universities in 2024, commitment to teaching on the part of PSI, WSL, Empa and Eawag was largely on a par with the previous year. These included lectures, seminars, internships and other courses in a wide range of disciplines. The MOOC on EPFLx: Synchrotrons and X-Ray Free Electron Lasers was added to EPFL's range of courses in February 2024. The new course was developed by a researcher from the PSI, who also works as a lecturer at EPFL and as an adjunct professor at the University of Zurich. The research institutes supervised 829 Bachelor's and Master's theses as well as 1,009 doctoral theses in 2024.

Several scientists from the research institutes are regularly appointed as professors of one of the two Federal Institutes of Technology. ETH Zurich and the PSI launched a joint appointment procedure for a position in the field of battery materials, leading to the appointment of a full professor in 2024. In recognition of their commitment to teaching in particular, a scientist from the PSI and two from Eawag were appointed adjunct professors at ETH Zurich in the reporting period. An Eawag researcher was also promoted to full professor at ETH Zurich. In addition, the new Director of WSL was appointed full professor at ETH Zurich and EPFL.

One of the highlights of 2024: start of the Master's degree programme in Space Systems at ETH Zurich with an initial group of 28 students.

In the picture: NASA's James Webb telescope captures a cosmic tarantulas.
› NASA, ESA, CSA, STScI, Webb ERO Production Team

Promotion of transversal skills

Transversal skills are an essential part of high-quality education because they strengthen job prospects and enable graduates to make a positive contribution to society. ETH Zurich has developed a Competence Framework that distinguishes between subject-specific, method-specific and personal competencies. The study programmes were recently mapped in a mapping tool on the basis of this skills framework. This tool makes it possible to highlight the various skills which are developed and taught to stand out in the curricula and to support the design of programmes that focus on skill development.

EPFL's Centre for Transversal Competencies and Careers (CCTC) has developed a strategy to identify the needs of future graduates. This also includes asking the teachers of the individual departments, alumni and external partners about the necessary skills expected of the engineers and architects of the future. It will then be examined how these skills can be developed within the framework of the existing curricula. The initiative aims to develop a framework for all EPFL degree programmes by 2030. At doctoral level, the university is expanding its range of courses with a view to developing multidisciplinary skills, specifically with courses on leadership, interdisciplinary research methods, communication skills and scientific policy.

Computer skills are promoted across all courses of study and form an integral part of the curricula developed by ETH Zurich and EPFL. The Computational Competencies initiative at ETH Zurich strives for the sustainable integration of algorithmic thinking, programming, data analysis and data-based modelling. The use and understanding of large language models (LLM) were added as a new part of this initiative in 2024. Thanks to the swissuniversities Digital Skills project, in 2024 the EPFL Center for Digital Education was able to launch a course on responsible software, which is attended by over 300 students in the field of computer science. The course is also offered as an online course (MOOC) to reach a wider audience.

ETH Zurich and EPFL are also actively involved in training in computer science and computational thinking for teachers. For instance, the Education and Advice Center for Informatics Teaching at ETH Zurich supports schools and teachers at primary and secondary level who want to develop or expand their computer science teaching skills. Through the LEARN Center, EPFL actively participates in the training of primary and secondary school teachers through continuing education in the field of computational thinking with or without the use of computers. In the reporting period, the LEARN Center launched an initiative that enabled researchers, start-ups and schools to work together on new education technologies.

In order to improve teaching in digital education from an early age, EPFL has also founded the Digital Education for Equity in Primary Schools (DEEP) research consortium. The aim is to investigate the challenges of the digital transformation in Swiss primary schools in order to achieve a sustainable digitalisation of education from the earliest school years. DEEP is supported by the Jacobs Foundation and is a collaboration of six Swiss partner universities.

Innovation and quality assurance in teaching

The major study reform project PAKETH (Examinations and Academic Calendar) at ETH Zurich was met with broad approval in the 2024 consultation, leading to approval by the Executive Board. All Bachelor's and Master's degree programmes are now being revised in accordance with the project specifications so that they can be introduced as of the 2027/2028 academic year. The aim is to remove obstacles to teaching development and provide students with greater flexibility to ensure high-quality education in the long term. There is a general emphasis on project work, which constitutes one of the key pillars of this ambitious study reform.

The quality of the teaching is assessed with various tools as well as on the basis of student satisfaction. In the 2024 spring semester, the VSETH Association of Students and the AVETH Academic Association of Scientific Staff of ETH Zurich carried out a satisfaction survey among students and doctoral students. The results are currently being evaluated. Student performance is also a key element in teaching quality assurance. An EPFL working group has authored a document for lecturers to propose specific measures to improve the sense of self-efficacy among students and thus their performance.

Quality assurance for continuing education and doctoral training is also essential. EPFL launched a review of the quality assurance processes within the Formation Continue Unil-EPFL foundation and created new processes and tools to improve the quality of teaching in continuing education. In addition, 2024 saw EPFL receive the report from the expert group, which evaluated all 22 doctoral programmes at the end of 2023. The recommendations were classified according to priority, and in the reporting period, several initiatives were launched to improve the range of courses for doctoral students.

Promotion of national and international mobility

The two Federal Institutes of Technology support mobility. In 2024, ETH Zurich had between 250 and 300 incoming mobility students per semester. For EPFL, there were more than 650 in the spring semester, and 770 in the autumn semester. On the other hand, around 250 of those enrolled in a Bachelor's or Master's degree at ETH Zurich and about 460 at EPFL spent time at another university in Switzerland or abroad (see key figures, p. 98).

The summer schools, jointly organised by and for the doctoral students of ETH Zurich and EPFL each year, are another tool that serves to promote mobility between the two institutions. In the reporting period, EPFL and ETH Zurich held five summer schools as part of their community programme. In addition, there are several winter or summer schools organised by research institutions that facilitate exchange with other institutions and offer students an international stage. In 2024, WSL organised two summer schools in Davos on various environmental issues. Eawag organised a summer school on the topic of environmental systems analysis as part of its Eawag Summer Schools programme for the 15th time in a row. For its part, the PSI offered a winter school on proton therapy and a summer school on particle physics as well as an international course programme on modern spectroscopic methods in solid state physics.

University networks promote the mobility of students. For example, the ENHANCE network, with ETH Zurich as a member since 2022, aims to facilitate the mobility of students between the partner universities, including through the introduction of innovative mobility formats. ETH Zurich also belongs to the IDEA League, as part of which a multilateral framework agreement for shared doctoral programmes was signed with partner universities in 2024. For its part, EPFL remains fully committed to the EuroTech alliance, which brings together six of Europe's top technology universities. The EuroTech project EuroTeQ, which EPFL joined in 2023, aims to create a joint EuroTeQ Engineering University. One of the flagship projects is a common course catalogue that has allowed EPFL students to take part in courses offered by other member universities since 2024, and has given external students the opportunity to participate in EPFL online courses.

With the SNF Doc.Mobility programme funding coming to an end in 2024, EPFL will set up a follow-up programme in 2025 that offers an alternative for EPFL doctoral students who fail to meet the requirements of the new Mobility Grants in Projects funding. In fact, the latter have stricter formal conditions than Doc.Mobility.

Further education

All institutions of the ETH Domain offer a range of further education programmes tailored to the needs of society and the economy. The new MAS in AI and Digital Technology (MAS AID), which was introduced by ETH Zurich in 2024, is a typical example of this. It's a targeted technical programme for managers who need a better understanding of machine learning, artificial intelligence, cybersecurity, and other digital technologies that are rapidly changing their industry. EPFL is also planning to offer a new course of study in artificial intelligence that combines technological and management skills currently being developed in close collaboration with IMD. In addition, several new continuing education courses will be launched in the following areas: innovation management in the age of AI, innovation through data science, the media in the age of AI, introduction to machine learning and LLMs, digital education in secondary school II, digital mobility, imaging and AI. EPFL also offers training on machine learning and artificial intelligence to the Federal Statistical Office (FSO) and, as of 2024, to the Swiss National Library.

The "lead campus", the joint education centre of the four research institutes of the ETH Domain established as part of the ENRICH initiative, began its operations in 2024. Its range includes subject-specific and interdisciplinary training and further education services for Eawag, Empa, PSI and WSL employees as well as training in selected subject areas for external customers. For example, the "lead campus" offers a number of internal courses related to workplace security and digital skills and tools, such as basic or advanced programming courses. Other offerings are aimed at scientific and academic careers, such as courses in scientific communication or career planning. External course offerings include, for example, radiation protection in medicine, transportation or emergency organisation. The "lead campus" organises training courses at all main research institute locations.

Empa has been offering further education courses for more than ten years in collaboration with the FSRM Institute (Swiss Foundation for Research in Microtechnology). In 2024, some of the courses organised included topics of interest to the industrial sector such as tribology and the additive manufacturing of metals.

Strategy for the development of enrolment at the undergraduate, graduate and doctoral levels

The excellence of ETH Zurich and EPFL contributes significantly to strengthening its attractiveness in Switzerland and internationally. This dynamic is particularly gratifying, as there is a shortage of experts in the STEM disciplines and in engineering. According to the latest FSO survey, the employment rate for people who have completed a Master's degree at ETH Zurich or EPFL one year after they have graduated is 96%. However, the steady increase in students could jeopardise the quality of education in the long term. At the end of 2022, the ETH Board adopted a strategy for the development of student numbers, which serves as a guideline and provides measures to mitigate the risk that an increase in student numbers could pose to educational quality in the long term. ETH Zurich and EPFL have started to implement the measures that were developed in the context of this strategy.

In 2023, the ETH Zurich adopted and published an admission strategy that aims to better manage the growth of student numbers. Various measures were introduced in 2024, including ones related to the partial automation of admission procedures and the optimal composition of student cohorts in study programmes. In addition, ETH Zurich is in the midst of defining a transparent calculation of its capacity limits, i.e. the maximum number of students who can be accepted without compromising the quality of teaching, and is also working on a teaching staff strategy and a teaching and learning space strategy.

Due to the steep increase in students, EPFL had to adopt an admission limit at Bachelor's level for students with foreign educational qualifications. These students are admitted until they reach an annual total of 3,000 study spaces in the first Bachelor's year. The corresponding decision was adopted in September 2024 by the ETH Board at the request of EPFL. The admission limit enters into force at the beginning of the 2025/2026 academic year and will apply over a four-year period. EPFL has also revised its admission conditions: as of the beginning of the 2024 academic year, it will require first-year students from another country to have achieved 80% of the highest grade in mathematics and 80% in physics – in addition to a specific average grade. This measure may have already taken effect to a certain extent, as the number of new admissions at Bachelor's level already decreased slightly in 2024 (–1% compared to 2023). At Master's level, the EPFL selection process is based on dossiers, ensuring that applicants have the necessary basic qualifications. EPFL is also taking measures to increase its admission capacity, in particular with the Double Deck project, which aims to adapt and expand the EPFL infrastructure. The project involves the construction of a new building on the EPFL Esplanade and the renovation and modernisation of the Coupole rooms. This new building is scheduled for 2028.

Strategic objective

RESEARCH

2

Global challenges require coordinated research efforts to achieve the greatest possible impact. The institutions of the ETH Domain, with their partners in Switzerland and internationally, actively participate in these collective initiatives and conduct top-level research in many different areas.

A leader in international research

With the establishment of the Swiss National AI Institute (SNAI) in the reporting period, ETH Zurich and EPFL are working together to strengthen artificial intelligence (AI) in Switzerland. This institute, which is led jointly by both Federal Institutes of Technology, aims to leverage the scientific expertise of the ETH Domain to tackle the challenges of AI and support public, private and non-profit organisations in their digital transformation. The SNAI, which draws on the ETH AI Center and the EPFL AI Center, will manage the Swiss AI Initiative (see review, p. 10). Another example of collaboration in the field of AI is the launch of the International Computation and AI Network (ICAIN) at the 2024 World Economic Forum in Davos by the Federal Department of Foreign Affairs (FDFA), ETH Zurich and EPFL together with other partners and stakeholders. The aim is to develop AI technologies that benefit society as a whole, are available and sustainable for all, and help reduce global inequality.

The institutions of the ETH Domain work with their Swiss and international partners on climate, environmental and energy issues. For example, WSL has conducted a major international study, which shows that the atmosphere in Europe has become much dryer in recent decades due to greenhouse gas emissions. In other work related to the atmosphere, albeit in a different area, the PSI successfully led an international study to identify the various sources of particulate matter responsible for the smog in Beijing. Empa, for its part, participates in the EU project HEATWISE. This project is funded by Horizon Europe and brings together 12 companies and research institutions from eight countries to rethink energy management in buildings with a large IT infrastructure.

Last but not least, cooperation with the Swiss Federal Offices enables researchers in the ETH Domain to become involved in challenges of national importance (see also Objective 4, p. 64). For example, Eawag is currently involved in a project supported by the Swiss Federal Office of Energy (SFOE) that is investigating the influence of CO_2-saturated fluids on the integrity of geological barriers on Mont Terri under real conditions. These analysis methods are also used in connection with the storage of nuclear waste and the geological storage of CO_2.

In 2024, scientists from Swiss institutions again received SNSF Starting Grants, SNSF Consolidator Grants and SNSF Advanced Grants as part of transitional measures introduced to mitigate the impact of eligibility restrictions regarding Horizon Europe's calls for proposals and financing. As part of the call for the 2024 SNSF Starting Grants, 20 scholarships were awarded to researchers in the ETH Domain. Four SNSF Consolidator Grants of a total of 19 approved in 2024 went to scientists from the ETH Domain, as did more

than half of the SNSF Advanced Grants from the 2023 call, which were awarded in 2024. Researchers from Swiss research institutions were once again able to participate in the 2024 call for the ERC Advanced Grants, as negotiations between Switzerland and the EU commenced. Scientists from ETH Zurich, EPFL and Eawag are also partners in European projects which received an ERC Synergy Grant in 2024.

Launched in 2014, the fourth series of the National Centres of Competence in Research (NCCR) is in its final phase, which is set to run until 2026. ETH Zurich has agreed to support the research activities of SwissMAP (Mathematics of Physics; network for the exchange of ideas between mathematics and theoretical physics) beyond this period. Efforts are also being made to continue the activities of the RNA & Disease NCCR (the role of RNS in disease mechanisms), provided that funding can be secured. Led by EPFL, the MARVEL NCCR dedicated to computer-aided design and the discovery of new materials will continue its activities over the next two years as planned.

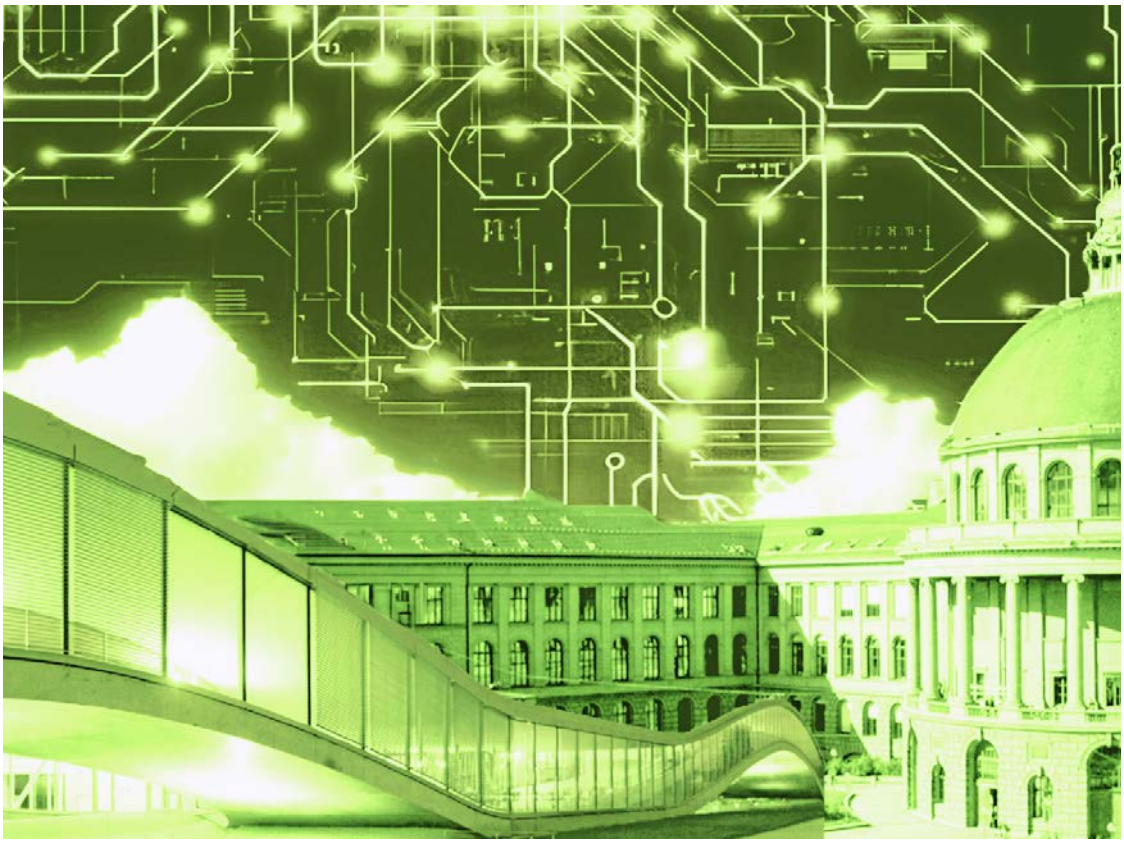
In 2024, researchers from the ETH Domain were honoured with various prestigious awards. Mackenzie Mathis, for example, received the Latsis Prize for her work on AI algorithms in behavioural neuroscience. Andrea Alimonti, professor of experimental oncology, and Andrea Ablasser, a specialist in congenital immunity, were honoured with the Cloëtta Prize. Aside from this, Andrea Ablasser received the NOMIS Distinguished Scientist and Scholar Award. In addition, there were prestigious international awards, including the Dr H.P. Heineken Prize for Ruedi Aebersold for his advances in proteomics, the Max Planck-Humboldt Research Award for Torsten Hoefler for his research in the field of computer science and the Roger Revelle Medal for outstanding contributions to atmospheric and climate sciences for Nicolas Gruber. Philippe Schwaller received the prestigious Hansch Award, Javier Mazzitelli the Guido Altarelli Award and Daniel Mazzone the Erwin Felix Lewy Bertaut Prize (for the international rankings of ETH Zurich and EPFL, see p. 101).

Complementary expertise within the ETH Domain

Some research programmes and initiatives are jointly launched by the ETH Domain's institutions to leverage their complementarity and synergies. Against this backdrop, the ETH Domain's Joint Initiatives were launched for the 2025–2028 period (see Objective 5, p. 67). ReCLEAN, for example, is one of the Joint Initiatives in the Strategic Area of Energy, Climate and Environmental Sustainability. As part of this initiative, two measurement campaigns were carried out in 2024 to quantify nitrogen flows in various compartments (atmosphere, soil, forest and groundwater). These have led to important data for improving the modelling of nitrogen flows in Swiss ecosystems.

In 2024, two new scientific streams were launched within the framework of ENRICH – the research institutes' initiative to strengthen their collaboration in certain areas: one on the topic of climate and one on data and computing. The Eawag and WSL Blue-Green Biodiversity research initiative, originally supported by the ETH Board as a cooperation project between the institutions of the ETH Domain, was successfully completed in the reporting period (see Objective 5, p. 68).

The proximity of Empa and Eawag in Dübendorf also facilitates research collaboration. As part of the ARTS (Aquifer Reaction to Thermal Storage) project launched in 2024, Eawag is investigating how the use of borehole thermal energy storage impacts surrounding soil, groundwater and microorganisms in the subsoil. These research activities are carried out directly on campus in cooperation with Empa and its Demonstrator Energy Hub (ehub).



ETH Zurich and EPFL are pooling their expertise to advance artificial intelligence in Switzerland. The AI-supported photomontage shows the Rolex Learning Center at EPFL and the ETH Zurich main building.
› ETH Zurich

Research activities in the energy sector

In addition to basic research on energy in numerous laboratories, the institutions of the ETH Domain are involved in various energy research initiatives and programmes. They continue to play a key role in the SWEET funding programme, for example with the PATHFNDR consortium (PATHways to an efficient future energy system through Flexibility aND sectoR coupling), whose first results were presented in 2024. It comprises eight research partners, including ETH Zurich (Leading House), EPFL, PSI and Empa, and aims to develop and analyse transition approaches for the integration of renewable energies in Switzerland.

The ETH Domain has extensive expertise in nuclear energy research, covering both nuclear fusion and nuclear fission. The institutions of the ETH Domain are participating in numerous new EURATOM projects approved in 2024; PSI, EPFL and Empa, for example, together with European partners, NAGRA and the University of Bern, are involved in the EURAD-2 programme in the field of deep geological repositories. In the reporting period, PSI signed a cooperation agreement on experimental collaboration with a Danish developer of molten salt reactors.

In order to achieve net-zero greenhouse gas emissions, there is a crucial need for negative emissions technologies, which often require demonstration platforms of a certain size. The pilot plant for the production of sustainable aviation fuels from renewable energies, supported by the SFOE pilot and demonstration programme (P+D), is currently being built on the PSI campus in collaboration with the start-up Metafuels. This project is closely linked to the refuel.ch project, which is supported by the SWEET programme and involves several institutions within the ETH Domain. The DemoUpCARMA project (Demonstration and Upscaling of CARbon dioxide MAnagement solutions for a net-zero Switzerland) is another pilot project supported by the SFOE and the FOEN. The project, led by ETH Zurich, brings together numerous academic partners, including EPFL, PSI, Empa and Eawag, as well as industrial partners. It examines the implementation of long-term CO_2 storage in concrete, as well as the transport and long-term storage of CO_2 in a geological reservoir.

The Coalition for Green Energy & Storage launched in 2023 by EPFL, ETH Zurich, Empa and PSI has selected six "catapult" projects that can serve as models for scaling at a global level (see also Objective 5, p. 69). For its part, EPFL has decided to set up six additional professorships in Valais in areas related to the energy transition (see also Objective 5, p. 71).

Enhancing computer sciences and information technology

In addition to the numerous research projects and initiatives in the field of computer sciences and AI, the institutions of the ETH Domain are also heavily involved in quantum technology. They successfully participated in the SNSF's Swiss Quantum Call 2024 call for projects. This call is supported, among other things, by the transitional measures established to bridge Switzerland's non-association in the Horizon Europe programme and, at the same time, to strengthen the position of Swiss research in the field of quantum technology (see also QTNET, Objective 3, p. 60 as a supplementary measure implemented by the ETH Board in the ETH Domain). Of the 13 projects supported as part of the Swiss Quantum Call 2024, nine came from the ETH Domain. The second edition of Swiss Quantum Days, which took place at EPFL at the beginning of 2024, should also be mentioned in this context.

The contribution of ETH Zurich and EPFL to the training of teachers at primary and secondary schools in computer science and computational thinking is described in more detail under Objective 1, p. 51 et sqq., as is the strengthening of computer sciences and information technology in their curricula.

Protection against cyber risks

The future role to be adopted by the Swiss Support Center for Cybersecurity (SSCC), led jointly by ETH Zurich and EPFL, was agreed upon with the new National Cyber Security Centre at the beginning of 2024. In the new National Cyber Strategy, the SSCC is intended as an interface to all higher educational institutions and research institutions in Switzerland. The inclusion of the Zurich University of Applied Sciences (ZHAW) as a partner institution was a first important step in this regard.

The Zurich Information Security and Privacy Center (ZISC) at ETH Zurich and the Center for Digital Trust (C4DT) based at EPFL are also active in the field of cybersecurity. In 2024, the two centres organised or attended several events on this topic. The C4DT is also an active member of the core group of the Geneva Dialogue on Responsible Behaviour in Cyberspace. It brings together governments as well as stakeholders from industry, civil society and science to establish internationally recognised standards and create greater security and stability in cyberspace.

Research priorities

The three Strategic Focus Areas (SFAs) defined for the ETH Domain in two consecutive ERI periods from 2017 to 2024 have been completed. Over the past eight years, the Personalized Health and Related Technologies (PHRT) SFA has collaborated closely with the Swiss Personalized Health Network (SPHN) to lay important foundations for research on personalised health. PHRT funded over 130 projects involving over 500 people from research and clinical settings. At the end of the two initiatives in late October 2024, the Data for Health symposium was held to examine the achievements of the initiatives and to provide an outlook on the future research data ecosystem for health in Switzerland.

Since its foundation in 2017 as part of the Data Science SFA, the SDSC has repeatedly demonstrated its importance in the Swiss research landscape. In the reporting period, the SDSC call for cooperation projects was expanded to national level. The fact that demand now goes beyond the ETH Domain is also reflected in new collaborations, such as those with Square Kilometre Array (SKA) and CERN. Financing and expansion of the SDSC (SDSC+) at national level in the period 2025–2028 have been ensured through its inclusion in the 2023 Swiss Roadmap for Research Infrastructures and core funding from the ETH Board.

In total, 19 projects were funded in the Advanced Manufacturing (AM) SFA up to 2024. By way of example, one project saw researchers from EPFL, ETH Zurich, PSI and Empa develop a smaller melting device for laser melting (selective laser melting) for one of the PSI infrastructures, enabling the study of the microstructural nature of metallic components during 3D printing. The eight projects in the second financial period will run until the second semester of 2025. The established technology platforms will continue to be used, and the KTT activities will continue after the AM SFA.

While they weren't directly part of the 2021–2024 SFA series, biodiversity, climate and environmental sustainability also featured among the key topics in the recently completed ERI period. For example, WSL scientists coordinated the international BIODIVERSA project FeedBaCks, in which a large number of partners, including ETH Zurich, were involved and which concluded at the beginning of 2024. The aim of the project was to investigate the interactions between climate and biodiversity and their effects on society. To strengthen its leading position in climate change adaptation research in aquatic systems, Eawag advertised four tenure-track group leadership positions, focussing on biodiversity, public health, water resources and water reuse. The selection process was completed in autumn 2024.

