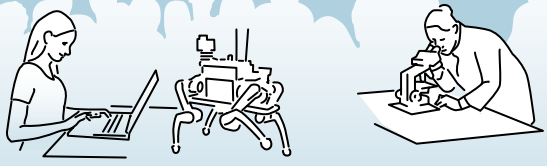
ETH zürich

Annual report 2020

ETH IN FIGURES

STUDENTS
headcount (rounded)



23,420
students

from **121** countries

of which **640**
MAS/MBA students
(incl. teaching diploma)

33.2%
women

of which **4,320**
doctoral students

STAFF HEADCOUNT
full-time equivalents,
annual average (rounded)

34.6%
women

6,400
scientific staff

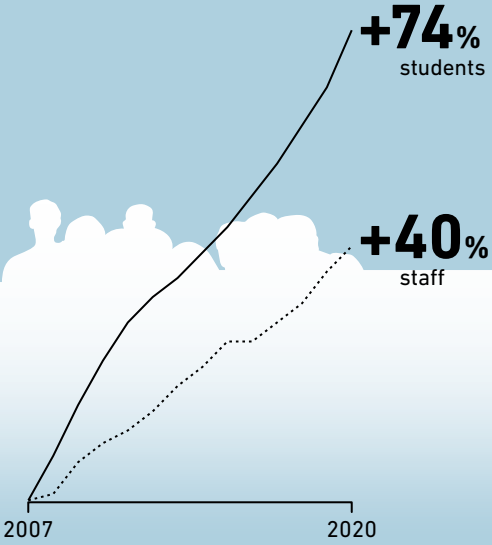
170
apprentices

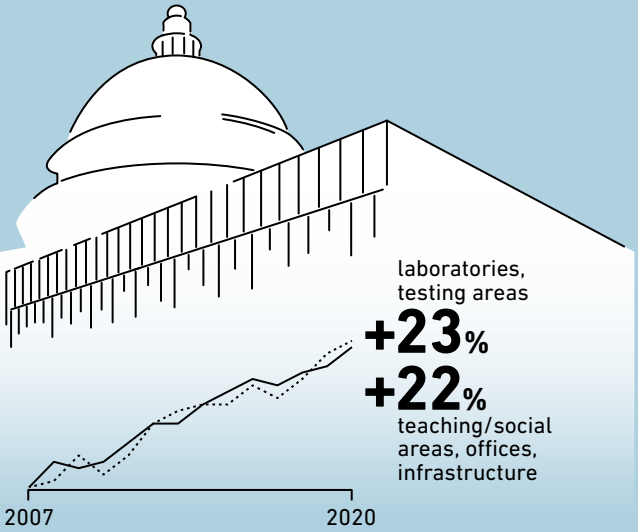
520
professors

3,000
technical and administrative staff