The institutions of the ETH Domain are committed to open research data. Following the calls for projects in 2023, several projects supported by the ETH Board were launched in 2024. The projects "Open e-Learning Modules for Open Research Data and Research Management", "Interoperability between ETH Domain Repositories" and "Data Stewardship Network in the ETH Domain" pursue the overarching objective of harmonising approaches across the entire ETH Domain and are led by Lib4RI – the library of the four research institutes. In the reporting period, ETH Zurich set up a committee of experts for the FAIR principles (Findability, Accessibility, Interoperability and Reuse) and a new governance system that aims to anchor these principles for research data at ETH Zurich.

The ETH Domain continues to focus on maintaining research integrity and establishing best practices in this area. In 2024, ETH Zurich decided to set up a decentralised Research Integrity Advisory Service (RIAS) assigned to each of the departments. This information and advisory service is intended to help anchor the culture of scientific integrity and discipline-specific good scientific practice even more firmly in everyday research. In addition, a new ordinance on procedure in the event of scientific misconduct came into force. Since 2024, EPFL's online courses on scientific integrity and data protection have been mandatory for all new employees involved in scientific research. In addition, EPFL updated its ethical guidelines on the use of public data in research – "Use of public data" and "Further use". These continue to represent important resources for the institution's researchers. The ETH Domain was also involved in the creation of the Swiss National Competence Centre for Scientific Integrity, founded at the behest of the Swiss University Conference in 2024. In future, higher education institutions will have to report all procedures instituted regarding violations of scientific integrity and scientific misconduct to the Competence Centre.

Strategic objective

RESEARCH INFRASTRUCTURES

3

In 2024, the main research infrastructure projects listed in the Swiss Roadmap for the 2021–2024 period were completed. At the same time, the ETH Domain continued its commitment to international cooperation and increased its involvement in European and global research infrastructures and research infrastructure networks.

Operation, development and provision of large research infrastructures

The ETH Domain owns and operates a unique portfolio of large research infrastructures in Switzerland that are made available to the national and international scientific community. These include, for example, major PSI facilities, digital research infrastructures and large research platforms.

PSI's large-scale research facilities allow researchers from Swiss and international institutions to conduct cutting-edge research in a wide range of fields. Thanks to experiments at the Swiss Light Source (SLS), researchers from PSI have discovered, in collaboration with ETH Zurich and the Swiss company CASALE AG, how to use catalysts to neutralise certain polluting and harmful gases from industrial processes such as fertiliser production. Thanks to the unique combination of various large-scale research facilities at the PSI, researchers also discovered a way to optimise lithium-air batteries that significantly extends their service life.

The number of users of the various PSI facilities is comparable to that of the previous year. One exception is the SLS, which has been in shutdown for the SLS 2.0 upgrade project since September 2023 and therefore did not carry out any experiments in the reporting period. The average annual availability of accelerator systems at the PSI between 2021 and 2024 amounted to 94.5%.

In 2024, the use of high-performance computing resources at the Swiss National Supercomputing Centre (CSCS) remained as high as in the previous year. As part of the "User Program", two calls for projects are launched every year, with CSCS 2024 giving numerous users access to their computing and data services.

To complement the Federal Government's efforts to consolidate Switzerland's excellent position in quantum technologies, the ETH Board decided to allocate CHF 10 million for the years 2023 and 2024 to the joint ETH Domain Quantum Technology Network (QTNet) infrastructure programme of ETH Zurich, EPFL and PSI. In 2024, the programme enabled the further expansion of the micro and nano manufacturing capacities needed to advance quantum technology, especially thanks to the procurement of new equipment for shared laboratories. The programme also offers start-ups as well as small and medium-sized enterprises (SMEs) and Swiss industry access to its infrastructure.

At EPFL, the neuroinformatics project Blue Brain (BBP), which is now nearing an end after running from 2005 to 2024, has made significant progress in the creation of biologically detailed digital reconstructions and simulations of the brains of mice. From 2025, the neuroscientific community will have access to all aggregated data, developed software, algorithms and

numerous detailed models of the mouse brain via the Blue Brain Open Platform.

In addition to its large-scale research facilities, the ETH Domain is developing research and demonstration platforms that accelerate the innovation process. In the reporting period, the new STEP2 unit was completed at Empa and Eawag's modular NEST research and innovation building. Developed in close collaboration with SMEs and the company BASF, this project aims to initiate innovations in the recycling of building materials, industrial and digital manufacturing, building envelopes, and energy concepts. A globally unique WSL installation in the Pfynwald in Valais has been fully operational since summer 2024. The experimental set-up, consisting of fog nozzles and rain canopies, is intended to assist in analysing the influence of air and soil dryness on the forest, from cellular level right up to the ecosystem.

Swiss Roadmap for Research Infrastructures: implementation of the strategic projects

The implementation of the ETH Domain's research infrastructures listed in the Swiss Roadmap for Research Infrastructures for the ERI period 2021–2024 continued in 2024.

The new Alps supercomputer at the CSCS in Lugano was inaugurated in autumn 2024 in the presence of Federal Councillor Guy Parmelin among others (see p. 17). Alps has more than 10,000 of the globally sought-after NVIDIA Grace Hopper Superchips. Thanks to its innovative architecture, the research infrastructure meets the specific needs of various user groups. The institutions of the ETH Domain can thus benefit from a first-class computing infrastructure for research areas such as AI, materials sciences, particle physics, accelerator development and life sciences. For example, back at the beginning of 2024, the technical teams at PSI and CSCS agreed on an architecture tailored to PSI – one that ensures a high level of cybersecurity while enabling seamless interaction with the computing infrastructure for users of the PSI platform. Alps will also be a key element of the Swiss AI Initiative launched jointly by ETH Zurich and EPFL at the end of 2023 (see Objective 2, p. 55). In the context of this, the CSCS recorded a significant number of new users straight off the bat in 2024.

After the SLS was fully switched off for the SLS 2.0 upgrade project in September 2023, the reporting year was all about the upgrade. Not only were the centrepiece of the plant, the electron storage ring, and the first beam lines upgraded, but the modernisation of the roof and the integration of a PV system have also been implemented. After the upgrade, user operation is set to resume in 2025. Thanks to the upgrade, the SLS 2.0 will generate X-rays that will enable groundbreaking experiments in a wide range of fields.

The Catalysis Hub (Swiss Cat+) has seen ETH Zurich and EPFL jointly implement a data-based automated infrastructure for the discovery and optimisation of catalysts, which is accessible to the Swiss scientific community. Due to the excellent results achieved so far and the strategic importance of this unique infrastructure in Switzerland, the ETH Board decided in 2024 to extend its support for the project for the 2025–2028 ERI period.

Unrivalled in the world: The WSL installation in the Pfynwald in Valais has been fully operational since summer 2024. The experimental set-up, consisting of fog nozzles and rain canopies, is intended to assist in analysing the influence of air and soil dryness on the forest.
› Daniel Kellenberger/ETH Board

In March 2024, the ETH Board also gave the green light for the implementation of four of six major research infrastructure projects of national significance listed in the Swiss Roadmap for Research Infrastructures with regard to the ERI period 2025–2028. Unfortunately, due to budget cuts, the ETH Board had to decide not to grant funds for the two remaining research infrastructure projects in 2025.

Involvement in international research infrastructures

The institutions of the ETH Domain contribute to Switzerland's worldwide reputation as a location for research activity through their participation in international research infrastructures.

In 2024, the ETH Board decided to continue to support the implementation of the Swiss Accelerator Research and Technology (CHART) programme in the 2025–2028 ERI period. CHART was established in 2016 as a partnership between CERN, PSI, EPFL, ETH Zurich and the University of Geneva and supports the future-oriented accelerator project Future Circular Collider (FCC) at CERN as well as the development of advanced accelerator concepts in Switzerland that go beyond existing technology. The aim is to sustainably strengthen the future of CERN.

The Swiss Plasma Center (SPC) at EPFL is one of Europe's leading centres for nuclear fusion research. Its international cooperation and infrastructure play a crucial role in the EUROfusion effort and contribute directly to the International Thermonuclear Experimental Reactor (ITER) project. In 2024, a team of European scientists, some of whom work at the SPC, set a new world record for fusion energy generation in the United Kingdom's Joint European Torus (JET) facility.

Switzerland is a member of several European research infrastructure networks, including through the participation of the ETH Domain's institutions. Through the PSI, Switzerland is involved in the construction and operation of the European Spallation Source (ESS) in Lund, Sweden. Construction of two of the five instruments in which the PSI is involved was completed in 2024. The ESTIA reflectometer, which the PSI alone developed and built, was delivered to Sweden by the end of 2024 and is expected to be installed at the ESS during 2025. In 2024, the PSI also joined the EuPRAXIA project in which Empa and EPFL are already members. It is the first European infrastructure project to develop two decentralised, compact and innovative accelerator systems based on plasma technology. The project was included in the Roadmap of the European Strategy Forum on Research Infrastructures (ESFRI).

The institutions of the ETH Domain coordinate the Swiss nodes of certain European research infrastructure networks. One such example is the Integrated Carbon Observation System (ICOS), whose Swiss node is led by ETH Zurich and in which WSL and Empa are also participating. Since February 2024, ICOS-CH has been delivering monthly and daily CO_2 concentration averages at the Jungfraujoch station. The Swiss Seismological Service (SED) at ETH Zurich coordinates the Swiss node of the European Plate Observatory System (EPOS). The first activities were undertaken in the context of EU projects linked to this platform, such as the launch of the call for transnational projects in ETH Zurich's Bedretto Underground Laboratory.

Strategic objective

KNOWLEDGE AND TECHNOLOGY TRANSFER

4

In the reporting period, various projects advanced knowledge and technology transfer (KTT) to boost Switzerland's innovative strength and, once again, a number of spin-offs were established. The institutions of the ETH Domain were also active at the various locations of the Swiss Innovation Park. Park Innovaare was officially opened in 2024.

Research cooperation with the Swiss business community and the public sector

By transforming scientific findings into marketable products and services, the institutions of the ETH Domain make a significant contribution to Switzerland's competitiveness and innovative strength. In the reporting period, they registered 222 new patents and 137 licences as well as 282 invention disclosures and 25 software notifications (see p. 99). In addition, 576 new collaboration agreements with private businesses and 245 with the public sector were concluded (each at least CHF 50,000, see Fig. 14, p. 100). To establish contact with industry, the institutions organise annual large-scale events, such as the ETH Zurich Industry Day and the EPFL Engineering Industry Day. This results in a large number of research projects with Swiss or international companies. In the reporting period, EPFL negotiated framework agreements with two major Swiss companies in the fields of transport and watchmaking, for example. Among other things, ETH Zurich advanced its collaborations in the pharmaceutical sector – with projects on the topic of the "Next Generation of Translational and Therapeutic Approaches" as part of the agreements with Roche, for example. Empa participated in a demonstrator project for the production of hydrogen using an enamelling kiln with the Canton of Zug and an industrial association established for the project. In June 2024, the PSI signed a framework agreement with Proxima Fusion to promote the development of high-temperature superconductor magnet technology for use in the fields of fusion energy and particle physics through increased collaboration at Park Innovaare (see below). The Coalition for Green Energy & Storage, in which several institutions of the ETH Domain are involved, strengthened its cooperation with major energy companies (see also Objective 5, p. 69).

The institutions of the ETH Domain offer various platforms to promote cooperation with small- and medium-sized Swiss enterprises (SMEs), but also with start-ups. EPFL continued the KNOVA programme launched in 2021, with 18 companies exploring the potential for innovative collaborations on the EPFL campus in monthly "onsite sprints" in the reporting period, many for the second time. EPFL also houses Alliance, Western Switzerland's technological innovation platform that supports SMEs and start-ups in their strategic and analytical decisions – often in cooperation with funding agency Innosuisse. Likewise, ETH Zurich runs numerous projects with Swiss SMEs via Innosuisse. For example, it collaborated with shaker manufacturer Adolf Kühner AG in Birsfelden in the reporting period. The institutions of the ETH Domain also work in the core teams of major Innosuisse innovation boosters, such as Empa and ETH Zurich in the Carbon Removal Booster.

In addition to industry, the public sector as well as associations and non-profit organisations are important cooperation partners to the institutions of the ETH Domain. This often involves concrete application examples for improving public safety and quality of life. In collaboration with the Federal Office for Civil Protection (FOCP) and the insurance industry, researchers at WSL have developed a staff exercise for cantonal emergency services to test the crisis resilience of the cantonal operations centres in the face of extreme events such as extreme drought. Eawag has compiled its numerous activities in the service of society in the publication *Wasserwandel*, which shows how the water research institute develops solutions in the areas of health, cycles, biodiversity and climate change. In April 2024, Eawag published a report on the impact of the Swiss Federal Government's Action Plan on Plant Protection Products on waterways together with the association of Swiss wastewater and water protection experts (VSA). While instances of threshold values being exceeded have fallen significantly since 2019, many kilometres of rivers and streams remain affected. Numerous projects are supported by Federal Offices that use government-funded research as an important tool to facilitate targeted research on issues at the interface between legislation and implementation. By way of example, the Swiss Federal Office of Energy (SFOE) is involved in Bedretto Energy and Circulation of Geothermal Energy (BEACH) at ETH Zurich, which examines the feasibility of storing and recovering thermal energy in hard rock.

Transfer activities in the public sector also have an international dimension. WSL is building local environmental DNA laboratories in Bhutan and Colombia. In Bhutan, they also collaborate with the WWF and the government, which aims to advance country-wide monitoring to assess the diversity and population development of vertebrates to enable informed decisions on conservation. Empa is working on the European model for the calculation of aircraft noise on behalf of the Federal Office of Civil Aviation (FOCA) and represents Switzerland in the corresponding working group of the European Civil Aviation Conference. At structural level, the institutions are engaged in international KTT networks. By way of example, the PSI participates in the European TTO Circle to promote the transfer of technology and knowledge at research institutions across Europe.

Favourable conditions for KTT and enterprise

After a record year in 2023, another 64 spin-offs were established in the ETH Domain in 2024 (see p. 99). A wide range of the institutions' funding programmes support entrepreneurial thinking and action, such as the ETH Pioneer Fellowship, the Empa Entrepreneur Fellowship programme, EPFL Changemaker and blaze accelerator, and the PSI Founder Fellowship, which was complemented by an extended preparatory programme and led to the spin-off Inveel GmbH in the reporting period. Inveel offers services in the field of printed electronics and sensor technologies. In 2024, a Deep Tech Investor Summit for spin-offs and investors was held at ETH Zurich for the first time as part of the long-term partnership with UBS, and work commenced on the establishment of an innovation platform for linking students with external partners. In the field of aerospace, ETH Zurich is the leading institution in the ESA Business Incubation Centre Switzerland, where it supports numerous space-related spin-offs and start-ups in the ETH Domain, but also start-ups from other university and non-university fields. At the end of 2024, the PSI and the European Space Agency (ESA) signed a contract to mark the start of the European Space Deep-Tech Innovation Centre (ESDI), which aims to further strengthen cooperation in the aerospace sector with drivers of innovation in Switzerland. EPFL is the leading house for Space Exchange Switzerland – a national platform initiated by the SERI. Numerous aids to assist the use of satellite data for commercial applications are just one example of how this platform promotes entrepreneurship. To strengthen KTT internally, EPFL now awards "Sciencepreneur" status to those working directly towards spin-off ideas in the research groups and laboratories.

The Glatec association, which supports Eawag and Empa start-ups in the fields of materials science, environmental science and technology, welcomed WSL as a new member in the reporting period. In the summer of 2024, the RAMMS software developed at the WSL Institute SLF for the modelling of natural hazards culminated in the first SLF spin-off – RAMMS AG – which awards licences to engineering firms around the world in the field of natural hazards management and provides training on the correct use of the software.

Switzerland Innovation Park Innovaare in Villigen
› Markus Fischer / PSI

National network of technology transfer centres in advanced manufacturing

In the context of the Federal Government's "Action Plan for Digitalisation", the ETH Domain played a key role in the establishment of the association of technology transfer centres in the field of advanced manufacturing (AM-TTC). Since the end of 2022, the first two centres – Swiss m4m Center and ANAXAM – in which Empa and the PSI are involved as scientific partners have been augmented by the Swiss Photonics Integration Center (Swiss PIC, with the PSI as its founding partner) and the Swiss Cobotics Competence Center (S3C) for collaborative robotics, in which ETH Zurich and EPFL are involved as scientific partners. S3C is located at the Swiss Innovation Park Biel. Swiss PIC makes innovations in the field of optical systems integration accessible, is supported by the Canton of Aargau and, in the reporting period, started hiring employees and commenced work on the establishment of its clean-room infrastructure at Park Innovaare.

To further improve the range of services offered by the centres, the AM-TTC Alliance, the umbrella association of the initiative, evaluated the progress and achievements of the four centres on behalf of the SERI in autumn 2024. All technology transfer centres made applications for funding as research institutions of national importance for the ERI period 2025–2028, which were approved at the end of 2024, in some cases on a reduced scale.

Strong involvement in Switzerland Innovation

The institutions of the ETH Domain feature prominently at the Swiss Innovation Park, which aims to better network science and industry, at its various locations. In 2024, ETH Zurich commissioned the first of two aircraft hangars at the Switzerland Innovation Park Zurich. The focus here is on teaching projects, such as the new "Space Systems" Master's degree (see Objective 1, p. 50). The second hangar, which will primarily be used for cooperation with industry partners in the fields of mobility, aerospace and advanced manufacturing, is due to be commissioned in early 2025.

In the reporting period, the Switzerland Innovation Park West EPFL particularly welcomed the addition of carbon-capture company Mitico from Valais, which boosted the park's presence. A memorandum of understanding has been signed with KoreaBio, opening up new opportunities on the international stage for cooperation in the biotechnology sector. Following the completion of the Park Innovaare buildings on schedule last year, the opening ceremony took place in April 2024 in the presence of Federal Councillor Guy Parmelin. In the meantime, over 20 companies and more than 300 PSI employees are now working at Park Innovaare, where they are involved in innovative exchanges on the topics of semiconductors, photonics, biosciences and novel nuclear technologies, including fusion energy (see also the report on p. 23 et seq.). Empa was involved in the establishment of the Research Council at Switzerland Innovation Park East in 2024. Business incubator Startfeld, which Empa

operates together with the Innovation Park, is one of Europe's leading start-up hubs and received the Financial Times Award in the reporting period.

Dialogue with society and tasks assigned by the Federal Government

The institutions of the ETH Domain engage in direct dialogue with the public on socially relevant research topics in a variety of ways. In 2024, for example, EPFL was responsible for the Swiss Pavilion at the International Astronautical Congress (IAC) in Milan in partnership with the SERI, Swissnex and Presence Switzerland. EPFL appeared at major public events on the same topic, such as the Fantasy Basel convention and Air & Space Days at the Swiss Museum of Transport in Lucerne. WSL was able to present their research on tree growth at different altitudes in film. The documentary with breathtaking views of the Lötschental valley's Alpine tree population won the prize for the best short film at a festival in Los Angeles. For the third time, ETH Zurich staged the Cybathlon, where nearly 70 teams from around the world gathered in Zurich and seven hubs in Europe, North America, Asia and Africa simultaneously competed in a number of disciplines, exemplifying a world without barriers. Science can also be experienced at the institutions themselves. Empa and Eawag opened their doors to the public in September. Interested parties were able to learn about issues such as water as our most important means of subsistence and a central element in almost all current social challenges. At the PSI in October 2024, the Laboratory of Atmospheric Chemistry presented its state-of-the-art research institutions for the analysis of gases and particles in the air, which can be used to examine the impact of these components on health and climate. Empa opted for a hybrid format with "wissen2go", which serves as a means of presenting the latest scientific findings for a wide audience twice a year, most recently at the end of October 2024 on the topic of new battery technologies.

At structural level, ETH Zurich's Corporate Communications department expanded its Communication Academy further education programme, which has been enabling researchers from ETH Zurich and the four research institutes to attend workshops and training sessions aimed at imparting scientific knowledge since 2021. EPFL is now offering a Master's degree course that will guide future scientists in making technical and academic topics accessible.

The institutions of the ETH Domain attach great importance to close dialogue with schools as a way of fostering interest in science, technology, engineering and mathematics (STEM) among young people. Proven formats include the ETH Zurich Youth Academy, which provides supplementary school lessons in mathematics and science and the "Les sciences, ça m'intéresse!" programme offered by EPFL, which was available in 22 Swiss cantons in 2024, reaching 25,000 children and young people. In this context, EPFL has also worked together with the Canton of Valais and UBS to develop a comprehensive school and extracurricular programme aimed at promoting natural sciences in Valais. WSL also engages in the Alpine region through increased collaboration between SLF and the secondary school in Davos. As part of excursions or project weeks, young people come to SLF to conduct experiments on topics such as the development of the snow cover. The book *Zukunfts(K)reise*, co-authored by Empa together with schoolchildren and the St. Gallen University of Teacher Education, is aimed at children. It was presented at numerous reading workshops in 2024 and is intended to spark enthusiasm for science, sustainability and technology. The four ETH Domain research institutes are also involved in the "Get more girls into STEM" think tank, within which a joint project is to be developed and then implemented over the course of the next ERI period.

Scientific advisory services for public authorities and political decision-makers on current issues constitutes one particularly dialogue-centric aspect of knowledge transfer. At structural level, the ETH Domain continued to engage in the implementation of the Federal Council's concept for the future involvement of science in crisis situations announced in December 2023. In the reporting period, it consulted with the other ERI stakeholders to nominate the management members of the three newly created clusters, appointing several experts from the ETH Domain, and assumed responsibility for the scientific secretariat for the Health cluster. In 2024, ETH Zurich issued guidelines to provide researchers with guidance on engagement at the interface to politics. In addition, the Science-Policy Interface unit at ETH Zurich – a central contact point established in 2022 – made the ETH Policy Fellowship permanent and opened it up to interested parties outside of the Federal Administration. Researchers from the ETH Domain were again involved in platforms, initiatives and exchange events on topics such as energy and biodiversity. Eawag launched a project on the influence of climate change on fish movement patterns in the Swiss Rhine-Aare river system, which will serve to enforce the Federal Act on Fish. As a neutral information centre for terrestrial biodiversity, WSL compiled highly regarded documentation, including questions and answers on the topic of the biodiversity, prior to the biodiversity initiative referendum in September 2024. In the field of energy, ETH Zurich staged another Energy Week@ETH. The PSI organised an Energy Briefing Event entitled "Hydrogen in the energy system" in Bern, with representatives from the worlds of politics, industry and administration. WSL produced a leaflet entitled "Energy transition: municipal and regional opportunities for action", demonstrating how to increase the population's acceptance of energy plants at municipal level.

The four Joint Initiatives in the Strategic Area "Engagement and Dialogue with Society" of the ETH Domain 2025–2028, launched in 2022, also made great progress during the reporting period (see also Objective 5, p. 68). Two examples of this are described here. In "Energy Science for Tomorrow", the permanent interactive exhibition "Experience Energy!" presented at the Swiss Museum of Transport in Lucerne was expanded to include a tool for self-assessment of CO_2 footprints. The Joint Initiative "Engage" is dedicated to improving and researching dialogue formats. Activities in 2024 included the development of simulation games to strengthen the dialogue between science and politics in the areas of climate change, biodiversity loss and the energy transition.

Finally, some examples of current developments regarding the tasks transferred to the ETH Domain by the Federal Government in accordance with the Notes to the Strategic Objectives (for the CSCS see also Objective 3, p. 60). Empa operates the National Air Pollution Monitoring Network (NABEL). According to new recommendations, the limits for immissions are to be significantly reduced, which is why NABEL will continue to play an important role in air pollution control. Eawag and EPFL house the Swiss Centre for Applied Ecotoxicology. In 2024, the Ecotox Centre launched a comprehensive project to investigate the importance of UV filters from sunscreen in Swiss bathing waters. WSL is dedicated to protecting forests from diseases and pests. In cooperation with the FOEN and the cantons, it is currently expanding active area monitoring. This new approach was developed in response to primarily randomly detected harmful organisms. The ETH Zurich Center for Security Studies (CSS) provides platforms for promoting exchange between security policy specialists, federal government and cantonal stakeholders, and the interested public. In 2024, for example, it invited the Director-General of the International Atomic Energy Agency for a more in-depth discussion of nuclear security in conflicts. The PSI is dedicated to maintaining nuclear security expertise in Switzerland. In the summer of 2024, the SFOE published a comprehensive technology monitoring report on the current state of nuclear energy, compiled together with specialists from the PSI, ETH Zurich and EPFL.

Strategic objective

COOPERATION AND COORDINATION

5

In the reporting period, a large number of joint projects supported collaboration in the ETH Domain and with other Swiss educational and research institutions. The Swiss National AI Institute was established, among other things. In the field of medicine and medical technology, cooperation with various hospitals was strengthened on a structural level, as was networking between research and practice.

Cooperation within and outside the ETH Domain

Various formats support cooperation in the ETH Domain. Examples include the ETH Domain's strategic focus areas for the years 2021–2024 (SFAs; see Objective 2, p. 58 et seq.), the major research infrastructures (see Objective 3, p. 60 et seq.) and, in teaching, the joint Master's degrees and the involvement of the research institutes (see also Objective 1, p. 50). The ENRICH initiative of the four research institutes is also a driver of collaboration (see Objective 1, p. 53). Finally, the Joint Initiatives tool introduced in 2022 is also worthy of mention. They are part of the five Strategic Areas for global challenges that the ETH Board has set out in its Strategic Plan 2025–2028. In the two key areas of "Energy, Climate and Environmental Sustainability" and "Engagement and Dialogue with Society", a range of Joint Initiatives are already underway (see also Objective 2, p. 56, and Objective 4, p. 67). The ETH Board had to suspend further planned calls for Joint Initiatives in the Strategic Areas "Human Health", "Advanced Materials and Key Technologies" and "Responsible Digital Transformation" in March 2024 due to reduced funds.

In addition to the mentioned formats, the institutions are joining forces bottom-up. The collaboration between ETH Zurich and EPFL within the Swiss AI Initiative recorded another highlight in the reporting period, with the establishment of the Swiss National AI Institute (SNAI) (see Objective 2, p. 55). WSL strengthened collaboration and its presence in French-speaking Switzerland by moving the headquarters of its Glaciology research group from Birmensdorf to the premises of EPFL's Alpine and Polar Environmental Research Centre (ALPOLE) in Valais. A joint Empa and EPFL research group, led by the professorship of Sustainability Robotics, will use the DroneHub at Empa's NEST opened in November 2024 as a joint research infrastructure. The WSL and Eawag "Blue-Green Biodiversity" research initiative came to a close in 2024, ending on a high with the publication of the textbook "Biodiversity between water and land", as well as a joint event and a magazine with articles on the initiative's milestones. The collaboration between ETH Zurich and the PSI around the Quantum Computing Hub continued during the reporting period. A test environment for superconducting circuits and a platform for quantum computing based on ion traps, set to go into operation at the beginning of 2025, were installed at the hub. EPFL, the PSI and Empa were invited to take part in ETH Zurich's first Medicine @ETH Day. The format was very well received, with further jointly organised medical-research events to follow. In the area of climate and energy, the institutions are collaborating via the Coalition for Green Energy & Storage (CGES), among other things, in which ETH Zurich, EPFL, PSI

and Empa participate. The association, which was officially established in December 2024, aims to create an ambitious infrastructure in order to implement an independent, climate-neutral energy network. Five agreements with major energy companies have now been concluded. The Eawag-Empa Climate Solutions seminar series was also launched in the reporting period to advance the idea of a Climate Solution Hub on the campus in Dübendorf.

Alongside cooperation within the ETH Domain, collaboration with educational and research stakeholders across Switzerland is also highly important. By way of example, ETH Zurich entered into a strategic partnership with the Botnar Institute of Immune Engineering in Basel in the reporting period, while EPFL signed an agreement with the University of Lausanne to set up the Formation Continue Unil-EPFL Foundation, which is now fully integrated into the EPFL Extension School. The partner institutions in certain projects are very diverse. As an example, Eawag is collaborating with the University of Bern, the Wyss Academy for Nature, the Swiss Fisheries Competence Centre, the Canton of Bern and the Federal Office for the Environment (FOEN) on the Lanat-3 research project. AI-supported models are used to develop the basis for a list of priorities for the protection of biodiversity. Universities of applied sciences are also popular cooperation partners. In 2024, EPFL signed an agreement with the University of Applied Sciences and Arts Western Switzerland for a joint Master of Advanced Studies in Sustainable Energy Systems Engineering. For the Future Tree Species documentation tool, WSL collaborated with Bern University of Applied Sciences (BFH-HAFL) and various specialist centres. This nationwide platform for documentation and the exchange of experiences is intended to help determine which future tree species will one day be able to ensure forest functions in the face of climate change.

Structure of the Swiss higher education sector

The research infrastructures of the ETH Domain are available to the entire research community (see Objective 3, p. 60 et seq.). The ETH Domain therefore makes a significant contribution to shaping Switzerland's higher education sector in this cost-intensive area. As members of swissuniversities, ETH Zurich and EPFL are also closely involved in coordination in accordance with the Higher Education Act (HEdA). The cooperation projects play an important role here. These are funded by the Federal Government within the scope of the project-related contributions via swissuniversities. All six institutions of the ETH Domain are actively involved in this scheme. The ETH Board provides the funding for the involvement of the research institutes centrally. Examples include the Diversity, Inclusion and Equal Opportunities programme, in which all ETH Domain institutions participate, including the Sexual Harassment Awareness Day. EPFL is the leading house in the Strengthening Digital Skills in Teaching programme and, together with ETH Zurich and a dozen other universities (of applied sciences), is implementing projects to improve digital skills among students and lecturers, as well as at the level of the institutions (see also Objective 1, p. 51).

A new home for sustainable robotics: the "DroneHub" was opened at NEST at Empa in November 2024 in collaboration with EPFL and as part of the "Sustainability Robotics" professorship.
› ROK Architects

Review of the function and structure of the ETH Domain

As part of the FIT for the Future organisational development programme, the ETH Board is currently reviewing the organisation and structure of the ETH Domain so as to be better equipped for urgent current and future challenges. Following an internal preliminary consultation in the reporting period, the ETH Board took a directional decision in December 2024. By combining the four existing research institutes of the ETH Domain and any new units in the future under one roof, the mission-oriented research area is to be further developed and strengthened as an important pillar and independent legal entity within the ETH Domain. The brands of the research institutes and the sites are to be preserved. A concrete proposal for an appropriate structure and governance is now being developed. In late 2025/early 2026, the ETH Board is expected to decide on how to further implement the overall project. It will then submit an application to the EAER to initiate a corresponding legislative procedure, in which Parliament will have the final say.

Strategic alliances

Within the framework of strategic alliances, ETH Zurich and EPFL cooperate closely with various Swiss technology competence centres and research institutes funded by the Federal Government. This collaboration includes teaching, research, and knowledge and technology transfer. Numerous doctoral students at both Federal Institutes of Technology are conducting their research at the technology competence centres. In the reporting period, ETH Zurich extended the cooperation agreement with the competence centre inspire AG for the transfer of technology to the engineering, electrical and metal industries. EPFL maintains a strategic alliance with the Swiss Centre for Electronics and Microtechnology (CSEM). As part of the SERI-funded SwissChips initiative, EPFL, the CSEM and ETH Zurich are working together to establish a strong Swiss network for chip development. There is also a strategic alliance between the Swiss Tropical and Public Health Institute (Swiss TPH) and EPFL, which saw the new Sinergia project on the biological and genetic determinants of tuberculosis diseases with minor or no symptoms – funded by the Swiss National Science Foundation until 2027 – gather speed in the reporting period.

Activities in the areas of medicine and medical technology

To closely combine the medical technology research of the ETH Domain institutions with hospital practice, the PSI established the "Association for medical research and innovation in the Canton of Aargau" in June 2024, together with ETH Zurich, Empa and several hospitals in the Canton of Aargau. A jointly financed funding programme is set to enable research projects between the ETH Domain and clinical practice to accelerate the implementation of scientific findings. Four projects were approved during the first call for proposals. In 2024, ETH Zurich also signed declarations of intent for better collaboration in medical research with the Charité in Berlin and the Lucerne Cantonal Hospital (LUKS).

Once again, numerous initiatives on medical topics were promoted in project-related research. By way of example, Empa collaborated with the St. Gallen Cantonal Hospital in the field of wound treatment and dedicated itself to the development of a "Wound Booster" – a biomarker for the early stages of chronic wound formation – as well as new nanotherapeutics to better combat antibiotic-resistant germs. In a project financed by the Future Fund fundraising programme, Empa collaborated with the Balgrist University Hospital in Zurich to conduct research into the stabilising ligament in the spinal column to better understand the causes of degenerative diseases. The fight against cancer features prominently in medical research at the PSI. In 2024, a radiopharmaceutical of the PSI was used successfully for the first time – in a clinical trial at the University Hospital Basel. In future, it is to be used for patients with metastatic neuroendocrine tumours that are not responding adequately to existing treatments. Furthermore, the Center for Proton Therapy at the PSI succeeded in integrating a procedure for daily irradiation of cancer patients into everyday clinical practice – a world first. Here, the irradiation is constantly adapted to the location of the tumour and the conditions in the body so as to achieve the best possible result.

In collaboration with the Federal Office of Public Health (FOPH), Eawag continued monitoring wastewater for viruses in 2024. Furthermore, as part of a pilot project, wastewater samples also underwent chemical analysis to assess the use of drugs and medicinal products. With a view to the future institutionalisation of monitoring, Eawag organised a symposium in December 2024, which attracted the interest of numerous professionals from the fields of health, police and judiciary, politics, research, and industry.

The ETH Domain is also active in the training of young medical professionals. The Bachelor's degree programme at ETH Zurich has now become established, with a reputation for being innovative and forward-looking. This was demonstrated by the fact that the degree course's digitalisation learning objectives have been incorporated into the latest version of the binding Swiss Catalogue of Learning Objectives. A survey among the first graduates showed that most of the young doctors are doing clinical work, with an above-average share also interested in clinical research. EPFL offers the option of gateways to the medical faculties at the Universities of Lausanne and Geneva, which were also used by some students in 2024; however, there are currently only a few places available in Geneva.

Strategy for the sites of the institutions of the ETH Domain

In order to ensure a coherent strategic approach and identify challenges early on, the ETH Board adopted a strategy for the associated sites operated by the ETH Domain institutions in 2022. This strategy relates to associated sites established after 2006 and all future associated sites. In the reporting period, the ETH Board approved the process for implementing the evaluations envisaged in the strategy. In addition, the criteria from the site strategy were used in the development of the ETH Zurich Campus Heilbronn (see Objective 6, p. 74). In the reporting period, EPFL and the canton of Valais signed a third supplementary agreement on the development of the site with a focus on the green energy transition. There are plans to set up six additional professorships in Valais, two of which are to be funded by the canton.

Strategic objective

INTERNATIONAL POSITIONING AND COOPERATION

6

In 2024, the ETH Domain's institutions continued to expand their international alliance and cooperation networks, in particular with their European partners. They also strongly committed to initiatives in the areas of humanitarian aid, peacebuilding and sustainable development. The visibility of the institutions and the opportunities they offer remain essential factors that allow the ETH Domain to attract the best talent.

Attractiveness of the ETH Domain

Thanks to its commitment to excellence and academic freedom, but also on account of its unique research infrastructures and platforms (see Objective 3, p. 60), as well as the development and continuation of major collaborative initiatives of international importance, the ETH Domain continues to attract the best talents from around the world. In return, these talents help enhance the international attractiveness of the institutions and Switzerland. The outstanding international reputation of the ETH Domain is also down to its positioning in the context of EU research and innovation programmes. The decisions taken by the European Commission to re-allow applications from Swiss researchers for various Horizon Europe funding instruments from March 2024 onward, and the fact that Switzerland is allowed to participate in almost all calls for proposals from Horizon Europe, Digital Europe and the Euratom programme in 2025 – communicated at the end of the year – are very pleasing developments.

International mobility programmes are key to ensuring that the ETH Domain remains attractive to talented scientists. In 2024, the ETH Domain's institutions were also actively involved in the Marie Skłodowska-Curie Actions (MSCA) Doctoral Networks PhD programme, which is an important tool for international mobility. By way of example, support from the State Secretariat for Education, Research and Innovation (SERI) enables two doctoral students from the PSI to participate in the MSCA UPLIFT Doctoral Network, which focuses on the further development of radiotherapy for patients who are positioned upright. This network aims to train the next generation of experts in this technology. In addition to this, the MSCA Global Fellowships enable postdocs from EU member states to conduct their projects at one of the ETH Domain's institutions for up to two years. The 52nd annual conference of the European Society for Engineering Education took place at EPFL in 2024 – under the slogan "Educating Responsible Engineers". It brought together 550 delegates from 38 countries and four continents.

In autumn 2024, EPFL signed a new green-energy agreement with the Mohammed VI Polytechnic University (UM6P) in Morocco. UM6P is considered the top university in Morocco and North Africa.
› UM6P

Numerous agreements with partner universities around the world were signed or extended in 2024. To further increase their attractiveness and visibility abroad, the ETH Domain's institutions award scholarships to international talents, among other things. One example of this is the Eawag Partnership Program (EPP), which has awarded six scholarships to students from non-OECD countries annually since 2008. Both Federal Institutes of Technology offer the best-qualified students from renowned partner universities around the world the opportunity to complete research internships in their laboratories. Examples include ETH Zurich's Summer Fellowships and the EPFL Excellence Research Internship.

International cooperation

The global network of institutions within the ETH Domain comprises, among other things, academic institutions and international and non-governmental organisations. The institutions are constantly strengthening existing networks and alliances while looking for new, relevant opportunities for international cooperation, guided by strategic considerations in the interests of Switzerland.

In autumn 2024, EPFL signed a new green-energy agreement with the Mohammed VI Polytechnic University (UM6P) in Morocco. This partnership will promote joint research and the development of solutions that address the growing challenges in the field of renewable energies. In the reporting period, Empa signed several memoranda of understanding (MoU), including one in the field of education and research on the topic of low-carbon construction with the University of Stuttgart, and another in the field of biomedical technology with Queen's University in Kingston, Canada.

The ETH Domain's institutions are also involved in a number of international alliances and networks. By way of example, both Federal Institutes of Technology are members of the Global University Leaders Forum (GULF), the International Sustainable Campus Network (ISCN), and the Conference of European Schools for Advanced Engineering Education and Research (CESAER). The latter enables them to follow and help shape European strategies, policy measures and programmes. As a result, both Federal Institutes of Technology were able to state their positions on issues related to the responsible use of artificial intelligence (AI), the next EU Framework Programme for Research and Innovation (EU FP), and the development of science diplomacy in 2024. The European Commission's European Universities initiative is based on transnational alliances of higher-education institutions that play a key role in the development of joint strategies for education, research and innovation. The two alliances founded in this context – ENHANCE and EuroTech, of which ETH Zurich and EPFL are members – are of particular importance for teaching and are described under Objective 1 (see p. 52). The participation of both Federal Institutes of Technology is co-financed by Movetia as part of national support for European university alliances.

Across all international cooperations, the ETH Domain is becoming increasingly involved in initiatives in the areas of peacebuilding and humanitarian aid. As part of the MoU agreed between ETH Zurich and the UN in 2023, the first ETH Zurich students were given the

opportunity to complete internships at a UN institution. In addition, various projects were launched, including an AI-based programme for predicting conflicts for UN peace operations. The ETH for Development (ETH4D) initiative at ETH Zurich and the EssentialTech Centre at EPFL have established close links with various international organisations in the Geneva region and beyond, including UN organisations such as the WHO and UNICEF. As a result, EPFL, ETH Zurich and Eawag, among others, contributed to the Geneva Technical Hub (GTH) initiative, which was established by the UN High Commissioner for Refugees (UNHCR) and the Swiss Agency for Development and Cooperation (SDC) and completed in the reporting period. The GTH initiative deals with complex technical problems and finds solutions that can be applied in various UNHCR operational contexts to improve the lives of refugees and displaced persons. In addition, ETH4D and the EssentialTech Centre coordinate the Engineering for Humanitarian Action initiative in partnership with the International Committee of the Red Cross (ICRC). Launched in 2020, this initiative's aim is to develop and use innovative technologies that facilitate the planning and implementation of the ICRC's humanitarian relief actions, predominantly working in the laboratories of ETH Zurich and EPFL. To date, around 20 projects at EPFL and ETH Zurich have received funding. In 2024, the Geneva Science and Diplomacy Anticipation (GESDA) Summit brought together leading figures from around the world to discuss how scientific anticipation can contribute to overcoming global challenges, focusing on diplomacy, science and technology. The ETH Domain contributed specifically to the development of the GESDA Science Breakthrough Radar – a tool that provides an overview of trends as well as medium- and long-term forecasts regarding scientific progress. In the third year of Russia's war against Ukraine, various research groups at ETH Zurich were involved in the Swiss Network with Ukraine – an organisation dedicated to reconstruction and infrastructure projects. The PSI was involved in the Light for Ukraine project, which is also supported by the SNSF and aims to support Ukraine in its efforts to build its own beamline at the SOLARIS synchrotron light source in Poland.

The ETH Domain's international cooperation is facilitated by the presence of the institutions' associated sites abroad. In the reporting period, the Singapore-ETH Centre (SEC) was highly active in the international media and visited by a growing number of delegations. At the end of 2023, ETH Zurich announced its collaboration with the Dieter Schwarz Foundation to establish a teaching and research centre in Heilbronn, Germany. In 2024, the work focused on the definition and establishment of the project structures as well as the governance of the future campus. For instance, the legal structure of ETH Zurich Campus Heilbronn gGmbH was created, and an administrative department was established at ETH Zurich.

Various bottom-up initiatives enabled the ETH Domain institutions to consolidate their international collaborations. For example, risk management experts from the WSL Institute for Snow and Avalanche Research SLF are working on a pilot project for the Asian Development Bank in Nepal. This project looks at the risks posed by natural hazards to the water abstraction points in the Kathmandu Valley and thus also to the water supply for the city of Kathmandu. As part of the MEASURES project, an international team headed by an Empa researcher used the example of Accra in Ghana to examine the potential configurations of energy systems in the Global South that might ensure a secure energy supply despite climate change. Eawag coordinated a joint lecture programme with representatives of the ETH Domain and the University of Geneva at the UN Climate Change Conference (COP29) in Baku, Azerbaijan.

Active role in the framework of the bilateral cooperation

As mandated by the SERI, ETH Zurich took on the role of leading house in the bilateral research collaboration between Switzerland and East and Southeast Asia between 2021 and 2024. In this context, ETH Zurich used various funding instruments to support scientific cooperation and exchange between Swiss universities and research institutions and their Asian partners. More than 200 projects were funded during the mandate period.

Launched by EPFL with support from the Federal Department of Foreign Affairs (FDFA), the Transnational Red Sea Center (TRSC) is concerned with the protection of ecosystems in the Red Sea coral reefs. In 2024, the TRSC signed three further declarations of intent to establish scientific cooperation with the Eritrean Ministry of Marine Resources, the Djiboutian Centre for Studies and Research (CERD), and the Ministry of the Environment and Sustainable Development in Djibouti.

The ETH Domain's institutions are strongly committed to the African continent. Examples of this include the initiatives ETH4D at ETH Zurich and Excellence in Africa (EXAF) at EPFL. In 2024, ETH4D published a new call for proposals to support partnerships between universities and the humanitarian sector in developing technologies to address specific challenges. The EXAF initiative, jointly implemented by EPFL and the Moroccan Mohammed VI University, aims to address the major challenges facing the African continent in the coming decades by relying on excellence in research and academic education. This initiative, which involves around 20 countries from the African continent, has now been fully implemented and is delivering some initial interesting scientific results that give it international visibility. As part of a programme funded by the State Secretariat for Economic Affairs, Empa worked with the South African government to publish a strategy paper on the management of electronic waste in the country. The PSI plays a central role in the Horizon Europe SUNSTONE project, which was approved in 2024, and supports the SESAME synchrotron research infrastructure in Jordan. As the first infrastructure of its kind in the Middle East, SESAME makes an important contribution to the further development of scientific cooperation and to building peace in the region.

The ETH Domain's institutions ensure that they organise internationalisation responsibly, coordinate their risk management, and comply with statutory sanctions and export control regulations. In this regard, several of the ETH Domain's institutions adapted their policies in the reporting period. ETH Zurich specified its security verification regulations for applications and published fact sheets on this topic. EPFL introduced a new procedure for the admission of guest researchers from abroad and also specified the admission procedure for students applying for Master's degrees and doctoral programmes. ETH Zurich and Empa also organised a joint seminar on export control.

With people from well over 100 nations and collaborations around the world, it is of great importance to the ETH Domain's institutions to create space for fact-based and respectful academic discourse, especially in the face of crises and conflicts, such as the current situation in the Middle East. In the reporting period, both Federal Institutes of Technology opposed attempts to instrumentalise their institutions that violated the principles of academic freedom.

Strategic objective

SOURCES OF FINANCING AND ALLOCATION OF FUNDS

7

The ETH Domain suffered financial losses in 2024. At 68%, the total federal contribution remains the most important source of financing by far. The ETH Domain can make up part of the shortfall in the short term by reducing reserves, most of which are needed for strategic projects and infrastructure. Despite these financial challenges, the ETH Domain is investing in the future of Switzerland, in the training of specialists, in research priorities such as health and sustainable agriculture and in climate protection measures for buildings.

Allocation of funds based on relevant criteria

In accordance with Art. 33*a* of the ETH Act, the ETH Board allocates federal funds (total federal contribution) to the institutions. The allocation of funding within the ETH Domain is governed by Art. 12(2) of the Ordinance for the ETH Domain. The basis for the ETH Board's target agreements with the institutions are the Federal Council's strategic objectives for the ETH Domain, which are tailored to the expenditure ceiling.

When making these annual allocations of funding to the institutions, the ETH Board draws upon the budget requests of the institutions, the achievement of goals and the assessment of academic performance. In doing so, due consideration is given to the institutions' financial burdens for their teaching, research and knowledge and technology transfer (KTT) activities, as well as for the tasks assigned by the Federal Government. The funding effectively available to the ETH Board (budgetary credits) is then decided by the Parliament in December. Any changes to the funding available under the federal decree are taken into account when allocating funds in March of the following year by way of a supplementary resolution.

The Federal Assembly approved a total of CHF 2,748m for the 2024 budget of the ETH Domain (FedD Ia of 21 December 2023) (see Fig. 1, p. 78). The funding requested by the institutions of the ETH Domain for the 2024 budget exceeded the available federal funding by CHF 14m. The ETH Board therefore decided in March 2023, and by a supplementary resolution in May 2023, to finance the expenditure surplus from its reserves and allocated the available CHF 2,762m as follows.

CHF 2,600m for the institutions' base budgets:
- ETH Zurich CHF 1,341m
- EPFL CHF 719m
- PSI CHF 304m
- WSL CHF 63m
- Empa CHF 109m
- Eawag CHF 64m

CHF 147m for strategic projects:
- Research infrastructure/large-scale research projects: CHF 62m
- Strategic focus areas (SFAs) 2021–2024: CHF 26m
- Joint Initiatives in the Strategic Areas: CHF 14m
- ETH Domain Quantum Technology Network (QTNet): CHF 6m
- Incentive and seed capital funding, other central and various expenses, as well as special funds: CHF 39m

CHF 14.7m was allocated for the ETH Board:
- Own consumption by the Administration of the ETH Board and Internal Appeals Commission

2024 marks the end of the current ERI period and serves as the base year for the following one. The 2024 budget did not include an inflation adjustment and was also reduced by 2.03% on a straight-line basis.

While nominal value growth was only 0.4% compared to 2023, the actual annual inflation rate was 1.1%. In order to cover the lack of funds, increased savings and cutbacks were necessary, and the institutions once again drew on their reserves to cover the deficits.

Development of third-party funding

The total revenue for 2024 of CHF 3,913m consisted of the total federal contribution of the Federal Government (CHF 2,652m, 68%)[1] and revenue from third-party funding (CHF 1,261m, 32%). With the increase in third-party funds, the funding base remains broadly supported. The strategic target of a 31% proportion of third-party funding as of the end of 2024 was exceeded.

Stable basic funding by the Federal Government remains essential for the ETH Domain. The diversification of the funding base is becoming increasingly important, as shown by the rising proportion of total revenue that is made up by revenue from third-party funding (see Fig. 2, p. 78). Private foundations, donations, bequests and services make an important contribution, enable the accelerated implementation of strategic projects and give new impetus to the thematically focused expansion of teaching and research; however, they are subject to considerable fluctuations. In order to strengthen the acquisition of third-party funding, the institutions support their researchers with targeted measures (workshops, information events, individual advice). The research institutes are also making increasing use of specialised fundraising organisations.

Until the end of 2024, researchers at Swiss universities only had limited access to the Horizon Europe research programme, as Switzerland is considered a non-associated third country. The transitional measures adopted by the Federal Government are unlikely to be able to fully close the gap created by the EU FPs. The diversification strategy is being pursued vigorously in order to acquire third-party funding from the private sector and foreign support organisations for basic research.

Compared to 2023, revenue from third-party funding rose by CHF 25m (2023: CHF 1,237m). This was due in particular to an increase in project, service and finance income, while allocations declined. The revenue included in this figure and financed by the transitional measures amounted to CHF 121m in 2024, compared to CHF 62m in the previous year (see p. 110 and the Financial Report 2024).

About 40% of the revenue from third-party funding in 2024 originated from competitive projects with national research funding (SNSF/Innosuisse: CHF 353m; 2023: CHF 335m) and with European research funding (CHF 147m; 2023: CHF 149m). Other significant sources of funding were cooperation with the business sector (CHF 142m; 2023: CHF 140m), funding for research projects from the Federal Government (government-funded research: CHF 97m; 2023: CHF 92m) and cooperation projects with the cantons, communes and various international organisations (CHF 110m; 2023: CHF 106m). Other third-party funding included donations and bequests (CHF 131m; 2023: CHF 159m), tuition fees and revenue from continuing education courses (CHF 61m; 2023: CHF 61m), various service revenues (other revenue: CHF 169m; 2023: CHF 155m) and net financial income and income from participations (CHF 51m; 2023: CHF 38m).

The reported research revenue reflects in particular the annual progress made in the projects financed with third-party funding and not the contract volume obtained. For an overall assessment of the development of third-party funding, see the 2024 Financial Report.

The attracted research projects must be consistent with the core mandate and strategy and be financially feasible so as not to jeopardise the base budget. With third-party funded projects, the incurred indirect costs are netted, where possible, and inflation is passed on. Contributions toward indirect research costs serve to partially cover costs that the institutions incur from research projects. The overhead contributions of the Federal Government's transitional measures, which are 10% lower than those of the EU, lead to uncovered indirect project costs.

Maintaining teaching and research freedom

The acquisition of third-party funding is regulated by the ETH Act, the ETH Ordinance and various directives and guidelines at the ETH Domain and institutional level. Compliance with these is monitored on an ongoing basis. Researchers receive support through online courses on research integrity and fraud prevention. The institutions guarantee freedom of teaching and research by ensuring that the research results of third-party funded projects can be published and that the publication freedom of funded persons and projects is assured at all times. Open-access publications or "Freedom to Operate" (publication rights and free use of intellectual property) are actively promoted. Freedom of research and the rights to use research results are enshrined in the strategy for knowledge and technology transfer, in internal guidelines and in research contracts with donors. Directives also regulate the handling of donations.