+2.6%
increase
in staff
vs. 2019

INCREASE IN PEOPLE AND FACILITIES

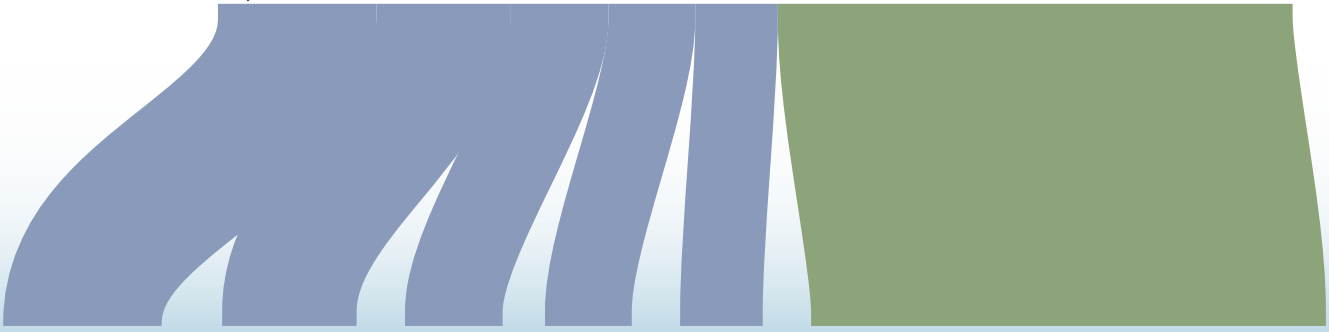




NEW STUDENTS

Bachelor's programmes with the most entrants

3,357 new Bachelor's students



495 BSc in Mechanical Engineering

420 BSc in Computer Science

305 BSc in Architecture

271 BSc in Health Sciences and Technology

258 BSc in Physics

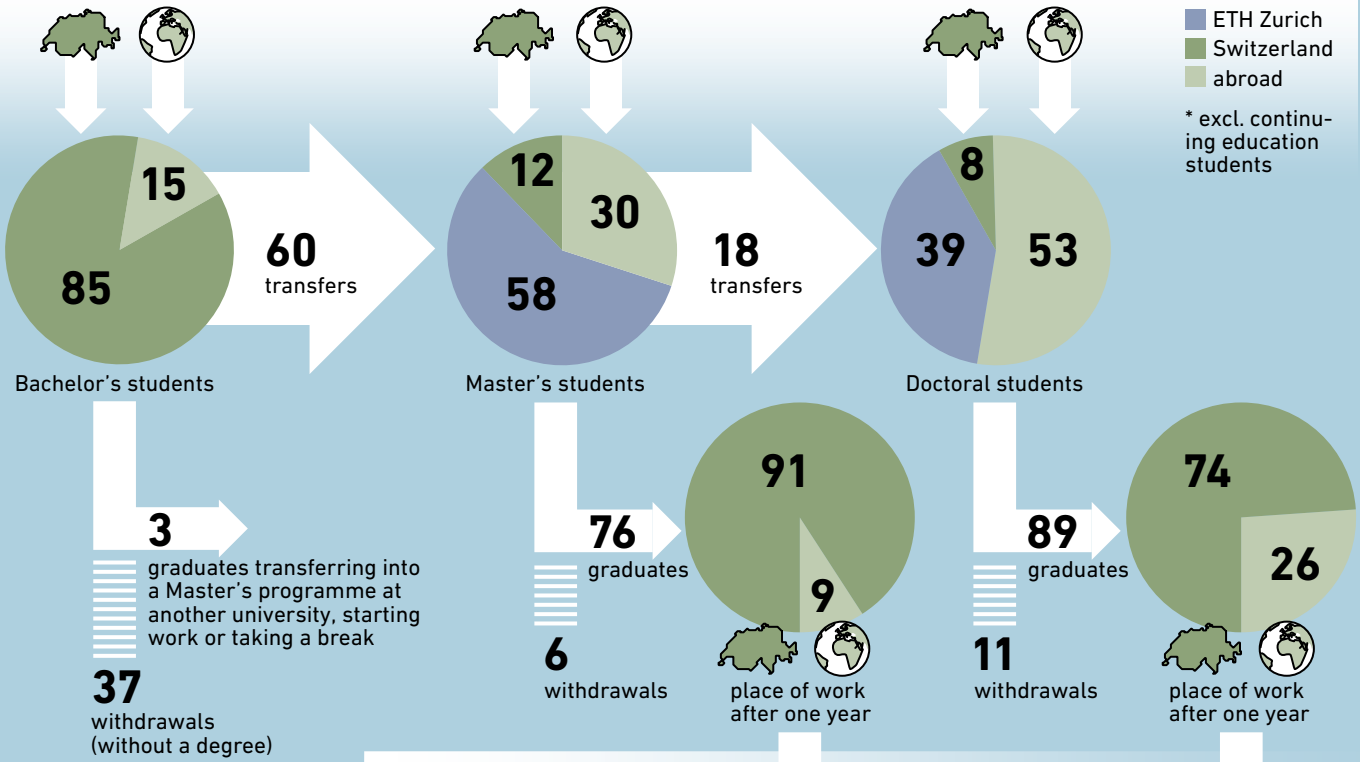
1,608 others

GRADUATIONS AND TRANSFERS*

values in %

ETH Zurich
Switzerland
abroad