[1] This refers to the total federal contribution of the Federal Government as accounted for in the consolidated financial statements of the ETH Domain (financing contribution of CHF 2,449m and federal contribution to accommodation of CHF 203m). On the other hand, the two approved loans, which are credited to the expenditure ceiling, amounted to CHF 2,748m (financing contribution or operating credit of CHF 2,449m and investment credit of CHF 299m).

Fig. 1: Allocation of funding to the institutions of the ETH Domain (after taking into account the reallocation in credit/funds in 2024)

CHF millions	2020	2021	2022	2023	2024	Δ 2023/2024 abs.	Δ 2023/2024 %
ETH Domain [1, 2, 9]	**2,596.1**	**2,600.1**	**2,666.2**	**2,736.2**	**2,747.9**	**11.7**	**0.4**
ETH Zurich [3]	1,314.9	1,316.3	1,349.3	1,372.6	1,388.4	15.8	1.2
EPFL [4]	698.4	712.1	725.7	747.5	754.3	6.8	0.9
PSI [5, 6]	315.1	336.5	340.5	346.5	334.5	–12.0	–3.5
WSL	59.4	63.2	65.3	64.8	62.8	–2.1	–3.2
Empa [7]	114.8	126.9	119.9	126.2	123.1	–3.1	–2.4
Eawag	62.2	62.2	62.8	67.1	64.6	–2.5	–3.8
ETH Board [8]	31.3	–17.2	2.8	11.5	20.3	8.8	76.5

Additional information on the budget/financial statements 2024:

1 Total allocation of funds in 2024

2 Annual tranches in accordance with the approved expenditure ceiling for 2021–2024 (credits taking into account the expenditure ceiling), annual tranche for 2024: CHF 2,822m

3 Including upgrade of the Sustained scientific user lab for simulation-based science at the CSCS (HPCN-24): CHF 23m, development of the SwissCat+: CHF 2m, ETH Domain Quantum Technology Network (QTNet): CHF 3m

4 Including the neuro information technology project, the Blue Brain Project: CHF 22m, development of the SwissCat+: CHF 1m, ETH Domain Quantum Technology Network (QTNet): CHF 2m

5 Including upgrade of the Swiss Light Source (SLS 2.0): CHF 14m, ETH Domain Quantum Technology Network (QTNet): CHF 1m

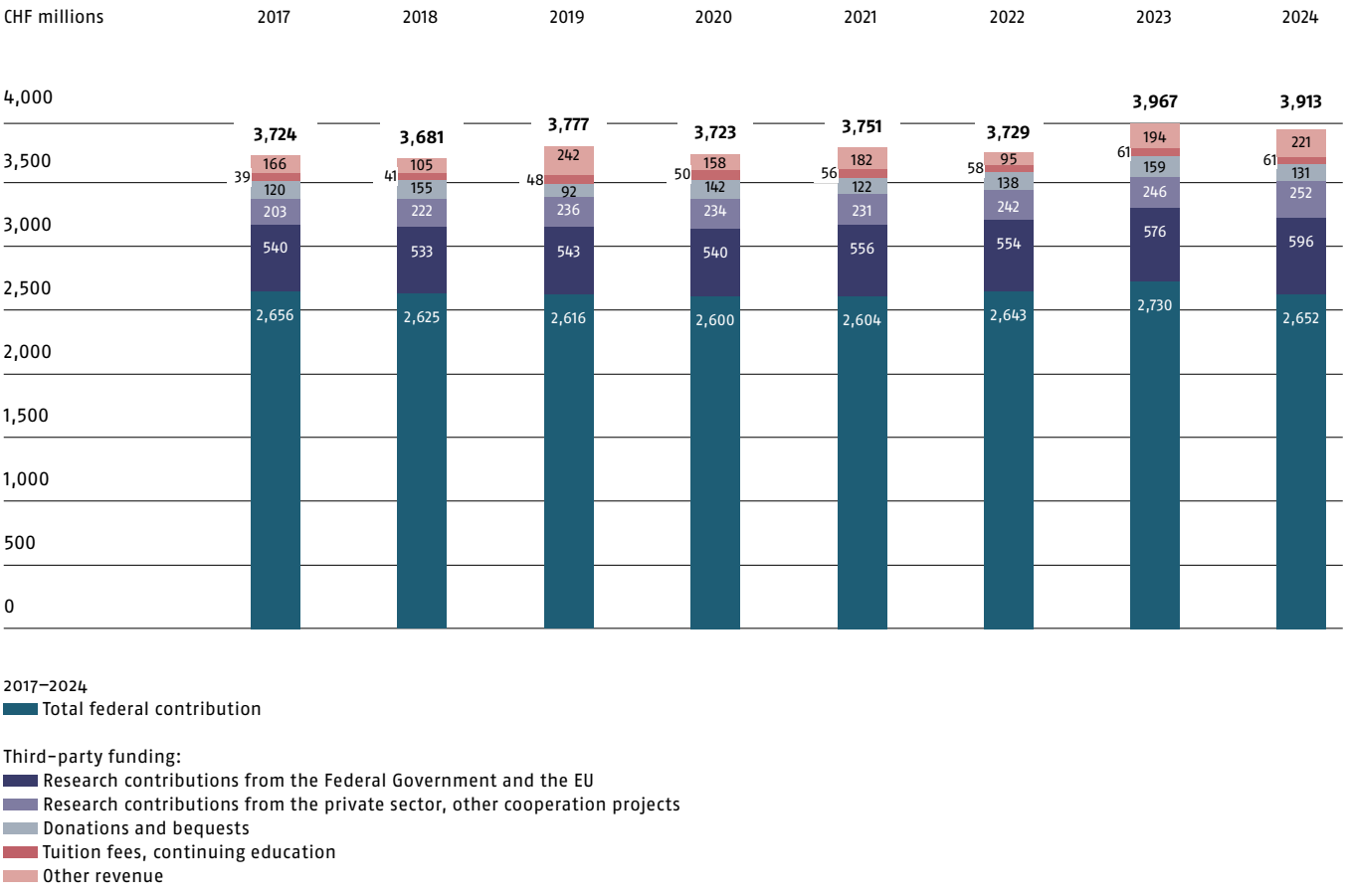
6 Including special funds (CHF 11m)

7 Including Empa Site Masterplan (CHF 8m)

8 Including strategic projects, financing the dismantling of accelerator systems at the PSI (CHF 11m); reporting period 2024: the low revenue of CHF 20m takes into account that CHF 14m of funds allocated in 2024 were financed from the reserves of the ETH Board.

9 Including strategic focus areas (Personalized Health and Related Technologies, Advanced Manufacturing, Data Science): CHF 26m, Joint initiatives in the Strategic Areas: CHF 14m

Fig. 2: Change in revenue 2017–2024



2017–2024

Total federal contribution

Third-party funding:

Research contributions from the Federal Government and the EU

Research contributions from the private sector, other cooperation projects

Donations and bequests

Tuition fees, continuing education

Other revenue

Increase in efficiency and use of synergy effects
Significant efficiency gains and synergy effects result from the jointly realised projects and the shared use of research infrastructures and platforms, such as projects of the SFAs, the Joint Initiatives and the ENRICH programme of the four research institutes. This promotes cooperation in select scientific fields (e.g. net zero, sensors), strengthens activities concerning the sustainable development of the campus and coordinates complementary offers and services, such as the continuing education programme at the "lead campus", an education centre established jointly by the research institutes that started operations in 2024. ETH Zurich and EPFL are achieving positive results with various platforms that their researchers use jointly to optimise investments and reduce operating costs. One example concerns the shared use of computer servers, which is a key aspect in view of the increasing importance of AI. The Swiss Data Science Center (SDSC), which is a Joint Initiative of EPFL, ETH Zurich and PSI, makes it possible to concentrate skills in the key area of data science. It is available to the other research institutes as well as all universities and industry, thus promoting interdisciplinary cooperation and innovation in this area. In addition, the research institutes engage in extensive cooperation both within the ETH Domain and with cantonal universities through joint professorships.

Synergies are also successfully utilised for administrative and logistical activities. New accounting standards are introduced on a cross-departmental basis, coordinated by the IPSAS Competence Centre, in which all institutions participate. Digitalisation projects are being driven forward, such as the introduction of expense reports with Concur at Empa, Eawag, WSL and PSI. ETH Zurich digitalised other processes such as secondary employment, guest administration and ordering office supplies. The measures listed as examples produce efficiency gains and enable the targeted use of resources for the increasing regulatory requirements for the ETH Domain.

Reserves
In the context of the strategic objectives 2021–2024 set by the Federal Council for the ETH Domain, the Federal Council expected other equity (sum of the reserves with internal dedication, the reserves without dedication and the accumulated surplus/deficit) to be reduced by at least 10% by 2024. With a reduction of 17%, the ETH Domain has exceeded this target by almost double.

At the end of 2019, which provides the baseline figure for the reduction target, other equity totalled CHF 1,402m; at the end of 2024, it was CHF 1,162m. Since then, the reserves with internal dedication and reserves without dedication have been reduced by CHF 531m, which was offset by an increase in the accumulated surplus of CHF 291m. The details on the use of funds from the reserves are published in each case in the Financial Report of the ETH Board for the ETH Domain.

The ETH Domain reserves have been managed actively for years. As part of its reserve policy, the ETH Board issued guidelines on this topic for the ETH Domain in 2019. The institutions regulate the operational reserve management through internal directives and processes. The targeted appropriation of reserves for determining Strategic Areas in teaching and research and realising large-scale research and buildings infrastructure is integrated into the institutions' budgeting and planning processes.

Sufficient, stable funding from the Federal Government is one of the cornerstones of the success of the ETH Domain. Reserves can be used in the short term to cushion the impact of funding cuts and high inflation. In the long term, however, this is not sustainable if the ETH Domain is to keep pace with the growth in student numbers and secure investments in promising research areas and important research infrastructures. Plans for reining in unnecessary expenditure are inevitable, which limits flexibility. Reserves are being reduced strategically with a focus on efficiency. The reserves of all institutions are constantly being reduced. If reduction continues at this rate, the reserves will be exhausted in the near future.

Dismantling and disposal of accelerator plants
Radioactive waste arises from the use of nuclear energy and ionising radiation applications in medicine, industry and research (MIR waste). The Nuclear Energy Act and the Radiation Protection Act set out the requirements for disposal. The financing of the provision for the decommissioning of the PSI accelerator plants (CHF 443m; 2023: CHF 449m) will be provided by means of annual savings which will be added to the financing contribution. By the end of 2024, the savings amounted to CHF 66m (savings amount in 2024: CHF 11m). PSI has so far used around CHF 20m (2024: CHF 6m) of the accrued savings for measures in connection with the dismantling.

Strategic objective

REAL ESTATE MANAGEMENT AND SUSTAINABILITY

8

Continued growth in student numbers and increased climate protection requirements necessitate high levels of investment in the structural and technical infrastructure. This contrasts with the strained financial situation of the Swiss Federal Government. In real estate management, this challenge was met with the revision of the SFMPs.

Strategy and long-term portfolio development
The medium- and long-term planning of the real estate portfolio and the determination of the associated financial requirements are carried out every four years on the basis of the "Spatial and Financial Master Plans" (SFMP). These are based on the development plans of the institutions in their core business of teaching and research. In 2024, a plan was drawn up at the level of the institutions and consolidated at the level of the overall portfolio of the ETH Domain for the years 2025–2036. This showed that the necessary realisation of previously postponed projects would lead to a further increase in space in the real estate portfolio of the ETH Domain in the medium term (+7% by 2036 compared to 2024). Pending projects and programmes were prioritised, taking into account the financial framework. The space requirements resulting from the Academy's ongoing growth phase will only be partially covered by the expansion. A significant part of meeting demand is achieved through increased space efficiency, both in administrative areas and increasingly in teaching and research. The strategic alignment emphasises a holistic approach to sustainability with increased requirements for climate protection, a high proportion of self-generated electricity through photovoltaics, maintaining the value and functionality of real estate and technical facilities, as well as increasing efficiency in all areas. This ensures that the high requirements of the Federal Government as the owner of the real estate and the future viability of the institutions are met.

ETH Zurich is striving for a state-of-the-art, barrier-free and climate-friendly infrastructure. Important measures include the digital transformation of the campus infrastructure using technologies such as Building Information Modelling (BIM) and Digital Twin, modern workplace concepts to increase space efficiency, the reduction of emissions with the aim of "net zero" and the promotion of a circular economy for sustainable construction and operating processes. The infrastructure is used as a living lab to advance research and development. As part of a strategy project, the Real Estate department at ETH Zurich is further sharpening its vision, mission and strategic fields of action. Under the mission "Creating space for development together", the project encompasses the digitalisation, process optimisation and realignment of the organisation.

EPFL focuses in particular on maintaining the value and functionality of the real estate portfolio and developing it in line with the needs of users. EPFL has also drawn up a long-term maintenance strategy for this purpose ("Renovation Masterplan" [1]), which, in addition to the condition of the building, also takes into account the dimensions of energy / CO_2 mitigation, densification potential and user needs. Topics such as

[1] *Masterplan pour la rénovation des bâtiments et infrastructures de l'EPFL et pour la densification du Campus*, EPFL 2024.

contemporary workplace design, desk sharing, densification of existing uses while taking sustainability into account and the expansion of teaching space (especially large lecture theatres) are the relevant measures for securing future space requirements. Another key element is the revision of the cantonal land use plan (PAC 229), which regulates the development of EPFL and UNIL until 2045. The expected conservation of the first construction phase of the EPFL campus in Ecublens will provide an essential framework for future developments.

PSI focuses on the development of its strategically relevant construction projects. Furthermore, space and utilisation efficiency are to be strengthened through the clustering of uses and the development of concepts for office and laboratory space. The ongoing dismantling of federally owned nuclear facilities may lead to potential space on the campus in future. Fundamental processes in real estate management are also being rethought and further developed with a view to the future, which is to be supported by a digital campus model.

WSL focuses primarily on a maintenance strategy adapted to the resources in order to ensure that the value and functionality are retained.

Eawag and **Empa** share the long-term strategy of their real estate due to their joint campus in Dübendorf and, following the successful completion of the "co-operate" research campus project (Masterplan – Stage 1), will also focus on preserving value and functionality in future.

Real estate management in figures

The purchase value of the ETH Domain's real estate portfolio at the end of 2024 amounted to CHF 8.79bn. In terms of value, this represents about one third of the entire real estate portfolio of the Federal Government. The book value is around CHF 4.46bn. The ETH Domain uses around 400 buildings on 126 plots of land. The main usable area reported at the end of 2024, which covers 1,068,700 m², is up 0.25% compared to 2023. The mix of space (see Fig. 28, p. 106) – consisting of spaces in state-owned buildings for own use and use by third parties and leased spaces in third-party buildings (in m² of main usable area since 2015) – shows how some of the growth in recent years was only able to be covered using additional leased spaces. The lease rate of the ETH Domain remains low at 15.9% of the main usable spaces. The growth in leased spaces in 2015 is attributable to the newly defined, statistical allocation of the spaces. Without this effect, there would be a decrease in the spaces used by third parties.

Ongoing and completed projects

The following major ongoing construction projects were continued or completed in 2024:

Following the gradual commissioning of the two **ETH Zurich** buildings GLC and BSS, they are now fully available for teaching and research. The formal project completion of the GLC research building is still pending due to disputed additional claims by the general contractor. The refurbishment and extension of the machine laboratory and the car park in the main building were successfully completed. Planning for the complete refurbishment of the main building and the MM extension in front of it has now begun. The construction of the new HPQ physics building on the Hönggerberg and work to renovate the cooling network in the Zentrum campus are currently under way.

At **EPFL**, the renovation of the energy centre was completed and it was put into operation; the data centre housed in the same building was also installed and its commissioning is nearing completion; an expansion to reach full capacity is currently being examined. The two new research buildings, the Biocosme (COS/SDLV), which will provide space for practical chemistry and biology lessons in future, and the Advanced Science Building for cutting-edge research, are currently in the planning phase. The same applies to the "Coupole-Esplanade" project, which will add 1,500 teaching places and 600 workplaces for students.

At **PSI**, the realisation of the new QMMC (Quantum Matter and Materials Discovery Center) building has begun. With the completion and occupation of Park Innovaare, the available space was expanded and new, modern workplaces were created for more than 300 employees. In addition, the Nanolino daycare centre was opened, which is now part of PSI's family-friendly infrastructure. The implementation of the SLS 2.0 project continued on schedule.

The project for a replacement building of the workshop building at **WSL** was cancelled for financial reasons. A New Work environment was installed in the existing building to provide the necessary workstations, which has been well received and positively evaluated by the workforce.

The joint "co-operate" research campus construction project (Masterplan – Stage 1) on the **Empa-Eawag** research campus was successfully completed. **Eawag** completed the conversion of the mass spectrometry laboratory and put a central laboratory area in the LA building in Dübendorf into operation. Eawag's "Limnion" project at the Kastanienbaum site, which envisages the construction of a new office, warehouse and laboratory building, was still blocked by an objection in 2024.

Investments and source of funds in 2024
The 2024 investment credit for buildings in the ETH Domain amounted to CHF 299.39m. It was higher than in the previous year (CHF 214.50m) and above the long-term average. This is because there was a credit shift between the financial contribution and the investment credit of CHF 88.66m (42.1%) for the purchase of the STCC in 2024. No dedicated reserves were created. Of the investments (excluding the STCC purchase), 46.7% related to new buildings and 53.3% to maintaining value and functionality. No third-party funds were used for federal real estate (co-financing). CHF 96.62m from the federal financial contributions was used for investments in user-specific operating facilities which will be owned by the institutions. These investments were supplemented by third-party funding of CHF 1.0m. The total volume of construction authorised by the ETH Domain in 2024 amounted to CHF 299.0m (see Fig. 30, p. 107). The ETH Domain received an accommodation credit of CHF 203.4m in 2024 for the imputed rent on federal real estate. The Source of Funds chart (see Fig. 25, p. 105) shows the sources of funds for the buildings in the ETH Domain since 2015. The annual fluctuations are dependent on the type of grant and the status of the current construction projects.

Construction programme for 2025
In terms of new construction projects planned in the context of new builds, extensions or refurbishments, the ETH Domain applied in 2024 for the necessary contingent credits with its annual construction programme. The 2025 construction programme totalling CHF 234.1m (total credit), approved by the Federal Parliament on 19 December 2024, includes the following major projects:

ETH Zurich applied for a contingent credit of CHF 48.3m for the "Main building maintenance phase 1b" project, which comprises the partial renovation of its main building, which is over 150 years old. The project aims to improve the energy standards and technical infrastructure and to strengthen the building as a modern learning and meeting place, taking into account preservation.

EPFL applied for a contingent credit of CHF 65.5m for the "Coupole-Esplanade" project. A new teaching building with 1,500 additional lecture places is planned as a replacement building as well as the refurbishment and upgrading of an existing building. The construction projects take into account the highest sustainability requirements.

A contingent credit of CHF 120.3m was requested for additional real estate projects in the ETH Domain. Accordingly, construction projects costing up to CHF 10m are being carried out, and projects over CHF 10m are being planned.

Maintaining value and functionality
The ETH Board is legally obliged to maintain the value and functionality of the properties of the ETH Domain, and this is in the interests of the Federal Government as the owner of the real estate and of the ETH Domain as the user. The refurbishment work on the historical building stock is considerable in some cases, leading to challenging projects. Renovation projects in excess of CHF 561.4m are currently included in the 2025–2028 real estate investment plan. They triggered an investment volume of around CHF 85.0m in 2024. In addition, annual maintenance work amounting to over CHF 50m on average was funded from the federal financial contribution. Despite the advanced age of some of the buildings and their intensive use, the current condition value of 80.3% determined in 2024 remains high in relation to the new value (see Fig. 26, p. 105). Consequently, the ETH Domain demonstrated that it is using the building stock provided by the Federal Government responsibly and sustainably. In the reporting period, the maintenance strategy process was also analysed with the help of external expertise. It was determined that compliance with the high building condition target value requires high additional investment in the medium term and that there is potential for optimisation. Various recommendations for action are now being reviewed and discussed, including the level of the target range, consolidation of the status records and segmentation of the portfolio.

Coordination tasks
In 2024, the Real Estate department of the ETH Board coordinated the interests of the institutions of the ETH Domain with those of the Federal Administration in the development of norms, standards and guidelines for the planning, realisation and operation of real estate. The ETH Domain also participated intensively in consultation procedures organised by the Federal Government and industry associations. Key topics were the further development of structural reforms, the development of a methodology for the application of life cycle costing in construction projects of the Federal Government, the expansion of digitalisation in real estate management and securing the energy supply for energy-intensive teaching and research institutions. Together with its institutions, the ETH Board played a coordinating and creative role in the Federal Government's exemplary function with regard to energy and the environment, including in "Exemplary Energy and Climate" (EEC). Moreover, the ETH Board is a member of the Coordination Conference of Public-Sector Building and Real Estate Authorities (KBOB) and the Office for University Buildings (FHB) of the University Council of the Swiss University Conference.

Governance
The development of the SFMPs was a focus of the development and management of the real estate portfolio in 2024 (see "Strategy and long-term portfolio development"). Following the review and approval by the ETH Board, release by the Federal Government as owner is planned for spring 2025 in accordance with the Ordinance on Federal Real Estate Management and Logistics (REMFLO).

One challenge is the implementation of climate protection targets. In this area, the ETH Board, as the Federal Government's construction and real estate body, is working closely with the federal authorities involved to concretise the design of the Federal Government's exemplary function and to assess the necessary measures and the financial and personnel requirements by means of studies. This also reveals diverging interests, e.g. between the requirement for high value and functional preservation of existing buildings, which necessitates more frequent replacement of components, and the objective of the circular economy, which strives for the longest possible service life of the components and thus aims to avoid CO_2 emissions with respect to grey energy.

A renovation and replacement project is being developed to repair the damage caused by the infestation of the EPFL cooling water system with quagga mussels and to prevent a total failure of the infrastructure for teaching and research. This is expected to be submitted to the Federal Council and the Swiss Parliament in 2025 with the 2026 construction programme. To finance these measures, estimated at CHF 60m, EPFL will have to utilise part of its reserves on behalf of the owner. To cover future damage to the real estate portfolio, the ETH Domain has launched a project which, among other things, is investigating the insurability of real estate-related risks.

In 2024, the SFAO conducted several audits in the ETH Domain's real estate management, which will run until 2025. The assessment of PSI's new build project QMMC for materials research and the investigation of quantum phenomena has been finalised and the SFAO's findings and recommendations as well as the opinions of the ETH Board and PSI have been published. Various measures were decided on the basis of the recommendations. The project is on track and the target achievement is foreseeable.

Environment and energy

Financing requirements for exemplary role of the Federal Government
For the ETH Domain, 2024 was characterised by significant developments in the areas of climate protection, the environment and energy. With a view to the entry into force of new legal framework conditions in 2025, in particular the Climate and Innovation Act (CIA), its own strategies were sharpened, measures intensified and high-impact projects implemented.

The ETH Domain is affected by Article 10(4) CIA. The law offers the institutions of the ETH Domain the opportunity to play a pioneering role through scientifically sound approaches. All institutions are currently working on net zero timetables. Their own direct and indirect emissions are to be reduced as far as possible and the remaining emissions are to be reduced to zero by 2040 at the latest using negative emission technologies. An interim target that has already been set is from the Federal Government climate package for 2030 (-50% CO_2 emissions compared to 2006 in the building sector). Further interim targets have already been set in various institutions, concrete, quantified measures are being developed for all scopes (emission categories 1–3) and their implementation is in preparation. In this context, ETH Zurich has launched the ETH Net Zero programme, which comprises nine transformative projects aimed at achieving complete decarbonisation by 2040. Similar measures were also taken by EPFL, Empa and Eawag. The remaining CO_2 emissions in Scopes 1 and 2 from the building sector and partly beyond are already fully offset today by the institutions of the ETH Domain, although PSI is already heating the buildings on the site without fossil fuels. With net zero, community involvement from all institutions is also relevant: this way, members of the ETH Domain who are already interested in the topic can expand their knowledge and options for action and realise concrete savings.

Strategic real estate management in the ETH Domain

Efficient building infrastructure is a central requirement for enabling both Federal Institutes of Technology and the four research institutes to achieve their targets in teaching and research and to meet the required quality standards. The real estate of the ETH Domain is owned by the Federal Government. The investment credit for construction is earmarked annually in the budget. It appears in the state accounts under the Federal Department of Finance (specifically the Federal Office for Buildings and Logistics, FOBL). As one of the Federal Government's three building and real estate authorities, the ETH Board assumes the ownership role in a fiduciary capacity. It is responsible for the real estate portfolio of the ETH Domain and consults the institutions on strategic real estate management in order to ensure the functionality of the real estate portfolio in the medium and long term and to preserve its cultural value. Needs-based planning, and the timely realisation of new construction projects, conversions and refurbishments, are at the heart of its remit. The preservation of value and functionality is the result of needs-based planning, geared – also in the interests of the owner – towards cost/benefit considerations, as well as corresponding controlling at the ETH Board level. The owner is kept abreast of this by way of reports from the ETH Board.

The renewal of the roof of the Swiss Light Source (SLS) with the lightweight PV system.
› Markus Fischer/PSI

The institutions of the ETH Domain have reviewed and updated their PV strategies and solar land registers on the basis of the new Article 45*b* EnA (Energy Act) on the expansion of photovoltaics, which will also come into force in 2025. The expansion of photovoltaics has been prioritised for all institutions in order to increase in-house production of renewable energy. PV panels with an output of around 960 kWp were installed in the ETH Domain in 2024 and other large-scale projects of a similar size were launched. In order to further accelerate the expansion of PV beyond the available financial resources, PSI has launched a tender for the occupancy of five additional buildings with an expected annual yield of approximately 1.7 GWh/year.

The promotion of the circular economy in the new Article 35*j* of the Environmental Protection Act (Part IV. "Strengthening the Swiss circular economy") also represents an important step towards a sustainable and resource-conserving economy for the ETH Domain. EPFL developed a pilot project for a reuse platform that is to be implemented in 2025. ETH Zurich adopted its strategic priority "Decarbonisation and circularity" and is now moving towards even stronger implementation and promotion within its operational processes. With the construction of two buildings in timber element construction, PSI has already realised and commissioned projects with a circular economy focus. Empa and Eawag carried out awareness-raising measures and workshops to anchor the circular economy in construction activities. At the same time, parameters for the costs of circular construction processes were determined in order to facilitate their economic evaluation.

In order to estimate the cost consequences that will be incurred by the Federal Government and thus also by the ETH Domain as a result of the three legally enshrined topics of net zero, PV expansion and the circular economy in the building sector, the Federal Council has commissioned the construction and property services (BLO) to draw up cost estimates for the exemplary role of the Federal Government. Following close and intensive collaboration between the ETH Board staff, the institutions of the ETH Domain and the other construction and property services, these cost estimates were available at the end of 2024. In addition to the direct investment costs, the long-term savings potential that can be achieved through greater energy efficiency and less dependence on fossil fuels was also taken into account.

The EEC initiative remains a key guide for the institutions. The ETH Domain's 2030 energy efficiency target set within this framework was already exceeded in 2024.

Measures to increase energy efficiency in the ETH Domain include the replacement of energy generation plants with fossil-free energy sources, energy-efficient renovations including building shells, HVAC systems and lighting replacement, new buildings based on a high energy standard, a densification of workplaces through co-working spaces, the realisation of geothermal probe fields and operational optimisations.

When purchasing energy, particularly electricity, great importance is attached to fossil-free, low-emission sources. Even though electricity consumption will continue to rise as a result of the continued growth of the ETH Domain and energy-intensive research and computer centres, projects are planned to significantly reduce energy consumption. PSI, for example, is implementing efficiency measures that will reduce annual consumption by around 20 GWh by 2030.

Institutions of the ETH Domain have committed to continuing the voluntary gas savings target (-15%) both in the winter period 2023/2024 and in 2024/2025. They also have target agreements with the Energy Agency of the Swiss Private Sector (EnAW).

There are also ambitious targets for mobility, such as reducing flight emissions by 30% by 2030 (based on 2019) in order to further reduce overall emissions. ETH Zurich is developing a comprehensive policy mix for business trips. EPFL launched the "Travel Less Without Loss" programme to raise awareness of the CO_2 impact of travel. An awareness campaign was also launched at PSI in 2024, accompanied by new air travel regulations and the introduction of compensation payments to raise employee awareness. The electrification of vehicle fleets is also being driven forward. As for commuter traffic, the use of public transport, non-motorised traffic and e-mobility is encouraged.

Implementation of the new Swiss Landscape Concept action plan was launched in 2024. Although practically all areas of the ETH Domain are certified in terms of biodiversity, further major progress has been made.

The Hönggerberg biodiversity concept was realised at ETH Zurich, including wild bee havens, bat protection and nesting boxes for birds of prey. EPFL is planning wetland biotopes, improved pollinator habitats, integrated biosolar roofs (combining PV production and habitats for insects) and planting climate-resistant trees. The Empa-Eawag campus was expanded to include nature-oriented areas such as the "Green Belt" and recertified with the Natur & Wirtschaft foundation. PSI is continuing to monitor the biological success of SwissFEL. The campus has also been recertified by the Natur & Wirtschaft foundation. WSL restored its land by dismantling research institutions on the site that were no longer needed (foundations of the cable car, old research cabin).

In the ETH Domain, efforts in environment and energy are characterised by interdisciplinary cooperation between and among the institutions and between research and operational business. One example is the geothermal energy storage facility on the Empa-Eawag campus in Dübendorf. Empa plans to store the waste heat from ventilation systems and laboratory equipment there in summer, for example. Before operations begin in 2025, Eawag is investigating how the use of borehole thermal energy storage affects the surrounding soil, the groundwater and the microorganisms living in it. Along those lines, the Joint Initiatives SCENE (Swiss centre of excellence on net zero emissions, scene-project.ch) and Speed2Zero project (speed2zero.ethz.ch), which act as a key interface between research and operational implementation in the area of environment and energy, were continued in 2024.

The necessary transformation processes to achieve the ambitious environmental goals require an informed, sensitised and responsible community within the ETH Domain. The ETH Zurich community is strongly motivated to get involved in sustainability issues through modern communication, offers and incentives. At EPFL, a course on sustainability was also introduced as a pilot project for all first-semester Bachelor's students in spring 2024. Since 2022, WSL has recorded measurable success through "nudging" in cafeterias, i.e. the pricing and order of presentation leads to the sale of more vegan and vegetarian menus.

With ambitious goals, innovative projects and a clear strategic focus, the ETH Domain is positioning itself as a pioneer in sustainability and climate protection. The coming years will be decisive in achieving the targets set and actively shaping the transformation to a resource-conserving and low-emission society.

Strategic objective

WORKING CONDITIONS, EQUAL OPPORTUNITIES AND YOUNG SCIENTIFIC TALENT

9

The year 2024 was characterised by lifelong learning and AI upskilling, structural reviews, strategic workforce planning, the digitalisation of HR processes, strategies to combat the shortage of skilled workers and the accelerated development of HR marketing and employer branding.

Promotion of inclusive work attitudes

With the revision of the regulations regarding concerns and reports of inappropriate behaviour and workplace conflicts by ETH Zurich members, **ETH Zurich** has further developed positions, structures and processes. A programme to promote a work attitude based on personal integrity in research groups was created with Science Friction. **EPFL** employees completed The Essentials, six training courses to promote integrity and communicate the policies in the areas of security, IT security, data protection, respect, compliance guide and integrity. The Advanced Academic Leadership programme (AALP) was implemented and a management programme for new tenure-track associate professors was piloted. At the **PSI** retreat, the topics of recruiting women, digitalisation, shortage of skilled workers and the AI 2030@PSI programme were presented and discussed. PSI presented the results and methodology of the employee survey at the Leadership Day event. **WSL** carried out a structural review and focused on strategic personnel planning as a result of the many retirements. Managers at all hierarchical levels were involved in the development of structural adjustments and job planning.

Managers from all four research institutes completed the CAS Leadership in Science. Leadership forums on leadership and coaching as well as a "Leadership Impulse" were organised at Empa. **Eawag** also organised ERFA days for managers and further expanded its range of specialist training courses and webinars. The "lead campus", a further development of the **PSI** training centre, has been open to employees of all research institutes as of this year and is jointly supported.

Working conditions, development and continuing education

The AALP comprises various topics and offers to support senior employees throughout the **ETH Domain**: "Building high performing teams", "Understanding and shaping group dynamics" and "Taking stock of your own leadership". It includes both individual and group coaching and consists of two modules. PSI organised the AALP for the third time.

ETH Zurich conducted leadership development interviews to reflect on the skills and development of new professors and addressed both new and experienced managers with its "Fit for the new leadership role" and "Advanced Leadership" programmes. The "Lifelong Learning" programme was further intensified with the "AI Upskilling" initiative, the #BleibNeugierig (#StayCurious) learning conference and "Advancing your research career" for young researchers. **EPFL** developed the e-learning programme "Management Fundamentals – prepare yourself for your first leadership role at EPFL" and introduced the SuccessFactors module for managing appraisal and development interviews. Specific computer skills were certified under the European Certificate of Digital Literacy.

The Non-linear Career Path Event of the PhD and Postdoc Association was newly created at PSI, which emphasises that careers are not always linear, but can also be dynamic. Cooperation between the four research institutes was further expanded and a joint educational platform was created with the introduction of the Lead Campus. Several tenure-track positions at **WSL** were made permanent, internal employees were promoted to management positions and individual support programmes were offered to apprentices and postdoctoral researchers. Objectives for the individual promotion and development of employees were systematically developed and initiated at **Empa** using a competency model. Prospects and development objectives were discussed and training and development opportunities were defined on this basis. The rotation principle for department heads enabled Eawag group leaders to take on department head functions. With the Cluster Hire Project, **Eawag** aims to make an essential contribution to climate protection and enables newly created leadership roles for tenure-track group leaders.

Giving priority to domestic labour force potential

In the ETH Domain, jobs with the same qualifications are preferably filled by people living in Switzerland and advertised in the regional employment centres (RAV) as well as on various platforms. The structure of the employees shows that the legal requirement to give priority to employees living in Switzerland is practised for technical and administrative positions. In addition, the shortage of skilled workers is also a challenge in the ETH Domain. In the People Attraction project, **ETH Zurich** implemented its strategic initiative for talent acquisition and employer attractiveness through systematic evaluation of target groups and process improvements that maximise the use of resources and minimise the cost per vacancy. Employer branding expertise with an iterative, scalable approach for target group-oriented measures increased the ETH Domain's attractiveness as an employer and made it possible to counteract the shortage of skilled workers in a targeted manner.

Equal opportunities, diversity and inclusion

In 2024, the ETH Board adopted a strategy for Diversity, Equality and Inclusion in the ETH Domain for the years 2025–2028, which replaces the gender strategy 2021–2024. **ETH Zurich** is developing a diversity strategy to promote diversity and inclusion in its four key focus areas of teaching, research, leadership, discrimination and harassment. It ran mentoring and coaching programmes as well as lunch breaks on "unconscious biases", "Lunch & Learns" on inclusive language and workshops on creating an LGBTQIA+-inclusive working and learning environment. Action Days and Weeks against Racism were organised throughout the **ETH Domain**, as well as the Day of Women and Girls in Science and International Women's Day, and the "Day of Caring for Dependants" at ETH Zurich for the first time.

In addition to accessibility and participation in Pride and Hochschul-Pride Zurich, lunches for the LGBTQIA+ community and the presentation of the Diversity Award, the university took part in swissuniversities' P7 programme on equal opportunities and the cooperation project "Social mobility/First generation students and academics". The latter focuses on barriers that impede access to higher education and academic careers due to social background.

EPFL continued to implement the action plan for equality and diversity 2021–2024, with projects such as "EPFL without barriers" to improve accessibility and the inclusion of people with disabilities or "Inclusive Name Change", which enables everyone to use a name that corresponds to their identity. The structural anchoring was solidified by a new equal opportunities committee. There was lively use of the e-learning programmes "EPFL Respect" and "Implicit Bias Awareness". A theatre forum was organised as part of the Action Week against Racism. Participants were able to slip into roles and try out how to act and respond appropriately. The theatre forum was also very popular in connection with the Sexual Harassment Awareness Days.

PSI organised the "First aid for mental illness" training course. A representative of the LGBTQIA+ network is now part of the PSI Committee for Equal Opportunities. The online platform "True Stories – Science F(r)iction" and various **WSL** workshops proved very popular. A Diversity Committee was also set up with representatives from all hierarchical levels and areas. The Diversity, Equity & Inclusion (DEI) centre is active across all institutions at **PSI**, **Eawag** and **Empa**. Various DEI days were communicated internally and externally on social media in the ETH Domain. This included information and posts on cultural diversity, equal pay, gender equality, mental health and LGBTQIA+ issues. **Empa** initiated the Women meet Women Lunches and organised an event on the topic of cultural diversity, at which employees engaged in an open exchange on different cultures. At Eawag, the EDC Committee (Eawag Diversity Committee) promotes equal opportunities and diversity. All institutions of the ETH Domain are orientated towards the measures of the Swiss Federal Government for Gender Equality 2030.

Prevention of bullying, discrimination and sexual harassment

Bullying, discrimination and sexual harassment are not tolerated anywhere in the ETH Domain. The institutions have reporting systems as well as contact and Ombuds Offices that receive reports of incidents and offer counselling and support. The code of conduct of **ETH Zurich** and the six social and leadership compe-

tences form an important basis for cooperation. The Respect programme includes training and dialogue on collaboration, team culture, creativity, problem solving, conflict management and inclusion. E-learning courses on the topics of "Unconscious bias and prevention of sexual harassment" are part of the programme.

With the online learning module "You are not alone. Promoting respect", **EPFL** employees were made aware of inappropriate behaviour. The university offered training on "Personal protection: bullying, sexual harassment, rights and obligations", "Reception and care (psychosocial risks)", "Prevention and intervention in mental health situations" and support for LGBTQIA+ people in all areas of life. Trust Point has created easy access to all support services.

ETH Zurich, **PSI**, **WSL** and **Empa** took part in the Sexual Harassment Awareness Day. In this context, employees' experiences on inappropriate behaviour were collected and then discussed and analysed in a joint workshop. Managers at WSL were sensitised to these issues through online coaching from the Diversity & Inclusion contact point. To strengthen diversity and prevent bullying and discrimination, information is clearly structured and easy to find on the Empa intranet. Eawag and WSL technically adapted the Refline recruitment tool for diversity-based recruitment.

Increasing the proportion of women in management positions

The proportion of women among professorships was increased at both universities and at the management level throughout the ETH Domain. **EPFL**, in turn, organised a workshop for female managers. Various career development programmes for women in the ETH Domain were actively used: "High Potential University Leaders Identity & Skills Training Programme" (H.I.T.), "Connecting Women's Career in Industry and Academia" (CONNECT), which focuses on careers in industry, FemSpin and the mentoring, training and coaching programme of the ETH Domain, as well as "Fix the Leaky Pipeline", which is aimed at all women. The National Future Day is still very popular, inspiring participating children and girls in particular to take an interest in science. In 2024, children without a connection to **ETH Zurich** were also able to benefit from the various offers on the Future Day of the university.

PSI expanded its mentoring programme feM-LEAD (Female Mentoring: Leadership for Equity and Diversity) to include WSL, Empa and Eawag in order to increase the number of women in management positions over the long term. Women from various fields (science, technology, administration) who do not yet have a management role but are interested in one can take part. Thanks to the HoD (Head of Department) rotation principle, Eawag has achieved a more balanced gender ratio, which has had a positive impact on gender equality statistics.

Training and promotion of young scientists

All institutions organised activities (e.g. summer camps) to promote young talent. The Postdoc Career Weeks at **ETH Zurich** inform postdoctoral researchers about career opportunities in a wide variety of fields. In addition, there were a number of offers for doctoral students and postdocs: an e-learning course on preparing for interviews, a career management seminar, presentations on various topics, networking with companies, information events on the labour market for non-EU/EFTA graduates with the Zurich Employment Office, a panel with alumni as well as individual advice from third-party companies. **EPFL** offered training and support programmes specifically designed to encourage careers in research, innovation and

The International Day of Women and Girls in Science is an opportunity to promote full and equal access to and participation in science for women and girls.

Inge Herrmann was honoured for her research with the Falling Walls Science Breakthrough of the Year 2024 award in the Women's Impact category.
› Empa

entrepreneurship, with a particular focus on funding, management, contracting, intellectual property, ethics and professional ethics. **PSI** organised the second workshop of the think tank Getting More Girls Excited About STEM. A rough concept for an idea to promote girls in STEM was developed in this context. This is a joint project of the four research institutes. A network meeting was held during the P7 FemSPIN project with **PSI** as co-organiser. Doctoral students at **WSL**, **Empa** and **Eawag** had access to regular career planning meetings. The research institutes were involved in Future Day activities and the organisation of holiday camps with a scientific focus in order to ensure that young scientists will continue to be available in the future.

Integration of people with limitations

Case management teams contribute to re-integration into the work process throughout the ETH Domain. The vocational training programme at **ETH Zurich** also offers apprenticeships for students with disabilities. As part of the "**EPFL** without barriers" project, the university analysed its current situation and defined priority areas for action. By taking a more proactive approach, the aim is to improve inclusion for all. Various communication and awareness-raising measures were organised, including portraits of students and doctoral students, workshops and lectures on the subject of autism and neurodiversity in the workplace. EPFL was awarded the Partner Company 2024 label by the canton of Vaud for its commitment to the professional rehabilitation of people with disabilities.

PSI collaborated with external networks and management consultancies such as MyAbility and EnableMe and took part in the MyAbility Talent programme. People with disabilities were mentored and, in some cases, work permanently in a protected workplace. External persons who were not previously employed at PSI and are in a difficult phase of their lives were also offered a temporary re-integration position or work trial. **WSL** organised work trials in cooperation with invalidity insurance, which led to socially acceptable solutions for all parties. **Empa** and **Eawag**, meanwhile, focused on individual measures for people with physical or mental disabilities.

Training apprentices

This year, the range of apprenticeships offered as part of the vocational training programme at **ETH Zurich** was expanded by a total of 15 apprenticeship places in the areas of IT, operational maintenance and business administration. The university now also offers pre-apprenticeship integration, a programme developed and consolidated by the federal government, in the commercial sector. **EPFL** created training modules for trainers and now offers training for IT specialists. For the first time, **PSI** offers apprenticeships in plant and equipment engineering, mediamatics and ICT. Apprentices at the research institute are regularly awarded regional, national and international prizes. In 2024, the silver medal at the World Skills in Lyon went to an electronics technician with a Federal VET Diploma. Additional individual support measures were necessary for several **WSL** apprentices to ensure that they could continue their apprenticeship. This corresponds to a trend that is observed across the entire ETH Domain, with an increasing proportion of apprentices requiring more and more support to successfully complete their training. **Empa** was once again evaluated by Great Place to Work and recognised as one of the best host companies for apprentices in Switzerland. More than 40 apprentices in ten different occupations are offered a broad, well-founded and varied vocational training programme at Empa. In addition, the training infrastructure at **Eawag** guarantees sound professional training and is highly regarded.

External evaluation

Avenir Consulting audited the implementation of the personnel objectives at the institutions for the years 2021–2023 and prepared an interim report with measures for further implementation of the targets in the ERI period 2021–2024. The final report for 2024 will be prepared in 2025.

Outlook for 2025

ETH Zurich plans to further develop the leadership feedback process and conduct an employee survey. As a result of the change in presidency, EPFL is focusing on the further development of management and leadership skills and the consolidation of learning. PSI emphasises personnel marketing and employer branding as well as greater consideration of the various dimensions of diversity. WSL is continuing its strategic personnel planning and making the necessary organisational adjustments. Furthermore, it is continuing various digitalisation projects. Empa prioritises an innovative working environment, inspiring collaboration and personnel development at all levels, as well as the optimisation and further expansion of the electronic personnel processes. Eawag is working on gender equality and the digitalisation and optimisation of personnel processes.

Key Figures Personnel 2024

On 31 December 2024, the headcount in the ETH Domain stood at 24,995 employment contracts (ECs), or 20,943.5 full-time equivalents (FTEs) (see Fig. 17, p. 102). The headcount increased by 105 ECs (+0.4%) while FTEs fell by -64.5 FTEs, compared to the previous year.

The scientific personnel, which also includes doctoral students, remains by far the largest role in the ETH Domain with 14,989 ECs (12,223.4 FTEs) (60.0% of the total headcount, see Fig. 17, p. 102), followed by technical staff, which accounts for 4,350 ECs (3,939.6 FTEs) or 17.4% of the headcount. Of all employees, 17.0% or 4,265 ECs (3,421.0 FTEs) are administrative employees and 1.9% are apprentices. 2024 saw the new appointment of 45 professorships, with the total number of professors now at 916 ECs (885.0 FTEs). They made up 3.7% of the total headcount.

Professors
In 2024, ETH Zurich and EPFL had a total of 726 full and associate professors: in addition, they had 138 assistant professors with tenure track (TT) and 52 assistant professors without TT (see Fig. 18, p. 102).

The proportion of women in these three categories grew from 23.7% to 25.5% in 2024. The figures were 20.0% for full and associate professors, 48.6% for assistant professors with TT and 42.3% for assistant professors without TT.

In 2024, 67.0% of the total of 916 professors came from abroad (2023: 67.9%). 45.9% came from the EU (2023: 47.1%) and 21.1% from other countries (2023: 20.8%) (see Fig. 19, p. 103).

Funding of professorships
Of the 546 professors (527.8 FTEs) employed at ETH Zurich as of 31 December 2024, 462.6 FTEs (87.6%) were financed by the total federal contribution, 18.5 FTEs (3.5%) by SNSF, 0.7 FTEs (0.1%) by government-funded research, 9.8 FTEs (1.9%) by EU research programmes, and 36.2 FTEs (6.9%) by third-party financial research contributions, as well as by donations and bequests.

Of the 370 professorships (357.2 FTEs) at EPFL as of 31 December 2024, 325.9 FTEs (91.2%) were financed by the total federal contribution, 5.3 FTEs (1.5%) by SNSF, 1.0 FTE (0.3%) by government-funded research, 0.2 FTEs (0.1%) by EU research programmes and 24.8 FTEs (6.9%) by third-party financial research contributions, as well as by donations and bequests.

Proportion of women
The proportion of women in the ETH Domain increased in 2024 to 37.0% (2023: 36.7%), although it varies significantly by institution, role and discipline (see Fig. 22, p. 104).

The proportion of women in managerial positions (from function level 10) rose to 25.5% (2023: 24.8%). The two universities, WSL and Eawag made a significant contribution to this increase.

Apprentices
In the reporting period, the ETH Domain offered 475 apprentices an apprenticeship in more than 20 different career paths. Women accounted for 31.2% of apprentices in 2024.

KEY FIGURES

Monitoring table on the strategic objectives by the Federal Council

Fig. 3: Monitoring table on the strategic objectives set by the Federal Council for the ETH Domain for 2021–2024

	Reference values			Monitoring			
Indicators	2013	2017	2020	2021	2022	2023	2024
TEACHING							
Students and doctoral students ETH Zurich and EPFL (headcount)							
New admissions							
At Bachelor's level	5,255	4,756	5,245	5,218	5,295	5,660	6,011
Students[1]	**22,099**	**25,059**	**28,637**	**29,243**	**30,141**	**31,600**	**33,068**
Proportion of women (%)	29.1	30.6	31.7	31.9	32.0	32.3	32.5
Proportion of foreign nationals (%)	35.5	38.4	40.7	40.9	42.8	44.3	45.0
At Bachelor's level[1]	13,995	14,385	15,983	16,650	16,995	17,888	18,553
Proportion of women (%)	28.6	30.6	32.0	32.5	32.4	33.0	33.2
Proportion of foreign nationals (%)	30.9	29.4	32.6	34.1	36.2	38.3	39.0
At Master's level[1]	7,241	8,895	11,143	11,741	12,329	12,870	13,626
Proportion of women (%)	29.4	29.4	30.3	30.4	30.9	30.9	31.0
Proportion of foreign nationals (%)	43.1	45.4	48.4	50.0	51.6	52.4	53.0
On MAS/MBA programmes	863	840	816	852	817	842	889
Proportion of women (%)	34.6	38.8	42.6	42.1	41.7	38.4	39.6
Proportion of foreign nationals (%)	45.7	51.5	47.7	48.5	47.9	49.2	49.5
Visiting students (incoming)[1]	–	939	695	–	–	–	–
Proportion of women (%)	–	35.5	33.7	–	–	–	–
Proportion of foreign nationals (%)	–	96.5	95.0	–	–	–	–
Supervision ratio							
Bachelor's and Master's students per professor	27.7	28.3	31.7	33.2	33.6	35.1	36.4
Doctoral students	**5,947**	**6,234**	**6,598**	**6,867**	**6,975**	**6,837**	**6,752**
Proportion of women (%)	30.4	30.8	33.6	33.9	34.0	34.6	35.0
Proportion of foreign nationals (%)	72.6	75.0	78.1	78.6	78.6	79.1	79.9
Supervision ratio							
Doctoral students per professor	7.7	7.6	7.7	8.0	8.0	7.8	7.6
Students and doctoral students[1]	**28,046**	**31,293**	**35,235**	**36,110**	**37,116**	**38,437**	**39,820**
Proportion of women (%)	29.4	30.6	32.0	32.3	32.4	32.7	32.9
Proportion of foreign nationals (%)	43.3	45.7	47.7	48.1	49.5	50.5	50.9
Supervision ratio							
Students and doctoral students per professor	36.5	38.0	41.2	42.3	42.6	43.9	45.0
Degrees							
Bachelor	2,249	2,602	3,007	3,213	3,148	3,356	3,824
Diploma, Master	2,663	3,065	3,344	3,898	3,760	3,998	4,398
MAS/MBA	346	394	249	304	318	309	270
Doctorate	993	1,258	1,171	1,257	1,458	1,403	1,367
Teaching and supervision by the research institutes							
Teaching hours	15,670	17,992	18,553	19,305	21,348	23,989*	24,550
Bachelor's, Master's and Diploma projects	532	602	608	736	727	716	829
Doctoral students	797	807	842	872	924	950	1,009
Proportion of women (%)	36.3	39.0	39.9	39.0	38.4	40.8	41.7
Proportion enrolled in the ETH Domain (%)	67.9	67.7	70.3	70.8	69.4	68.9	70.5
Proportion enrolled at a foreign university (%)	13.4	10.3	9.1	11.0	12.1	11.7	11.2

RESEARCH							
Publications[2]	–	–	–	–	–	–	–
Research contributions, mandates and scientific services (in CHF millions)	–	**743.2**	**774.1**	**787.7**	**795.4**	**822.3**	**848.1**
of which Swiss National Science Foundation (SNSF)	209.0	260.3	262.6	267.8	268.3	287.0	306.6
of which Innosuisse	36.8	62.6	50.6	41.3	44.3	47.7	46.0
of which EU Framework Programmes for Research and Innovation (EU FPs), transitional measures Confederation	135.2	139.2	146.4	160.2	154.4	149.3	146.6
KNOWLEDGE AND TECHNOLOGY TRANSFER (KTT)							
Invention disclosures[3]	–	343	310	330	310	314	282
Software notifications[3, 4]	–	26	32	39	37	26	25
Patents	193	206	217	213	227	187	222
Licences[5]	223	377	338	181	180	156	137
Spin-offs	43	48	66	60	54	69	64
STAFF (FTE)							
Professors	767.7	823.8	854.6	854.6	872.0	875.9	885.0
Proportion of women (%)	12.4	14.8	18.6	20.0	21.8	23.8	25.6
Proportion of foreign nationals (%)	67.1	67.2	67.3	67.7	67.7	68.3	67.7
Scientific staff	9,927.3	11,204.4	11,994.6	12,277.4	12,245.5	12,346.9	12,223.4
Technical staff	3,157.3	3,439.8	3,676.3	3,722.3	3,772.4	3,896.9	3,939.6
Administrative staff	2,279.0	2,690.0	3,118.9	3,214.9	3,326.2	3,411.3	3,421.0
Apprentices	435.0	473.6	472.6	464.6	462.1	477.0	474.5
FINANCES/REAL ESTATE							
Total federal contribution (expenditure ceiling perspective) (in CHF millions)	**2,271.4**	**2,530.8**	**2,596.1**	**2,600.1**	**2,666.2**	**2,736.2**	**2,747.9**
of which federal financial contribution	2,073.9	2,377.9	2,355.1	2,373.3	2,441.4	2,535.0	2,448.6
of which investment credit for construction in the ETH Domain	197.5	152.9	241.0	226.8	224.8	201.2	299.4

[1] Until 2016, visiting students (incoming) were counted yearly in the numbers of students at Bachelor's and Master's levels. In 2017–2020, visiting students were reported yearly as a separate student category and counted in the total number of students. Since 2021, visiting students are reported per semester in a separate table (see Fig. 11) and are no longer counted in the total number of students. Without this modification, ETH Zurich and EPFL would have counted a total of 30,294 in 2021.