* excl. continuing education students



EMPLOYMENT

Rate of alumni employment after one year

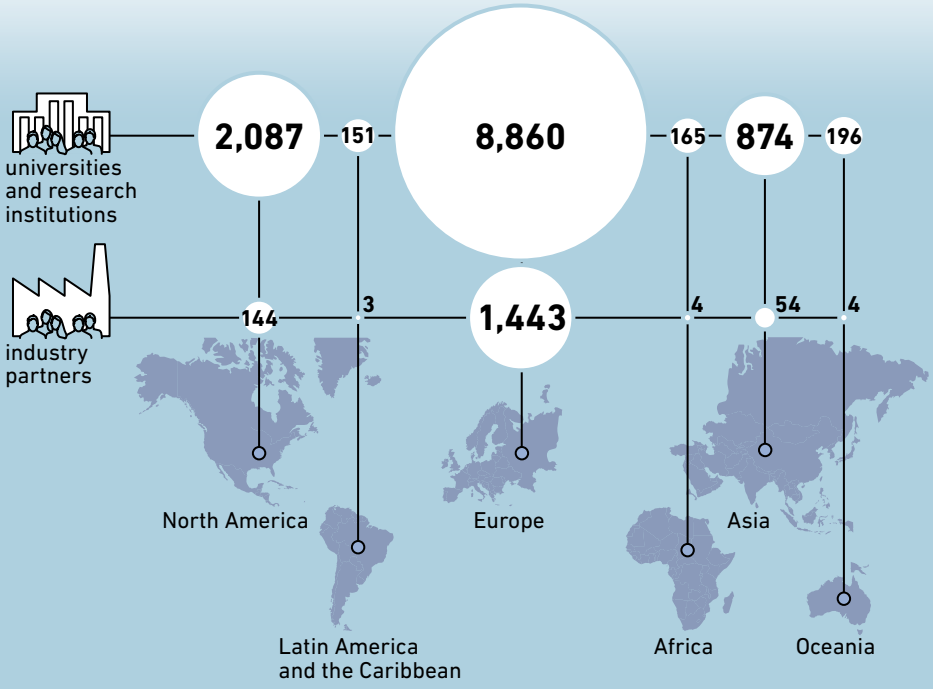
FSO Survey of Higher Education Graduates 2011–2019 (economically active persons only)

98% Master's

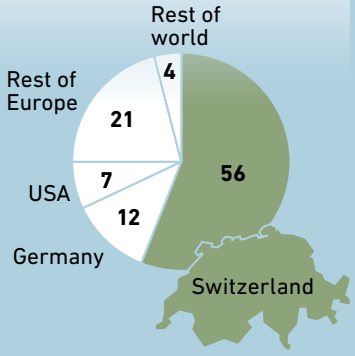
97% Doctorate

NATIONAL AND INTERNATIONAL RESEARCH CONTACTS

Number of individual contacts



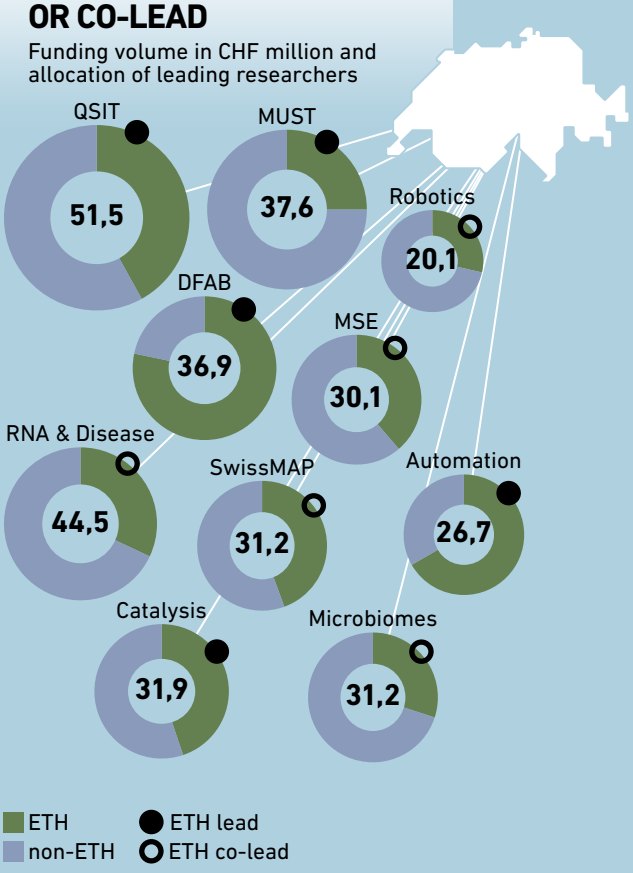
Private sector research contacts, in %



Source:
Annual Academic Achievements (AAA) and International Knowledge Base (IKB)