[2] Publishing activity is assessed every four years as part of the intermediate evaluation.

[3] Additional KTT indicators introduced in 2017.

[4] Open Source Software not included.

[5] 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.

* A technical error occurred when collecting the data for 2023. The correct number of teaching hours for 2023 is 23,989, not 25,617, as published in the 2023 Annual Report.

Indicators and counting methods for the monitoring table and the academic achievement report

If not specified in more detail, the term "students" is always understood to mean students at Bachelor's and Master's levels, as well as students in Master of Advanced Studies and Master of Business Administration (MAS/MBA) continuing education programmes. Doctoral students are defined as a separate category. Students and doctoral students are counted in numbers of persons (headcount). These figures may differ from those which ETH Zurich and EPFL enter in their respective annual reports, as there are different counting methods.

As of 2021, visiting students are no longer included in the total number of students. Incoming visiting students (students who are enrolled at another university and study for at least three months or 20 ECTS at one of the two Federal Institutes of Technology) and outgoing visiting students (students who are enrolled at one of the two Federal Institutes of Technology and study for at least three months or 20 ECTS at another university) are now listed in a separate table for each semester. Foreign students and doctoral students form two sub-categories: foreign-educated foreign nationals who resided abroad while obtaining the relevant necessary qualifications, and Swiss-educated foreign nationals who resided in Switzerland while obtaining the relevant necessary qualifications.

The employment level of all staff is counted in terms of full-time equivalents (FTEs). Professors, both full and associate, as well as assistant professors, including recipients of the Swiss National Science Foundation (SNSF) Eccellenza professorial fellowship who are employed at one of the two Federal Institutes of Technology, are taken into account in the calculation of the supervision ratio. Senior scientists and Maîtres d'enseignement et de recherche (MER) from both Federal Institutes of Technology correspond to the academic staff in management roles or senior management staff. Some of them are adjunct professors. To determine the "expanded" supervision ratio, the Senior Scientists and MER of both Federal Institutes of Technology are added to the professors. The teaching hours delivered by the research institutes do not include preparation time, only the time spent in the presence of students.

Academic achievement report

Fig. 4: Students and doctoral students by discipline

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Δ 2023 / 2024	
												in %
Architecture	**3,060**	**3,030**	**3,047**	**3,041**	**3,090**	**3,035**	**3,169**	**3,254**	**3,404**	**3,560**	**156**	**4.6**
ETH Zurich	1,805	1,771	1,823	1,855	1,904	1,923	2,031	2,136	2,204	2,293	89	4.0
EPFL	1,255	1,259	1,224	1,186	1,186	1,112	1,138	1,118	1,200	1,267	67	5.6
Civil and Geomatic Engineering	**2,882**	**2,860**	**2,791**	**2,777**	**2,716**	**2,700**	**2,641**	**2,576**	**2,517**	**2,517**	**0**	**0.0**
ETH Zurich	1,716	1,701	1,688	1,667	1,614	1,646	1,606	1,537	1,486	1,510	24	1.6
EPFL	1,166	1,159	1,103	1,110	1,102	1,054	1,035	1,039	1,031	1,007	−24	−2.3
Engineering Sciences	**7,903**	**8,069**	**8,398**	**8,699**	**9,081**	**9,577**	**9,795**	**10,045**	**10,380**	**10,803**	**423**	**4.1**
ETH Zurich	4,930	4,993	5,135	5,224	5,467	5,851	6,053	6,202	6,217	6,457	240	3.9
EPFL	2,973	3,076	3,263	3,475	3,614	3,726	3,742	3,843	4,163	4,346	183	4.4
Information and Communications Technology	**2,809**	**3,033**	**3,261**	**3,648**	**4,031**	**4,529**	**4,929**	**5,417**	**5,857**	**6,154**	**297**	**5.1**
ETH Zurich	1,405	1,536	1,753	1,991	2,246	2,560	2,776	3,021	3,281	3,508	227	6.9
EPFL	1,404	1,497	1,508	1,657	1,785	1,969	2,153	2,396	2,576	2,646	70	2.7
Exact and Natural Sciences	**5,145**	**5,442**	**5,595**	**5,810**	**5,940**	**6,290**	**6,412**	**6,689**	**7,040**	**7,362**	**322**	**4.6**
ETH Zurich	3,157	3,352	3,505	3,691	3,794	4,039	4,063	4,238	4,417	4,648	231	5.2
EPFL	1,988	2,090	2,090	2,119	2,146	2,251	2,349	2,451	2,623	2,714	91	3.5
Human Medicine[1]	**–**	**–**	**99**	**192**	**286**	**296**	**311**	**302**	**314**	**313**	**−1**	**−0.3**
ETH Zurich	–	–	99	192	286	296	311	302	314	313	−1	−0.3
Life Sciences	**4,051**	**4,216**	**4,312**	**4,500**	**4,624**	**4,859**	**4,864**	**4,942**	**5,030**	**5,235**	**205**	**4.1**
ETH Zurich	3,044	3,162	3,218	3,326	3,433	3,566	3,595	3,658	3,667	3,732	65	1.8
EPFL	1,007	1,054	1,094	1,174	1,191	1,293	1,269	1,284	1,363	1,503	140	10.3
System-oriented Natural Sciences	**2,284**	**2,411**	**2,437**	**2,520**	**2,538**	**2,569**	**2,542**	**2,447**	**2,411**	**2,331**	**−80**	**−3.3**
ETH Zurich	2,284	2,411	2,437	2,520	2,538	2,569	2,542	2,447	2,411	2,331	−80	−3.3
Management, Technology, Economics	**913**	**972**	**973**	**966**	**954**	**937**	**962**	**965**	**979**	**1,020**	**41**	**4.2**
ETH Zurich	582	571	583	573	560	566	571	574	553	561	8	1.4
EPFL	331	401	390	393	394	371	391	391	426	459	33	7.7
Humanities, Social and Political Sciences[2]	**310**	**318**	**380**	**378**	**382**	**443**	**485**	**479**	**505**	**525**	**20**	**4.0**
ETH Zurich	310	318	366	358	351	406	435	425	442	455	13	2.9
EPFL	–	–	14	20	31	37	50	54	63	70	7	11.1
Total students and doctoral students	**29,357**	**30,351**	**31,293**	**32,531**	**33,642**	**35,235**	**36,110**	**37,116**	**38,437**	**39,820**	**1,383**	**3.6**
ETH Zurich	19,233	19,815	20,607	21,397	22,193	23,422	23,983	24,540	24,992	25,808	816	3.3
EPFL	10,124	10,536	10,686	11,134	11,449	11,813	12,127	12,576	13,445	14,012	567	4.2
Women	**8,677**	**9,091**	**9,587**	**10,167**	**10,675**	**11,280**	**11,660**	**12,027**	**12,572**	**13,110**	**538**	**4.3**
ETH Zurich	5,873	6,164	6,563	6,917	7,304	7,768	7,995	8,194	8,353	8,667	314	3.8
EPFL	2,804	2,927	3,024	3,250	3,371	3,512	3,665	3,833	4,219	4,443	224	5.3
Foreign nationals	**12,804**	**13,615**	**14,290**	**15,160**	**15,993**	**16,799**	**17,368**	**18,387**	**19,404**	**20,288**	**884**	**4.6**
ETH Zurich	7,226	7,563	7,972	8,433	8,876	9,438	9,808	10,371	10,731	11,241	510	4.8
EPFL	5,578	6,052	6,318	6,727	7,117	7,361	7,560	8,016	8,673	9,047	374	4.3

Since 2021, visiting students are no longer being counted in the student totals. This should be taken into account when comparing figures from previous years.

[1] ETH Zurich introduced a Bachelor's degree in Human Medicine in 2017.

[2] EPFL introduced a Master's degree in Digital Humanities in 2017.

Fig. 5: Students and doctoral students by academic level

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Δ 2023 / 2024	
												in %
Bachelor's programmes	**14,292**	**14,727**	**14,385**	**14,792**	**15,243**	**15,983**	**16,650**	**16,995**	**17,888**	**18,553**	**665**	**3.7**
ETH Zurich	9,087	9,309	9,262	9,517	9,895	10,355	10,642	10,665	10,948	11,304	356	3.3
EPFL	5,205	5,418	5,123	5,275	5,348	5,628	6,008	6,330	6,940	7,249	309	4.5
Master's programmes	**8,126**	**8,662**	**8,895**	**9,517**	**10,163**	**11,143**	**11,741**	**12,329**	**12,870**	**13,626**	**756**	**5.9**
ETH Zurich	5,480	5,861	6,158	6,590	7,037	7,790	8,206	8,641	8,916	9,414	498	5.6
EPFL	2,646	2,801	2,737	2,927	3,126	3,353	3,535	3,688	3,954	4,212	258	6.5
MAS/MBA	**836**	**828**	**840**	**827**	**809**	**816**	**852**	**817**	**842**	**889**	**47**	**5.6**
ETH Zurich	640	635	646	635	626	644	675	673	703	739	36	5.1
EPFL	196	193	194	192	183	172	177	144	139	150	11	7.9
Visiting students (incoming)[1]	**–**	**–**	**939**	**1,004**	**1,060**	**695**	**–**	**–**	**–**	**–**	**–**	**–**
ETH Zurich	–	–	449	480	467	317	–	–	–	–	–	–
EPFL	–	–	490	524	593	378	–	–	–	–	–	–
Total number of students[1]	**23,254**	**24,217**	**25,059**	**26,140**	**27,275**	**28,637**	**29,243**	**30,141**	**31,600**	**33,068**	**1,468**	**4.6**
ETH Zurich	15,207	15,805	16,515	17,222	18,025	19,106	19,523	19,979	20,567	21,457	890	4.3
EPFL	8,047	8,412	8,544	8,918	9,250	9,531	9,720	10,162	11,033	11,611	578	5.2
Doctoral programmes	**6,103**	**6,134**	**6,234**	**6,391**	**6,367**	**6,598**	**6,867**	**6,975**	**6,837**	**6,752**	**–85**	**–1.2**
ETH Zurich	4,026	4,010	4,092	4,175	4,168	4,316	4,460	4,561	4,425	4,351	–74	–1.7
EPFL	2,077	2,124	2,142	2,216	2,199	2,282	2,407	2,414	2,412	2,401	–11	–0.5
Total students and doctoral students[1]	**29,357**	**30,351**	**31,293**	**32,531**	**33,642**	**35,235**	**36,110**	**37,116**	**38,437**	**39,820**	**1,383**	**3.6**
ETH Zurich	19,233	19,815	20,607	21,397	22,193	23,422	23,983	24,540	24,992	25,808	816	3.3
EPFL	10,124	10,536	10,686	11,134	11,449	11,813	12,127	12,576	13,445	14,012	567	4.2

[1] Until 2016, visiting students (incoming) were counted yearly in the numbers of students at Bachelor's and Master's levels. In 2017–2020, visiting students were reported yearly as a separate student category and counted in the total number of students. Since 2021, visiting students are reported per semester in a separate table (See Fig. 11) and are no longer counted in the total number of students. Without this modification, ETH Zurich and EPFL would have counted a total of 30,294 in 2021.

Fig. 6: New admissions at Bachelor's level at ETH Zurich and EPFL

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Δ 2023 / 2024	
												in %
Architecture	573	569	437	450	468	498	550	546	576	636	60	10.4
Civil and Geomatic Engineering	493	488	366	370	383	403	384	336	316	358	42	13.3
Engineering Sciences	1,550	1,518	1,350	1,303	1,353	1,327	1,333	1,401	1,621	1,782	161	9.9
Information and Communications Technology	596	679	582	662	708	780	799	897	896	907	11	1.2
Exact and Natural Sciences	1,001	1,108	985	928	952	1,074	1,091	1,162	1,276	1,231	–45	–3.5
Human Medicine[1]	–	–	100	100	100	100	99	99	104	102	–2	–1.9
Life Sciences	695	778	635	696	725	719	659	620	624	756	132	21.2
System-oriented Natural Sciences	366	372	288	307	259	326	288	219	232	214	–18	–7.8
Management, Technology, Economics	–	–	–	–	–	–	–	–	–	–	–	–
Humanities, Social and Political Sciences	16	19	13	11	18	18	15	15	15	25	10	66.7
Total	**5,290**	**5,531**	**4,756**	**4,827**	**4,966**	**5,245**	**5,218**	**5,295**	**5,660**	**6,011**	**351**	**6.2**

[1] ETH Zurich introduced a Bachelor's degree in Human Medicine in 2017. New admissions in this discipline are limited to 100 and will therefore remain stable over the years.

Fig. 7: Percentage of women among students and doctoral students at ETH Zurich and EPFL

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
% at Bachelor's level	29.2	30.0	30.6	31.6	31.9	32.0	32.5	32.4	33.0	33.2
% at Master's level	28.6	28.5	29.4	29.6	29.8	30.3	30.4	30.9	30.9	31.0
% at Bachelor's and Master's level	28.9	29.4	30.1	30.8	31.1	31.3	31.6	31.8	32.1	32.3
% on MAS/MBA programmes	38.6	37.9	38.8	40.6	40.3	42.6	42.1	41.7	38.4	39.6
% at doctoral level	30.6	31.0	30.8	31.4	32.8	33.6	33.9	34.0	34.6	35.0

Fig. 8: Supervision ratios at ETH Zurich and EPFL

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Supervision ratio										
at Bachelor's/Master's level	28.6	29.2	28.3	29.7	30.6	31.7	33.2	33.6	35.1	36.4
at doctoral level	7.8	7.7	7.6	7.8	7.7	7.7	8.0	8.0	7.8	7.6
Extended supervision ratio										
at Bachelor's/Master's level	19.3	19.8	19.2	20.0	20.7	21.5	22.5	22.8	23.9	24.6
at doctoral level	5.3	5.2	5.1	5.3	5.2	5.2	5.4	5.4	5.3	5.2

Fig. 9: Percentage of foreign nationals among students and doctoral students at ETH Zurich and EPFL

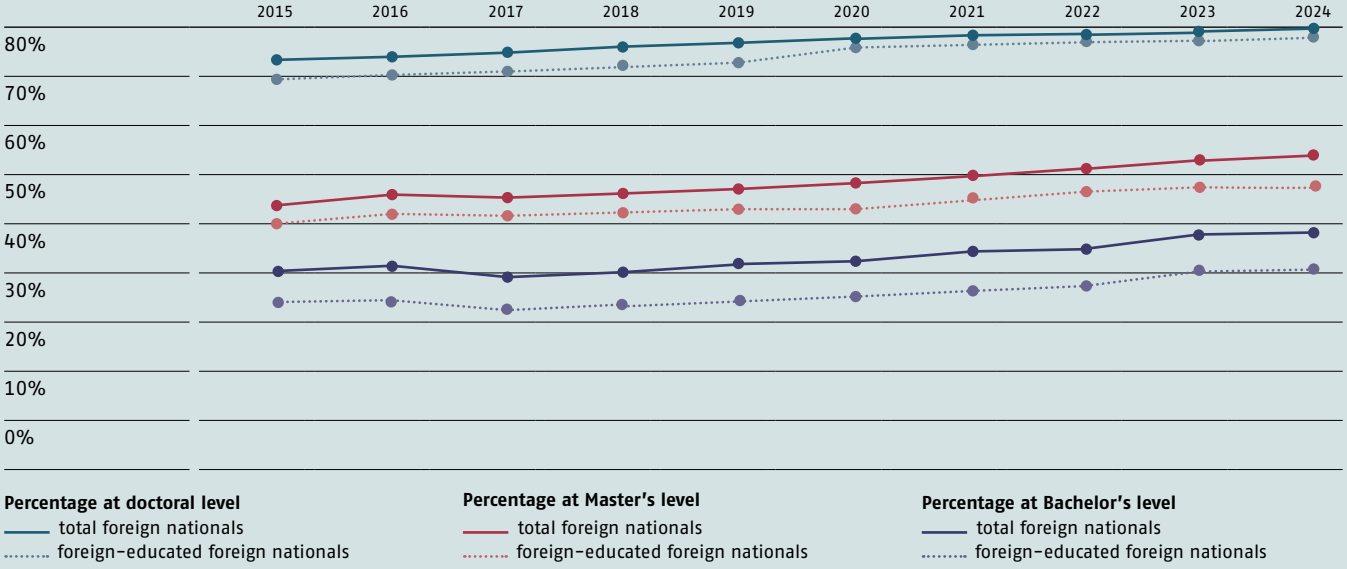


Fig. 10: Degrees awarded by academic level

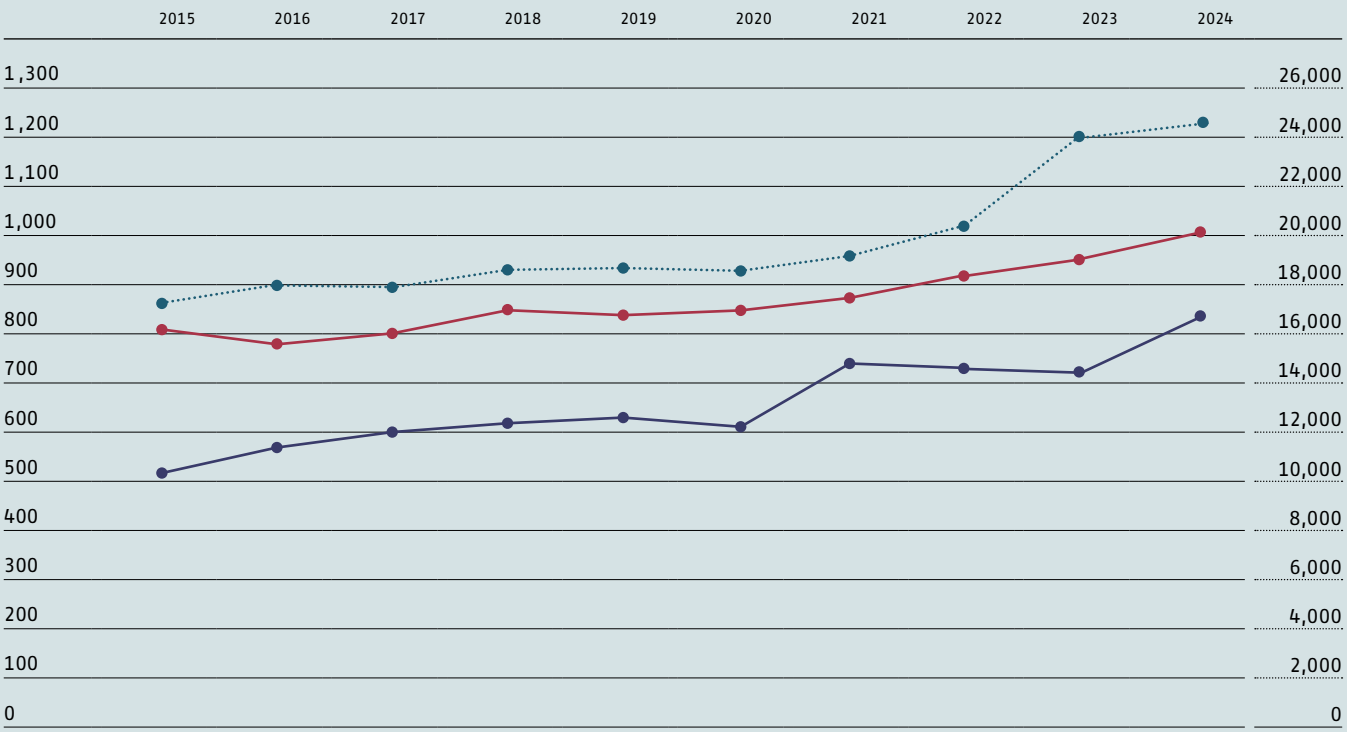
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Δ 2023 / 2024	
												in %
Bachelor	**2,528**	**2,500**	**2,602**	**2,686**	**2,876**	**3,007**	**3,213**	**3,148**	**3,356**	**3,824**	**468**	**13.9**
ETH Zurich	1,564	1,571	1,606	1,678	1,758	1,843	2,084	1,934	2,034	2,337	303	14.9
EPFL	964	929	996	1,008	1,118	1,164	1,129	1,214	1,322	1,487	165	12.5
Master	**2,821**	**2,989**	**3,065**	**3,240**	**3,368**	**3,344**	**3,898**	**3,760**	**3,998**	**4,398**	**400**	**10.0**
ETH Zurich	1,879	2,015	2,072	2,196	2,335	2,260	2,723	2,512	2,754	3,029	275	10.0
EPFL	942	974	993	1,044	1,033	1,084	1,175	1,248	1,244	1,369	125	10.0
MAS/MBA	**254**	**303**	**394**	**343**	**324**	**249**	**304**	**318**	**309**	**270**	**–39**	**–12.6**
ETH Zurich	175	203	272	232	245	160	219	236	236	208	–28	–11.9
EPFL	79	100	122	111	79	89	85	82	73	62	–11	–15.1
Doctorate	**1,109**	**1,256**	**1,258**	**1,209**	**1,290**	**1,171**	**1,257**	**1,458**	**1,403**	**1,367**	**–36**	**–2.6**
ETH Zurich	718	851	827	802	866	781	820	1,005	939	933	–6	–0.6
EPFL	391	405	431	407	424	390	437	453	464	434	–30	–6.5

Fig. 11: Visiting students

	2021		2022		2023		2024	
	Spring Semester	Autumn Semester	Spring Semester	Autumn Semester	Spring Semester	Autumn Semester	Spring Semester	Autumn Semester
Incoming								
at ETH Zurich	287	460	401	385	339	286	287	247
at EPFL	552	622	786	629	763	575	673	770
Outgoing								
from ETH Zurich	76	154	228	255	261	241	253	259
from EPFL	264	396	373	460	446	466	466	461

Since 2021, visiting students are no longer being counted in the student totals and now figure only in the table above per semester. It should be noted that the figures given per semester cannot be added together to obtain an annual total without counting students present during the two semester twice.

Fig. 12: Teaching and supervision by the research institutes



Left axis: Number of Bachelor's, Master's and Diploma projects supervised
Right axis: Number of teaching hours per year

Number of doctoral projects supervised
Number of Bachelor's, Master's and Diploma projects supervised
Number of teaching hours per year

A technical error occurred when collecting the data for 2023. The correct number of teaching hours for 2023 is 23,989, not 25,617, as published in the 2023 Annual Report.

Knowledge and technology transfer

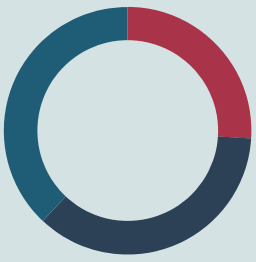
Fig. 13: Knowledge and technology transfer in the ETH Domain

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Invention disclosures[1]	**–**	**–**	**343**	**358**	**329**	**310**	**330**	**310**	**314**	**282**
ETH Zurich	–	–	171	205	159	165	169	142	172	141
EPFL	–	–	134	119	132	107	121	138	115	121
Research institutes	–	–	38	34	38	38	40	30	27	20
Software notifications[1,2]	**–**	**–**	**26**	**36**	**40**	**32**	**39**	**37**	**26**	**25**
ETH Zurich	–	–	20	19	26	18	24	28	11	15
EPFL	–	–	6	13	13	14	12	6	11	8
Research institutes	–	–	0	4	1	0	3	3	4	2
Patents	**219**	**230**	**206**	**230**	**224**	**217**	**213**	**227**	**187**	**222**
ETH Zurich	98	109	84	109	102	115	99	104	87	107
EPFL	88	100	95	95	98	75	88	95	86	90
Research institutes	33	21	27	26	24	27	26	28	14	25
Licences[3]	**311**	**353**	**377**	**341**	**324**	**338**	**181**	**180**	**156**	**137**
ETH Zurich	50	78	82	87	62	43	27	29	31	49
EPFL	48	58	50	39	50	53	40	43	45	36
Research institutes	213	217	245	215	212	242	114	108	80	52
Spin-offs	**48**	**50**	**48**	**55**	**59**	**66**	**60**	**54**	**69**	**64**
ETH Zurich	25	25	25	27	30	34	25	26	43	37
EPFL	18	20	15	25	23	25	32	21	21	24
Research institutes	5	5	8	3	6	7	3	7	5	3

[1] Invention disclosures and software notifications were introduced in 2017 as additional KTT indicators.
[2] Open Source Software not included.
[3] 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.