NATIONAL CENTRES OF COMPETENCE IN RESEARCH (NCCR) WITH ETH AS LEAD OR CO-LEAD

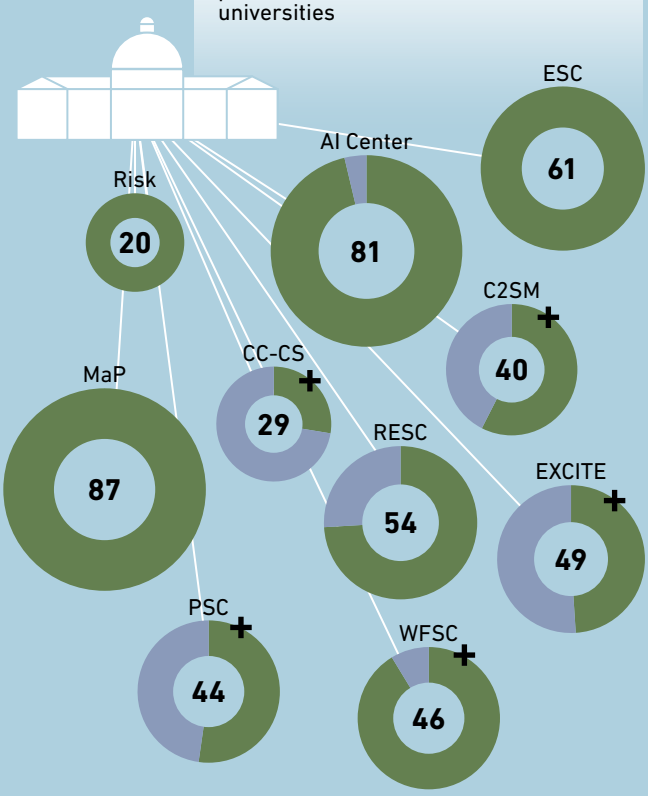
Funding volume in CHF million and allocation of leading researchers



ETH
non-ETH
ETH lead
ETH co-lead

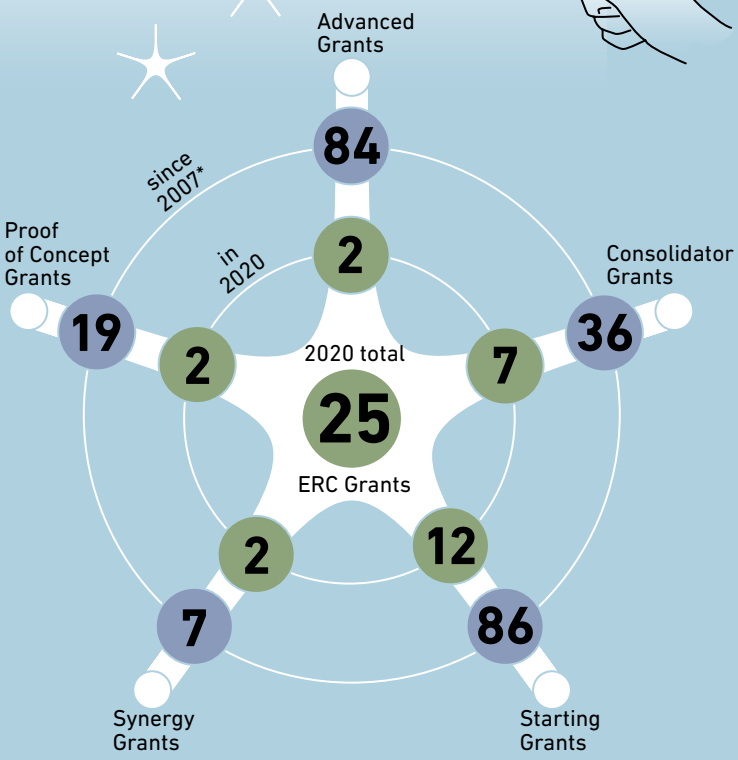
CENTRES OF EXCELLENCE

Number of professors in each centre and the proportion of professors from ETH or other universities



ETH
non-ETH
collaboration with other universities or institutions

SUCCESS WITH ERC GRANTS

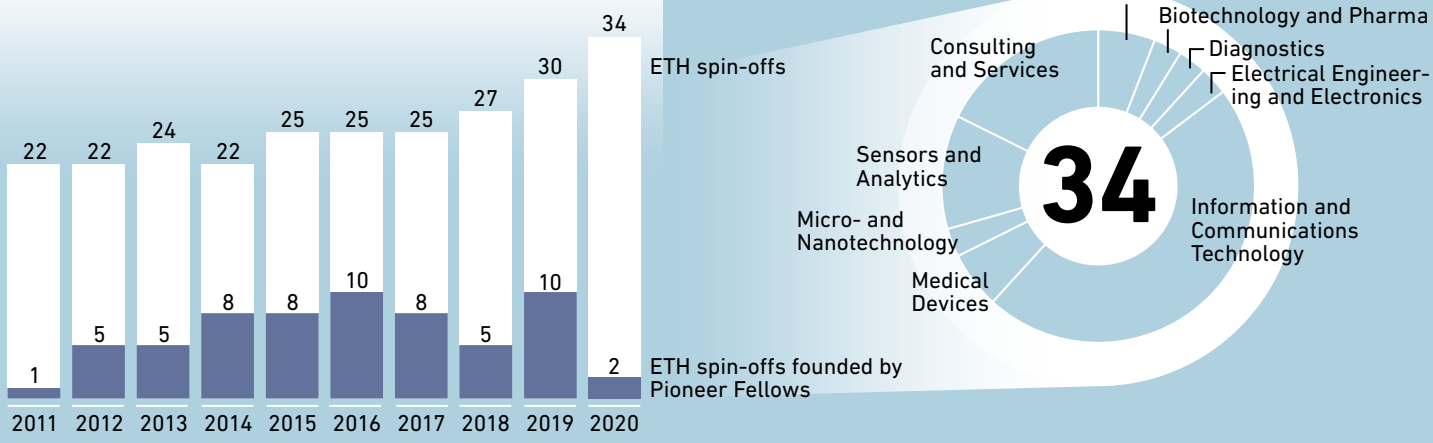


	in CHF m
Total received since 2007*	511.6
in 2020	55

* including SNSF Grants in 2014

PATENTS, LICENCES, INVENTIONS

SPIN-OFFS



PRIZES
since 1901

1 Turing Award

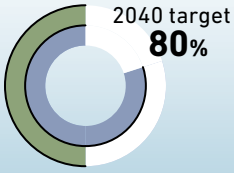
2 Pritzker Prizes

21 Nobel Prize winners (including Albert Einstein and Wolfgang Pauli)

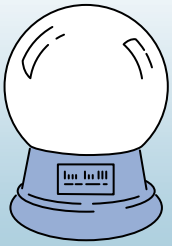
2 Fields Medals

HÖNGGERBERG ANERGY GRID

The dynamic geothermal energy storage system on the Hönggerberg campus won the Swiss energy prize Watt d'Or in the Buildings and Space category.