Licences

137



ETH Zurich	49
EPFL	36
Research institutes	52

Invention disclosures

282

Software notifications

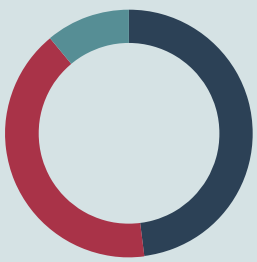
25

Spin-offs

64

Patents

222



ETH Zurich	107
EPFL	90
Research institutes	25

Fig. 14: Collaboration with the private and public sector

	2017	2018	2019	2020	2021	2022	2023	2024
Collaboration contracts with the private sector	**507**	**594**	**570**	**610**	**585**	**566**	**496**	**576**
of which financed by the private sector	**316**	**415**	**404**	**388**	**396**	**390**	**327**	**401**
ETH Zurich	122	149	163	143	172	171	138	191
EPFL	99	120	125	95	94	120	95	103
Research institutions	95	146	116	150	130	99	94	107
of which financed by Innosuisse/EU FPs *	**191**	**179**	**166**	**222**	**189**	**176**	**169**	**175**
ETH Zurich	57	74	55	72	72	62	59	58
EPFL	66	49	61	56	45	41	44	61
Research institutions	68	56	50	94	72	73	66	56
Collaboration contracts with the Swiss public sector	**285**	**261**	**278**	**262**	**272**	**281**	**263**	**245**
ETH Zurich	88	100	88	92	94	87	77	82
EPFL	54	43	51	47	46	42	29	43
Research institutions	143	118	139	123	132	152	157	120

Number of new cooperation agreements (research agreements and scientific services) with the private and Swiss public sector involving a volume of at least CHF 50,000 per contract. These indicators were introduced in 2017.
* EU FPs: European Framework Programmes for Research and Innovation.

KTT indicators and counting methods

The patents correspond only to first filing, and the licences also include technology transfer agreements. The invention disclosures and software notifications correspond to the reports and notifications submitted in writing to the Technology Transfer Offices of the institutions of the ETH Domain in the reporting period. They reflect activities in the early phases of the innovation process, thereby supplementing the other KTT indicators. Open Source Software is not considered.

In order to reflect the cooperation between the institutions and private enterprise and the public sector, only recently concluded cooperation agreements are included. These are only research contracts and scientific services with a volume of at least CHF 50,000 per contract.

Cooperation with the private sector is divided into two categories: projects that are directly financed by industry in Switzerland or abroad; and those funded by Innosuisse or the EU Research Framework Programmes for Research and Innovation (EU FPs). Cooperation with the public sector includes contracts with public sector institutions in Switzerland, but not those with national or international research funding organisations and foundations.

Rankings observed worldwide (see Fig. 15 and 16)

The universities are assessed and ranked by institutions and businesses using various methods. 2023, the THE (Times Higher Education World University Rankings) and QS (QS World University Rankings) rankings significantly changed their methodology. This must be taken into account when making comparisons with previous years.

THE uses 17 key performance indicators for teaching (29.5% weighting), research environment (29%), research quality (30%), international outlook (7.5%) and financing by the industry (4%). QS focuses mainly on reputation (with a 30% weighting on academic reputation and 15% on employer reputation), followed by citations (20%), internationality (15%) and the student–teacher ratio (10%), and ARWU (Academic Ranking of World Universities of ShanghaiRanking Consultancy) 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 (Centre for Science and Technology Studies Leiden Ranking) 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 World and Europe rankings of both Federal Institutes of Technology (see Fig. 15) are based on this indicator.

University rankings

Fig. 15: Rankings of ETH Zurich (blue) and EPFL (red) according to the THE, QS, ARWU and CWTS Leiden rankings in 2024/2025

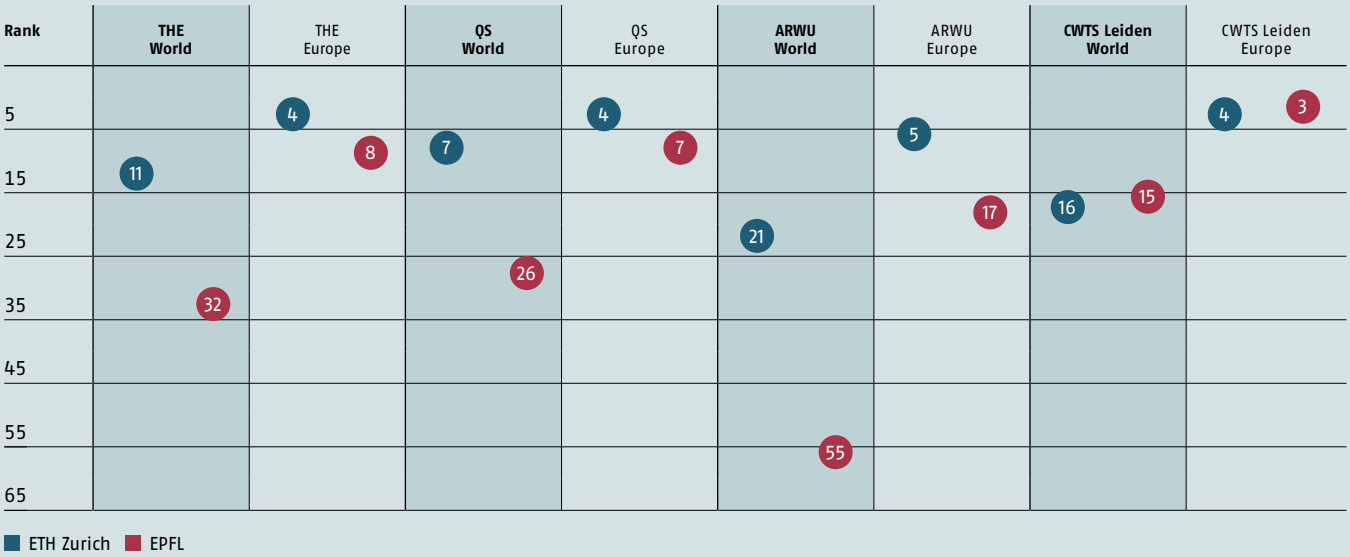
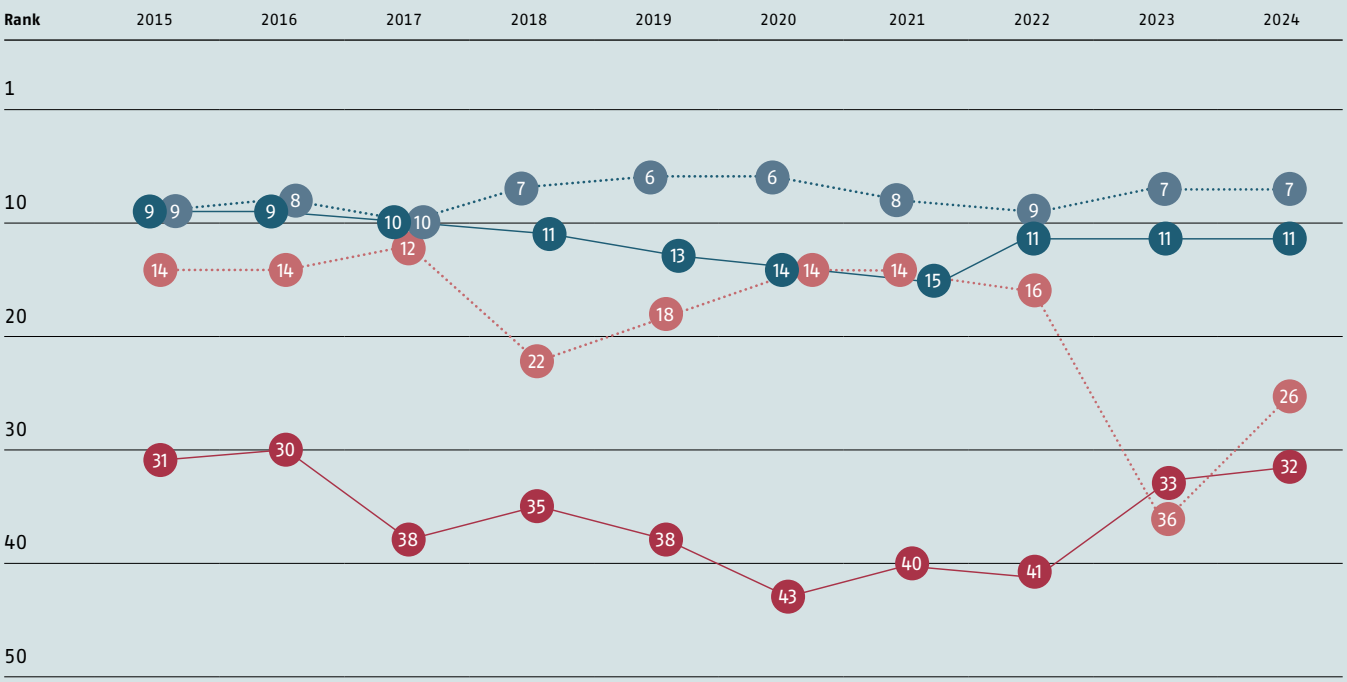


Fig. 16: Rankings of ETH Zurich (blue) and EPFL (red) according to the THE and QS World rankings 2015–2024



THE **Times Higher Education World University Rankings** from TES Global Limited, London
QS **QS World University Rankings** from Quacquarelli Symonds Limited, London
ARWU **Academic Ranking of World Universities** from ShanghaiRanking Consultancy
CWTS Leiden **CWTS Leiden Ranking** from the Centre for Science and Technology Studies (CWTS) of the University Leiden, Netherlands; indicator used: PP (top 10%) (see box on p. 100)

Personnel

Fig. 17: Headcount and employment level by function group

	Men			Women			ETH Domain		
2024	EC	FTE	ø EL %	EC	FTE	ø EL %	EC	FTE	ø EL %
Professors (F/A)	581	558.0	96.0	145	138.3	95.4	726	696.3	95.9
Assistant professors with tenure track	71	71.0	100.0	67	67.0	100.0	138	138.0	100.0
Assistant professors without tenure track	30	29.8	99.3	22	20.9	95.0	52	50.7	97.5
Scientific personnel	9,924	8,207.1	82.7	5,065	4,016.3	79.3	14,989	12,223.4	81.5
of whom senior scientific personnel	687	657.8	95.7	134	124.3	92.8	821	782.1	95.3
Technical personnel	3,350	3,125.9	93.3	1,000	813.7	81.4	4,350	3,939.6	90.6
Administrative personnel	1,465	1,268.7	86.6	2,800	2,152.3	76.9	4,265	3,421.0	80.2
Apprentices	327	326.5	99.8	148	148.0	100.0	475	474.5	99.9
Total	**15,748**	**13,587.0**	**86.3**	**9,247**	**7,356.5**	**79.6**	**24,995**	**20,943.5**	**83.8**

Headcount (employment contracts, EC) and employment level (EL) of men, women and the entire ETH Domain by function group. Senior scientists, maîtres d'enseignement et de recherche (MER) and other senior personnel are counted separately, but nevertheless are still included under scientific personnel. A total of 6,752 doctoral students are enrolled at the two Federal Institutes of Technology. Of these, all who are employed in the ETH Domain are included under scientific personnel.

Fig. 18: Development in the numbers of female and male professors

	2024			2023			Changes		
	Men	Women	Total	Men	Women	Total	Men in %	Women in %	Total in %
Professors (F/A)	581	145	726	579	136	715	0.3	6.6	1.5
Assistant professors with tenure track	71	67	138	78	62	140	−9.0	8.1	−1.4
Assistant professors without tenure track	30	22	52	34	17	51	−11.8	29.4	2.0
Total professors	**682**	**234**	**916**	**691**	**215**	**906**	**−1.3**	**8.8**	**1.1**

Change in the number of professors according to: full and associate professors, assistant professors with tenure track and assistant professors without tenure track. The three last columns show the percentage change since the previous year.

Professorial categories

The various professorial categories differ with regard to status and employment conditions. Full (F) and associate (A) professors, and assistant professors with and without tenure track (TT) teach and undertake research at both Federal Institutes of Technology. Professors with TT can become permanently employed as full or associate professors if they meet a certain performance target. Full and associate professors are appointed permanently, while assistant professors sign employment contracts for four years. The latter can be renewed for a maximum of another four years; in the case of parenthood or for any other just cause, it is possible to renew the employment contacts for up to another year.

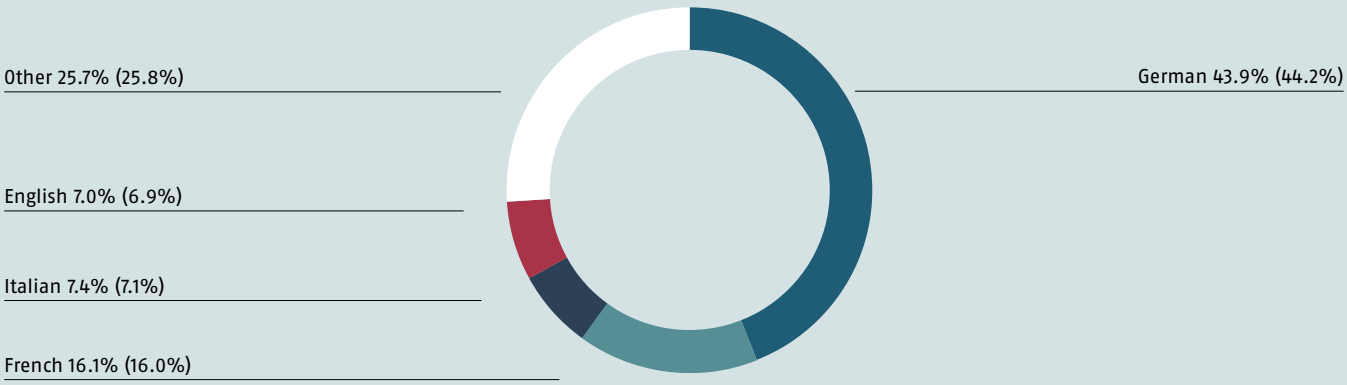
In the context of cooperating with other universities and research institutions, there is the option of a dual professorship and the appointment of affiliated professors with a low FTE level.
In recognition of outstanding performance in teaching and research, the title of adjunct professor may be conferred on senior scientific staff (senior scientists/Maîtres d'enseignement et de recherche, MER). Since 2022, the ETH Board has been able to award the title of Professor of Practice to external persons who have extensive professional experience and have excelled in their field. They take on teaching duties.
The ordinance concerning professors does not apply to these persons.

Fig. 19: Country of origin of male and female professors

	Switzerland			EU			Other		
	Men	Women	Total	Men	Women	Total	Men	Women	Total
Professors (F/A)	222	51	273	261	70	331	98	24	122
Assistant professors with tenure track	9	8	17	39	26	65	23	33	56
Assistant professors without tenure track	7	5	12	13	11	24	10	6	16
Total professors	**238**	**64**	**302**	**313**	**107**	**420**	**131**	**63**	**194**

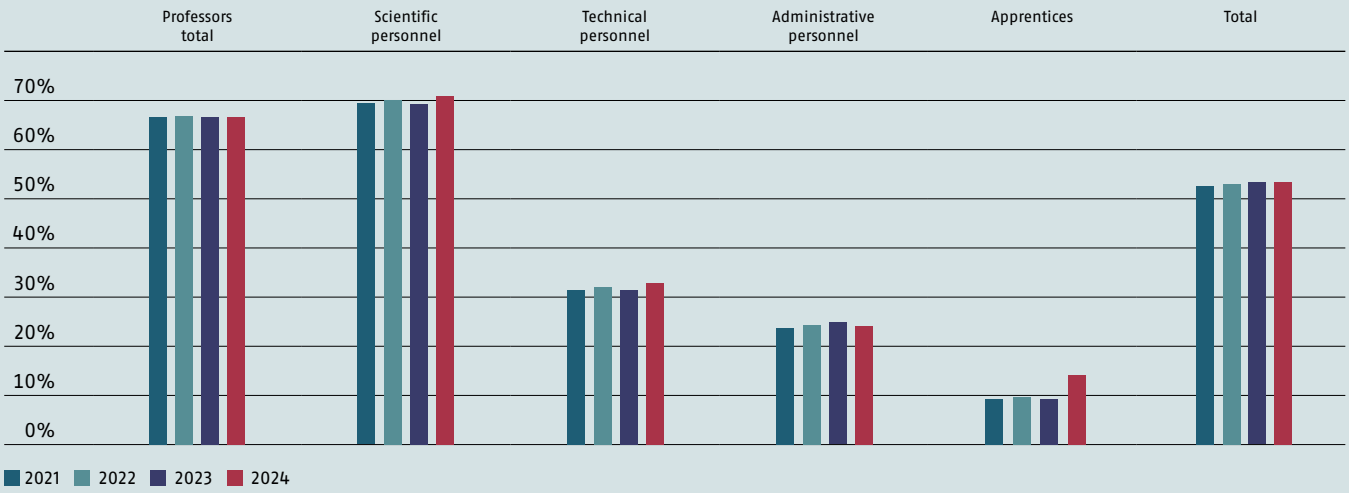
Number of professors broken down by origin: Switzerland, the EU and other countries.

Fig. 20: Employees' native languages 2024



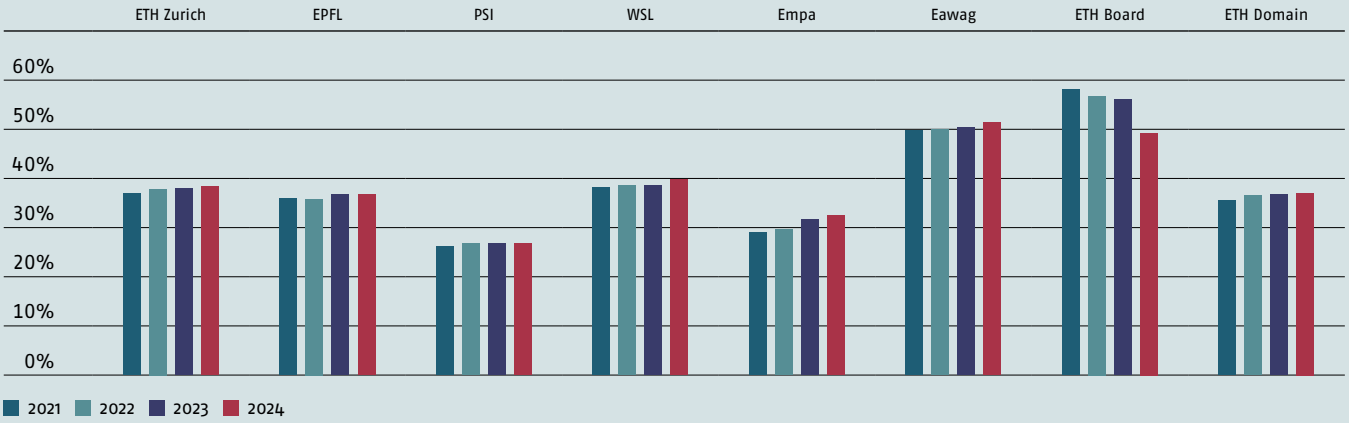
Native languages of employees in the ETH Domain in 2024. Figures for the previous year are shown in brackets.

Fig. 21: Development in the proportions of foreign employees by function group



Development in the proportions of foreign employees in the ETH Domain by function group (in relation to the number of employment contracts, EC).

Fig. 22: Development in the proportion of women by institution



Development in the proportion of women by institution over the past four years (in relation to the number of employment contracts, EC).

Fig. 23: Development in the proportion of women in management positions in the ETH Domain

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Management positions	2,643	2,697	2,745	2,767	2,793	2,810	2,853	2,897	2,928	2,982	3,049	3,061	3,065	3,071
Women	413	445	464	492	507	521	561	576	610	644	693	733	760	783
Men	2230	2252	2,281	2,275	2,286	2,289	2,292	2,321	2,318	2,338	2356	2328	2305	2288
in % women	**15.6**	**16.5**	**16.9**	**17.8**	**18.2**	**18.5**	**19.7**	**19.9**	**20.8**	**21.6**	**22.7**	**23.9**	**24.8**	**25.5**
in % men	84.4	83.5	83.1	82.2	81.8	81.5	80.3	80.1	79.2	78.4	77.3	76.1	75.2	74.5

Development of the proportion of women in management positions in figures and percentages, i e. function level 10 to 15 and professorship (with employment contracts, EC)

Fig. 24: Source of funds by function group

Function group		Professors (all)	Scientific personnel	Technical personnel	Administrative personnel	Total FTE
Source of funds						
Total federal contribution Federal financial contribution	2023	786.5	6,110.7	3,160.6	2,978.1	13,035.9
	2024	788.5	5,856.5	3,191.5	2,962.8	12,799.3
	Δ 2023 / 2024	2.0	−254.2	30.9	−15.3	−236.6
Third-party resources Research funding (SNSF, Innosuisse, further), government-funded research and EU research programmes	2023	35.6	4,272.7	274.6	88.2	4,671.1
	2024	35.5	4,325.3	277.8	93.6	4,732.2
	Δ 2023 / 2024	−0.1	52.6	3.2	5.4	61.1
Industry-oriented research, donations/bequests	2023	53.9	1,963.4	461.7	345.0	2,824.0
	2024	61.0	2,041.9	470.5	364.1	2,937.5
	Δ 2023 / 2024	7.1	78.5	8.8	19.1	113.5
Total	2023	876.0	12,346.8	3,896.9	3,411.3	20,531.0
	2024	885.0	12,223.7	3,939.8	3,420.5	20,469.0
	Δ 2023 / 2024	9.0	−123.1	42.9	9.2	−62.0

Source of funds according to function groups (in FTEs) in 2024 compared to 2023. Δ (delta) shows the absolute change compared to the previous year. Figures exclude apprentices (474.5 FTEs) and trainees.

Real estate

Fig. 25: Source of funds for ETH Domain construction (in CHF millions)

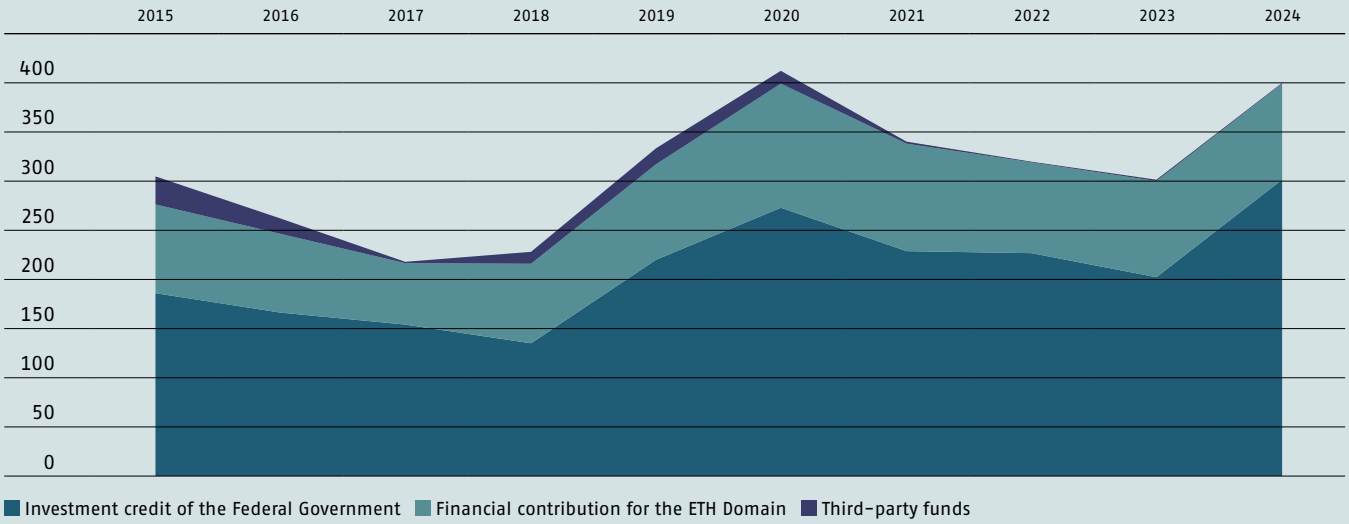
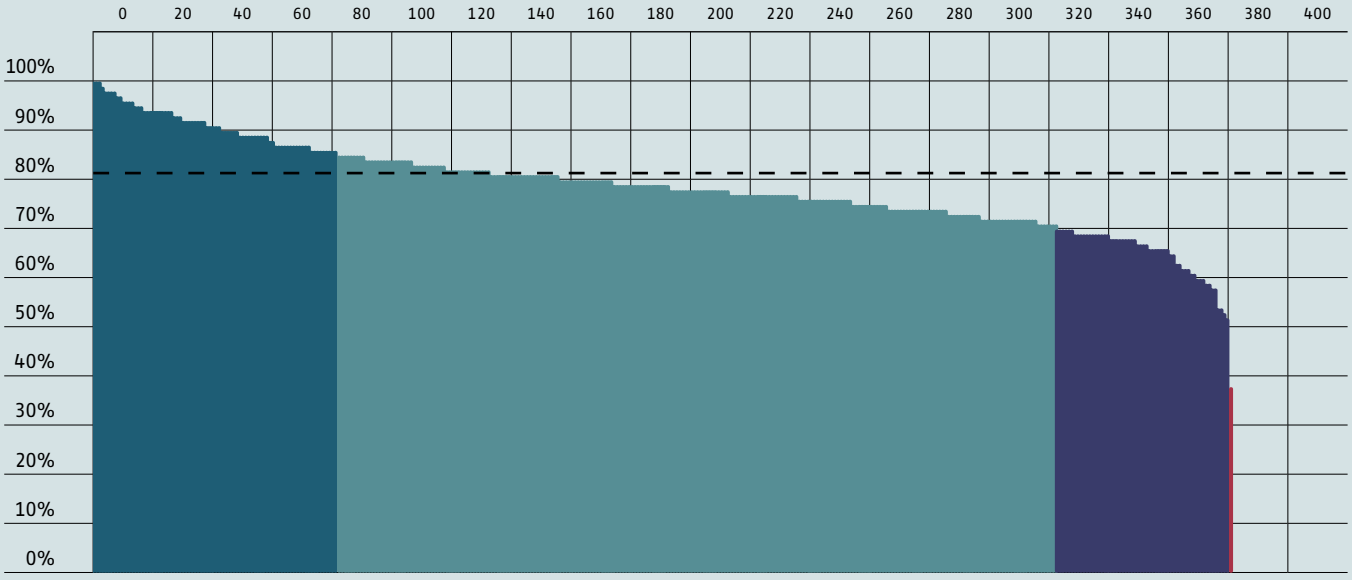