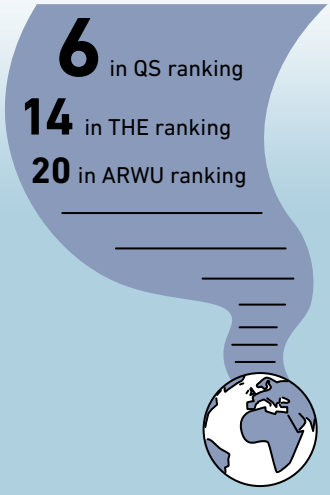


CO_2 reduction by year compared to 2006



Watt d'Or energy prize

PLACES IN INTERNATIONAL UNIVERSITY RANKINGS



COMPOSITION OF TOTAL REVENUE

in CHF million, consolidated (in accordance with IPSASs)

federal financial contribution **1,293**

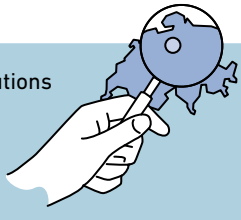
68%

1,888 total revenues

32%

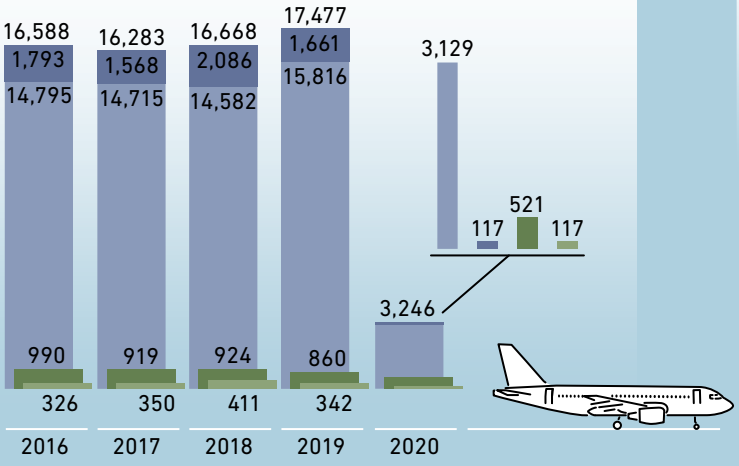
595 third-party funding revenue

5%	19%			6%	2%
86 self-generated revenues	**356** research contributions			**120** donations and bequests	**33** surplus/deficit from associated entities
	176 SNSF contributions	**72** European research frame-work programmes	industry-oriented research: **60**	**49** other project-oriented third-party funding	
tuition fees: **20** net finance income /expense; **31**; **36** other revenue					



BUSINESS TRIPS

Greenhouse gas emissions from ETH Zurich business trips – annual comparison in tonnes of CO_2 equivalents



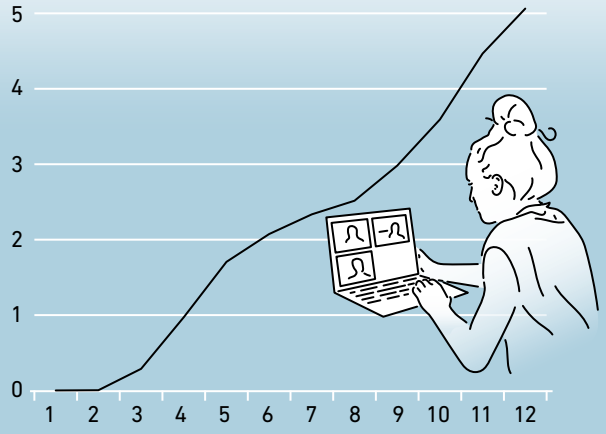
flights by employees and guests
flights by students
road
rail

Greenhouse gas emissions from ETH Zurich business trips 2016–2020. Flight emissions have been corrected compared to the previous annual report. For more information, please visit www.ethz.ch/airtravel

VIDEOCONFERENCING

Zoom use in 2020*

Cumulative number of participants, in millions



*ETH Zurich also supports other solutions.

COV-ETH STUDY

A longitudinal study on the immune response to COVID-19 infections.

2,900 participants

about 25% students

incl. **some 800** family members of ETH employees

SWISSCOVID APP

ETH helped to develop the SwissCovid app, working with EPFL, KU Leuven, TU Delft and UCL.

3 ETH professors

4 ETH staff members

2.9 mn downloads

1.8 mn active users per day

EMPLOYEE STUDY

A study of ETH employees about their day-to-day working lives and their overall experiences of working from home during lockdown.

ø1,700 participants during **10** weeks

\+
– Team spirit
– Learning opportunities
– Technical support

\-
– Loss of casual interactions
– Social isolation
– Need for constant availability

CORONA HELPER POOL

100 ETH employees signed up to provide their work colleagues with the support they needed, thereby also helping to alleviate some of the strain on resources.

STUDENT PROJECT HOUSE

As part of the helpfulETH initiative, ETH students used the Makerspace student workshop to develop products that the Swiss healthcare system required urgently.

19 hospitals supported

2,300 face shields produced

300 hrs. of volunteer work by Makerspace managers

2020 has been a turbulent year for ETH. It has highlighted our own vulnerability and our exposure to the wider interconnected world. The pandemic has affected every area of society, including educational and research institutions. The switch to online teaching, the temporary suspension of experimental research and the transfer of administrative staff to working from home all placed serious demands on the entire ETH community. Many ETH members went above and beyond, despite the circumstances: students volunteered to work in overstretched hospitals, while researchers launched projects to combat the pandemic and joined the scientific task force to contribute their expertise to the public good. Much of this year's annual report documents the incredible commitment university members have shown in these unprecedented times.

Even if the COVID pandemic may have dominated the past year, 2020 was more than trying to master a healthcare crisis. The situation also led to many innovations in teaching and continuing education, while important markers were set for the future in key strategic areas. One example is the launch of the ETH AI Center, the university's central hub for artificial intelligence, which draws on the skills of researchers from all academic departments. Another highlight has been the major investment in research into quantum technologies, which was boosted by a generous donation of 40 million Swiss francs.

The quality of the university's basic research is partly reflected in the many prestigious awards received by ETH scientists, such as Ruedi Aebersold, winner of the Swiss Science Prize Marcel Benoist. In total, 24 of our researchers received one of the coveted ERC grants. ETH was equally successful at the other end of the scientific value chain – the transfer of knowledge to industry and society. There were 34 new spin-offs and 215 new industry partnerships in 2020.

The university pressed ahead with the rETHink project for restructuring its organisation. Amongst other things, this led to the creation of two new Executive Board domains, with the appointment of Julia Dannath-Schuh as the new Vice President for Personnel Development and Leadership, and Vanessa Wood as Vice President for Knowledge Transfer and Corporate Relations.

In 2020 the new SwissCovid app and the development of vaccines in record time showed that science is an essential force in the fight against the pandemic. We can only master this and many other global challenges by working together – with Europe and with the international community. My sincere thanks go to all representatives from political circles, public authorities and industry, as well as our benefactors, whose belief in education and research has given us valuable support in these especially demanding times.

Joël Mesot, President of ETH Zurich

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Cover: ETH Zurich / Nicola Pitaro

HIGHLIGHTS

► Find out about more highlights in our ETH News:

ETH Zurich / Nicola Pitaro

COVID-19 RESEARCH

During emergency operations, the university had to pare down its research to the bare minimum, except for projects focused on coronavirus. The Executive Board appealed to scientists for ideas specifically aimed at combating the pandemic which could be implemented at short notice. Within 5 days, 36 projects had already been submitted, and 22 of them had been approved a week later. One of these projects came from ETH Professor Kristina Shea and her team, who developed a new ventilator that is inexpensive, flexible and easy to use. It is specially designed for use in low-income and developing countries. Start-up financing from the Swiss Federal Department of Foreign Affairs will allow production to start initially in small series in Ukraine. (Image: Prototype of the ventilator)

► Ventilator:

ENGINEERS FROM AFRICA, FOR AFRICA

In years to come, nowhere will population growth be as rapid as on the African continent. ETH Zurich is therefore involved in training qualified managers to promote sustainable industry, as part of its ETH for Development (ETH4D) initiative. ETH has joined forces with Ashesi University and industrial partners based around Accra, Ghana's capital, to offer a new Master's degree programme which lecturers and professors from Ashesi and ETH Zurich will teach in tandem.