Fig. 26: Condition value as of 31 December 2024



Number of properties recorded: 382

Very good condition, as new
Good condition, no measures needed
Average weighted by original value of properties: 80.3%
Average condition, plan and implement measures
Poot condition, measures needed

Fig. 27: Development of the main usable area by institution in %

Fig. 28: Mix of areas (in 1,000 m²)

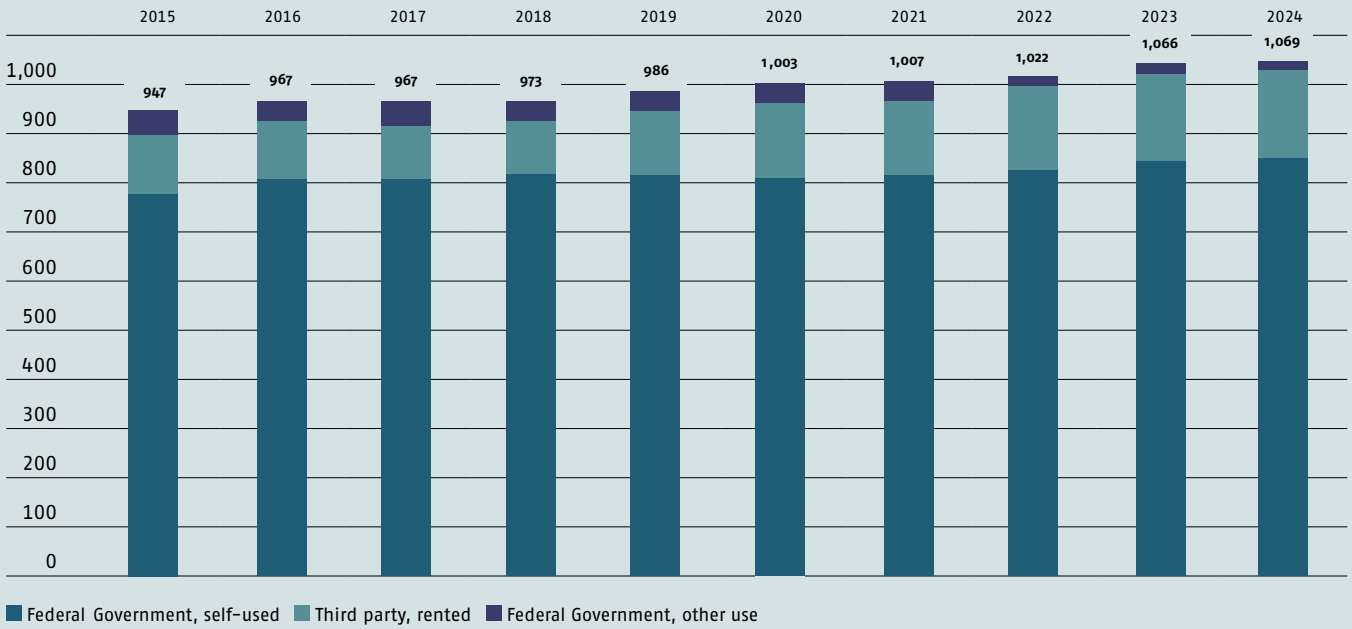


Fig. 29: Quantity structure of the ETH Domain portfolio

CHF millions	ETH Zurich	EPFL	PSI	WSL	Empa	Eawag	Total
Buildings							
Quantity	131	78	132	22	27	15	405
Original value	4,080	1,787	642	112	457	128	7,206
Book value	1,555	766	175	43	148	58	2,745
Plots							
Quantity	63	19	10	16	4	4	116
Book value	692	243	30	24	63	10	1,063
Book value of installations under construction	274	182	56	1	0	7	521
Building rights (not valuated, in compliance with regulations)							0
Total assets (book value real estate)	**2,522**	**1,191**	**261**	**68**	**211**	**76**	**4,329**
Provisions (e.g. for polluted sites, asbestos, radioactive waste)							226

Quantity and value of all government-owned real estate allocated to the institutions of the ETH Domain.

Fig. 30: Investments

CHF 1,000	ETH Zurich	EPFL	PSI	WSL	Empa	Eawag	Total
Investment credit from Federal Government	84,500	174,710	32,500	740	5,820	1,120	299,390
of which for new or replacement constructions	36,986	149,606	23,010	31	4,740	30	214,404
of which for maintenance of value and functionality	47,514	25,104	9,490	709	1,080	1,090	84,986
Financial contribution investments (for user-specific construction)	56,346	15,012	14,803	384	4,908	5,162	96,615
Third-party resources	0	0	0	0	1,031	0	1,031
Construction expenses of the Institutions	140,846	189,722	47,303	1,124	11,759	6,282	397,036
Main usable area (m²)	543,070	294,740	127,530	18,920	64,880	19,530	1,068,670
Construction expenses per m² main usable area (CHF/m²)	259	644	371	59	181	322	372

2024 investments in the ETH Domain portfolio, based on the main usable area (in m²). This is the part of the usable area that is directly allocated to the core task of teaching and research. Because the research institutes themselves do not provide teaching, a figure for the area across the entire Domain – for example in relation to the number of students – would not be very informative.

Environment and energy

Fig. 31: Environment and energy data

		ETH Domain 2022	ETH Domain 2023	ETH Zurich	EPFL	PSI	WSL	Empa	Eawag	ETH Domain trend 2024[1]
BASIC DATA										
Energy reference area (ERA)[2]	m²	1,531,435	1,560,271	764,941	436,705	173,919	27,032	123,442	34,232	1,562,951
Full-time equivalent[3]	FTE	42,679	43,436	24,822	13,582	2,176	909	1,205	742	44,758
ENERGY[4]										
Final energy, net[5]	**kWh/a**	**457,436,376**	**435,062,741**	**194,195,690**	**82,525,175**	**133,450,621**	**4,497,134**	**17,044,637**	**3,349,484**	**412,041,156**
Electricity, net (not incl. self-produced)	**kWh/a**	**366,793,941**	**356,480,689**	**141,788,000**	**70,081,136**	**127,603,288**	**3,374,128**	**10,435,026**	**3,199,111**	**350,712,152**
Consumption of uncertified electricity	kWh/a	59,073,646	65,063,000	0	65,063,000	0	0	0	0	
Consumption of certified electricity	kWh/a	305,475,091	289,373,667	140,935,000	4,794,000	127,316,200	3,248,838	10,038,980	3,040,649	
Electricity (without naturemade star)	kWh/a	280,764,344	277,133,430	136,935,000	0	127,061,869	840,516	12,296,045	0	
Photovoltaic naturemade star	kWh/a	2,374,300	329,898	0	0	254,331	0	0	75,567	
Hydropower naturemade star	kWh/a	24,381,839	14,167,404	4,000,000	4,794,000	0	2,408,322	0	2,965,082	
Wind naturemade star	kWh/a	0	0	0	0	0	0	0	0	
Sale of electricity	kWh/a	−2,045,392	−2,257,065	0	0	0	0	−2,257,065	0	
Heat	**kWh/a**	**91,037,637**	**78,863,262**	**52,569,000**	**12,451,000**	**5,951,820**	**740,750**	**6,841,857**	**308,835**	
Fuel oil	kWh/a	4,662,653	5,395,955	4,763,000	246,000	324,820	52,605	0	9,530	
Natural gas, biogas	kWh/a	57,774,308	45,794,032	30,696,000	10,422,000	0	0	4,379,476	296,556	
District heating	kWh/a	49,942,682	48,008,879	37,841,000	1,783,000	5,627,000	0	2,755,130	2,749	
Woodchip	kWh/a	809,585	688,145	0	0	0	688,145	0	0	
Sale of heat	kWh/a	−22,151,591	−21,023,749	−20,731,000	0	0	0	−292,749	0	
Fuel (own vehicles)	**kWh/a**	**1,850,002**	**1,762,812**	**691,690**	**217,175**	**182,601**	**507,546**	**163,800**	**0**	
Energy: additional information										
Energy costs, electricity and heat[6]	CHF/a	61,970,289	126,899,519	48,928,246	56,317,570	17,395,075	629,056	3,015,070	614,502	111,624,469
Self-generated renewable electricity	kWh/a	2,245,204	2,044,022	853,000	224,136	287,088	125,290	396,046	158,462	
Total sale to third parties	kWh/a	−23,680,392	−22,988,065	−20,731,000	0	0	0	−2,257,065	0	
WATER (DRINKING WATER)	m³	563,946	682,417	268,882	302,736	52,503	8,162	22,509	27,625	647,884
MATERIALS										
Paper	**kg**	**200,167**	**180,390**	**80,000**	**71,351**	**17,850**	**4,151**	**4,467**	**2,571**	**157,904**
Paper, new fibre	kg	53,122	41,049	12,500	16,387	11,264	439	354	105	29,414
Paper, recycled	kg	147,045	139,341	67,500	54,964	6,586	3,712	4,113	2,466	128,490
KEY FIGURES: ENVIRONMENTAL IMPACT										
Primary energy[7]	**kWh/a**	**545,703,245**	**627,898,422**	**221,740,106**	**214,023,473**	**161,101,308**	**5,650,636**	**21,019,867**	**4,363,033**	
Proportion of renewable energies	**%**	**72**	**72**	**61**	**16**	**77**	**81**	**64**	**94**	
CO_2 emissions[8]	**t CO_2/a**	**27,385**	**23,492**	**12,041**	**9,545**	**656**	**268**	**981**	**0**	

1 Provisional figures for the year under review (trend), as at: start of March 2025.
2 The energy reference area is the sum of all gross floor areas, above and below ground, which must be heated or air-conditioned in order to be used.
3 The FTE (full-time equivalent) value listed here was supplemented by the number of students with an FTE value of 0.68 to produce the consumption per person.
4 The key figures indicated for electricity and heat show the total consumption of both for buildings, as well as for teaching and research activities.
5 Final energy is the portion of the primary energy that is left after losses due to energy conversion and transmission, after it is supplied via the consumer's domestic connection. The final energy basically corresponds to the energy that is purchased.
6 The key indicator "energy costs" shows all expenditure (cash out) for the provision of energy (heat and electricity).
7 In energy economics, one refers to primary energy as the energy that is available using the original forms or resources of energy, such as fuel (e. g. coal or natural gas), as well as energy carriers such as sun, wind or nuclear fuels.
8 CO_2 emission factors according to Ecoinvent version 3.71.

FINANCES

* Extract of the Financial Report 2024.

Financial Report:
www.ethboard.ch/financialreport2024

Consolidated financial statements

Table 1: Statement of financial performance of the ETH Domain (consolidated)

CHF millions	Notes	Budget 2024	Actual 2024	Actual 2023	Change to Actual absolute
Federal financial contribution		2,449	2,449	2,535	–86
Federal contribution to accommodation		203	203	195	8
Total federal contribution	**7**	**2,652**	**2,652**	**2,730**	**–78**
Tuition fees, continuing education	**8**	**62**	**61**	**61**	**–**
Swiss National Science Foundation (SNSF), regular research funding		304	278	272	6
Swiss National Science Foundation (SNSF), transitional measures Confederation		n/a	29	15	14
Swiss Innovation Agency (Innosuisse), regular research funding		46	45	47	–2
Swiss Innovation Agency (Innosuisse), transitional measures Confederation		n/a	1	1	–
Special federal funding of applied research, regular research funding		94	87	90	–3
Special federal funding of applied research, transitional measures Confederation		n/a	10	2	8
EU Framework Programmes for Research and Innovation (EU FPs), regular research funding		130	65	106	–40
EU Framework Programmes for Research and Innovation (EU FPs), transitional measures Confederation		n/a	81	43	38
Industry-oriented research (private sector)		144	142	140	2
Other project-oriented third-party funding (incl. cantons, municipalities, international organisations)		105	110	106	4
Research contributions, mandates and scientific services	**9**	**823**	**848**	**822**	**26**
Donations and bequests	**10**	**109**	**131**	**159**	**–28**
Other revenue	**11**	**134**	**169**	**155**	**14**
Operating revenue*		**3,780**	**3,862**	**3,929**	**–67**
Personnel expenses	5, 12, 28	2,595	2,622	2,549	73
Other operating expenses	13	1,014	1,044	1,037	7
Depreciation	21, 23	321	328	296	32
Transfer expenses	14	38	63	62	–
Operating expenses		**3,968**	**4,057**	**3,944**	**113**
OPERATING RESULT		**–189**	**–195**	**–16**	**–179**
NET FINANCE INCOME/EXPENSE*	**15**	**9**	**37**	**30**	**7**
Share of surplus/deficit of associated entities and joint ventures *	20	–	14	8	6
SURPLUS (+) OR DEFICIT (-)		**–180**	**–144**	**23**	**–166**
Total revenue*		3,788	3,913	3,967	–54

Table 2: Balance sheet of the ETH Domain (consolidated)

CHF millions	Notes	31.12.2024	31.12.2023	Change absolute
CURRENT ASSETS				
Cash and cash equivalents	16	633	1,061	–428
Current receivables from non-exchange transactions	17	775	697	79
Current receivables from exchange transactions	17	54	65	–10
Current financial assets and loans	22	1,401	1,124	277
Inventories	18	13	12	1
Prepaid expenses and accrued income	19	77	60	17
Total current assets		**2,953**	**3,018**	**–65**
NON-CURRENT ASSETS				
Property, plant and equipment	21	2,137	2,136	1
Intangible assets	21	64	60	4
Non-current receivables from non-exchange transactions	17	1,242	1,098	144
Non-current receivables from exchange transactions	17	–	–	–
Investments in associated entities and joint ventures	20	267	254	14
Non-current financial assets and loans	22	84	80	4
Co-financing	23	100	105	–4
Total non-current assets		**3,894**	**3,732**	**162**
TOTAL ASSETS		**6,847**	**6,750**	**97**
LIABILITIES				
Current liabilities	24	223	217	7
Current financial liabilities	25	152	17	135
Accrued expenses and deferred income	26	213	200	13
Short-term provisions	27	98	97	1
Short-term liabilities		**687**	**531**	**156**
Dedicated third-party funds	29	1,942	1,697	245
Non-current financial liabilities	25	239	373	–134
Net defined benefit liabilities	28	596	497	99
Long-term provisions	27	511	519	–8
Long-term liabilities		**3,289**	**3,087**	**202**
Total liabilities		**3,976**	**3,618**	**358**
EQUITY				
Valuation reserves		392	508	–117
Reserves from associated entities	20	267	254	14
Donations, grants, co-financing		1,050	1,024	26
Other equity		1,162	1,346	–184
Total equity		**2,871**	**3,133**	**–261**
TOTAL LIABILITIES AND EQUITY		**6,847**	**6,750**	**97**

Total federal contribution

There are two views of the total federal contribution in the ETH Domain: according to the statement of financial performance and according to the expenditure ceiling.

The **statement of financial performance** on page 110 shows the surplus (+) or deficit (–) of the ETH Domain in accordance with IPSAS, i.e. all revenue and expenses shown therein are recognised on an accrual basis. In the statement of financial performance, the total federal contribution is made up of the federal financial contribution credit (A231.0181) and the federal contribution to accommodation credit of the ETH Domain (A231.0182) (see Fig. 32 on p. 113: Credits in the statement of financial performance). The federal financial contribution funds the operation of the ETH Domain and the accommodation contribution covers the costs for the use of federally owned real estate, which are recognised in the same amount as other operating expenses. In the reporting period, the total federal contribution in the statement of financial performance amounted to CHF 2,652.0m.

The ERI Dispatch contains the annual expenditure credit for the ETH Domain in the four-year **expenditure ceiling**. This is made up of the federal financial contribution credit (A231.0181) and the investments in buildings of the ETH Domain credit (A202.0134) (see Fig. 33 on p. 113: Credits in the expenditure ceiing). In the reporting period, the total federal contribution attributable to the expenditure ceiling totalled CHF 2,747.9m.

An explanation of the total federal contribution from the perspective of the credits approved annually by Parliament is provided below. The ERI period 2021–2024 is also analysed as a whole.

The ETH Domain's expenditure ceiling for the 2021–2024 period

In the ERI Dispatch 2021–2024, the Federal Council requested an expenditure ceiling of CHF 10,810.7m for the ETH Domain for the implementation of the Strategic Plan 2021–2024. This corresponds to average annual growth of 2.5% (based on the proposed 2020 budget of CHF 2,556.2m). The expenditure ceiling for the period from 2021 to 2024 was approved on 10 December 2020 with FedD 4 concerning ERI Dispatch 2021–2024 (FedD I 2021 72). This includes the costs of CHF 11m per year for the dismantling and disposal of the accelerator facilities at PSI.

Utilisation of the expenditure ceiling 2021–2024

With the annual budget resolutions from 2021 to 2024, Parliament approved a total of CHF 10,750.2m in credits for the ETH Domain. This corresponds to average annual growth of 1.8%, compared with the planned 2.5%.

The ETH Domain has therefore not utilised CHF 60.5m of the credits attributable to the expenditure ceiling (see Fig. 34 on p. 113). Both increases and reductions in the annual approved credit tranches contributed to this amount. The reductions include the budget cuts and deductions (CHF –62.6 m) and the non-balanced inflation adjustment (CHF –41.9m), in particular no inflation adjustment for 2024. The increases include the transfer of the CSS budget to the budget of the ETH Domain (CHF +9.0m), income from the adjustment of the real estate portfolio (CHF +21.6m) and increases in the investment credit for the dismantling and disposal of the nuclear facilities of the Federal Government at PSI (CHF +13.4m). The increases totalling CHF 35.0m had no ceiling-increasing effect due to the cuts totalling CHF 104.5m.

Approved credits in 2024

The Federal Assembly approved CHF 2,747.9m in FedD Ia for the 2024 budget for the two credits that count towards the expenditure ceiling. Compared with the 2023 financial statements (CHF 2,736.0m), the increase was CHF 11.9m. The federal financial contribution (credit A231.0181) amounted to CHF 2,448.6m and the investment credit to CHF 299.4m. As no dedicated reserves were created or released for the investment credit, the ETH Domain received a total of CHF 2,747.9m from the total federal contribution (2023: CHF 2,736.2m).

Fig. 32: Credits in the statement of financial performance

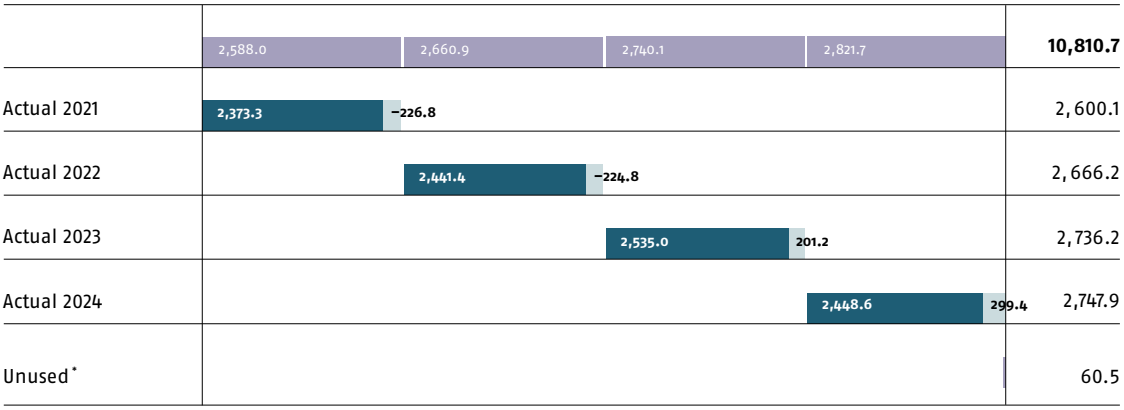
CHF millions	
Federal financial contribution (A231.0181)	2,448.6
Federal contribution to accommodation ETH Domain (A231.0182)	203.4
Total federal financial contribution financial performance view	**2,652.0**

Fig. 33: Credits in the expenditure ceiling

CHF millions	
Federal financial contribution (A231.0181)	2,448.6
Investments in buildings of the ETH Domain (A202.0134)	299.4
Total federal financial contribution expenditure ceiling view	**2,747.9**

Fig. 34: Expenditure ceiling and credits for the ETH Domain in the ERI period 2021–2024

CHF millions



* The utilisation of the expenditure ceiling for the period 2021–2024 amounts to CHF 10,750.2m. This corresponds to an average annual growth rate of 1.8%, compared with 2.5% planned for the expenditure ceiling.

A231.0181 Federal financial contribution
A202.0134 Investments in buildings of the ETH Domain

Publication data

Publisher: ETH Board, Häldeliweg 15, 8092 Zurich /
Hirschengraben 3, 3011 Bern, Switzerland
Project lead and editorial office: Communication ETH Board,
kommunikation@ethrat.ch
Graphical concept: Hej AG, Zurich
Graphic realisation: Linkgroup AG, Zurich
Reports: Roland Fischer, Basel, as well as the institutions
of the ETH Domain and the Communication department
of the ETH Board
Photography: Kellenberger Photographie, Stäfa
or as per image credits
Cover photo: Andreas Eggenberger, Zurich
Translation and proofreading: Diction AG, Buchs
Publishing system: mms solutions AG, Zurich
Printing: Cavelti AG, Gossau
Editorial deadline: 14 March 2025

The Annual Report is published in German, French and
English. The German version of the annual financial statements
shall be binding. The Annual Report is available electronically at
www.ethboard.ch/annualreport2024.

Rounding differences: The financial totals or figures presented in this document may not correspond precisely to the amounts shown in the tables. These amounts are calculated on the basis of nonrounded figures and may differ from a value based on rounded figures shown in the tables.

Special thanks are due to the following people for their contributions and involvement:
- all scientists in the ETH Domain's institutions in the preparation of the reports,
- the members of the ISP Group of the ETH Domain (Implementation of Strategic Planning),
- the members of the ETH Domain ComTeam (Heads of Communication and their staff),
- the departmental heads and employees of the ETH Board staff and of the institutions of the ETH Domain.

ETH BOARD

The ETH Domain consists of the two Swiss Federal Institutes of Technology ETH Zurich and EPFL as well as the four federal research institutions, the Paul Scherrer Institute PSI, WSL, Empa and Eawag. Appointed by the Federal Council, the ETH Board is the strategic governing and supervisory body of the ETH Domain.

www.ethboard.ch

The Institutions of the ETH Domain:

ETH Zurich
Around 525 professors, about 26,200 undergraduate and doctoral students, approx. 3,340 technical and administrative staff members, and around 6,620 scientific employees from about 120 countries: they all research, teach, learn and work at ETH Zurich. Networked globally with the scientific community, and rooted in Switzerland via National Centres of Competence in Research. Over 7,000 young people graduate every year, bringing the latest knowledge to Swiss companies. Or they found one of the dozens or so spin-offs established each year in industries with a promising future such as nanotechnology, medtech, cyber security or IT. www.ethz.ch

EPFL
With its dynamic community of about 19,000 people, EPFL has created a unique spirit of curiosity and an atmosphere of open dialogue. It provides its students with solid technical knowledge while encouraging them to develop their imagination, creativity and entrepreneurial spirit in interdisciplinary projects. At its various locations, EPFL has a strong research community that works on topics such as data science, personalised health and robotics. The knowledge and technology transfer ensures that this research finds its way into society. EPFL is an important driver of innovation in Switzerland and offers solutions to climate change and the ageing population – for the benefit of humanity as a whole. www.epfl.ch

PSI
The Paul Scherrer Institute PSI is the largest research institute for natural and engineering sciences in Switzerland. Its research is focused on four main topics: future technology, energy and climate, health innovation and fundamentals of nature. The PSI develops, builds and operates complex, large-scale research facilities. Every year, more than 3,000 researchers from Switzerland and all over the world come to conduct experiments at the unique facilities that are not possible anywhere else. www.psi.ch

Swiss Federal Institute for Forest, Snow and Landscape Research WSL

WSL
WSL investigates changes to the terrestrial environment and the use and protection of natural habitats and cultural landscapes. It monitors and researches the condition and progress of forests, landscapes, biodiversity, natural hazards and snow and ice, and develops sustainable solutions for socially relevant problems. WSL is an international leader in these areas of research and provides the basis for sustainable environmental policy in Switzerland. WSL also includes the WSL Institute for Snow and Avalanche Research SLF Davos. www.wsl.ch

Materials Science and Technology

Empa
Empa is the interdisciplinary research institute of the ETH Domain for materials science and technology. On the basis of its research, it develops innovative solutions to meet the biggest challenges currently facing industry and society, and therefore plays a significant role in reinforcing the international capacity and competitiveness of Swiss industry in an increasingly competitive environment. www.empa.ch

aquatic research

Eawag
Eawag is one of the world's leading water research institutes. Its strength and success are based on the combination of research, teaching and further education that it has provided for about 90 years, along with consultancy and the transfer of knowledge. The combination of natural sciences, engineering and social sciences enables comprehensive research into water in relatively untouched rivers and lakes, right through to wastewater management systems. www.eawag.ch

Cover page

Access to medical knowledge should be a universal right: medical doctor and EPFL professor Mary-Anne Hartley co-developed the MEDITRON language model for medical knowledge (see also p. 19 et seq.).

ETH Board
Board of the Swiss Federal
Institutes of Technology

Zurich:
Häldeliweg 15
8092 Zurich
Switzerland

Bern:
Hirschengraben 3
3011 Bern
Switzerland

www.ethboard.ch