TACKLING ENVIRONMENTAL PROBLEMS

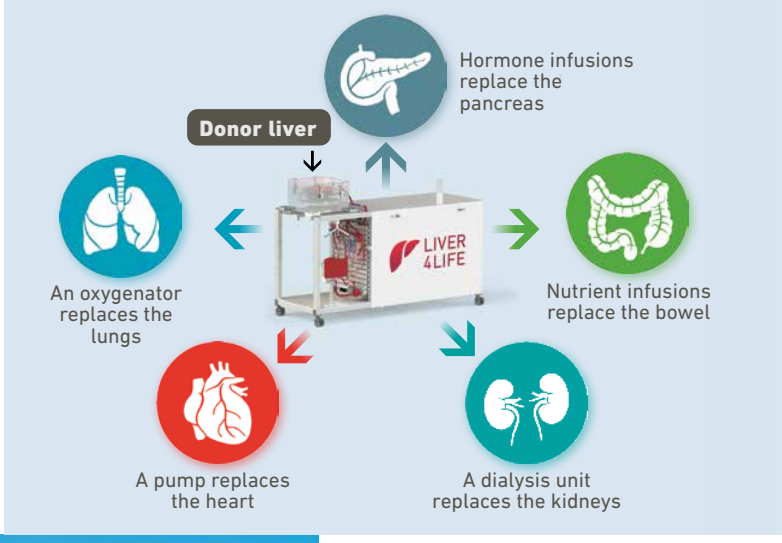
ETH Zurich presents the KITE Award in recognition of high-quality teaching concepts. The 2020 award went to the team led by Christian Pohl, a lecturer in the Department of Environmental Systems Science, for the Tackling Environmental Problems course. During their first year of studies, Bachelor's students get to grips with complex environmental problems. In the first semester they learn approaches, while in the second they move on to develop practical solutions.

A YEAR DOMINATED BY ONLINE TEACHING

The lockdown imposed in spring 2020 meant that teaching had to be switched online in the space of a week – a huge achievement that was only possible through an incredible collective effort. Exams were held as usual in the summer and the results showed no significant variance from previous years. The Autumn Semester started with a higher proportion of on-site teaching, which unfortunately then had to be scaled back again and replaced with online teaching due to the rapid increase in the nationwide infection rate.

MACHINE KEEPS DONOR LIVERS ALIVE FOR A WEEK

Until now, donor livers could only be stored safely outside the body for up to 24 hours. This period has now been extended to one week thanks to a breakthrough by a multidisciplinary team of researchers from ETH Zurich, the University of Zurich and University Hospital Zurich (UHZ) working on the Liver4Life project. The perfusion system treats the liver before the transplant, a procedure that could help save many patients' lives. By imitating the human body, the new machine provides optimal conditions for the donor liver.



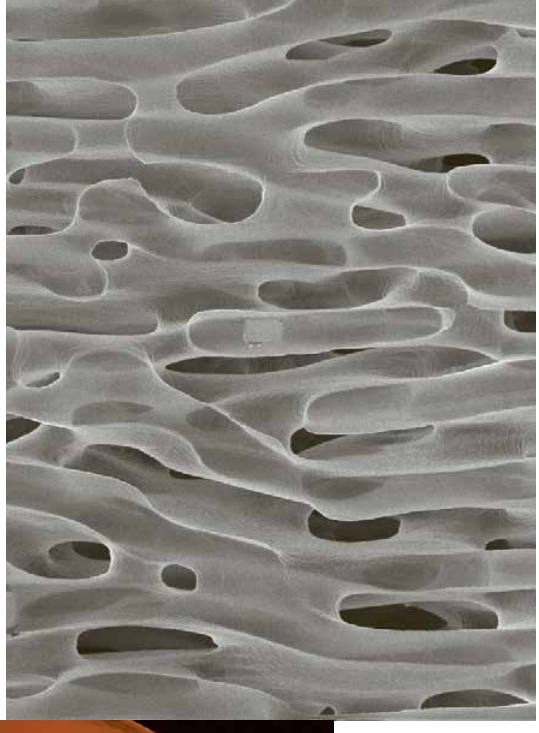
BIODIVERSITY PAYS OFF

Farmers can potentially increase their revenues by increasing biodiversity on their meadowland: the quality of the forage remains the same, but the yield is higher. This is the conclusion reached by an interdisciplinary research team including specialists from agricultural sciences, ecology and economics at ETH Zurich and other universities. Researchers were able to quantify the economic added value of biodiversity for different intensities of cultivation.

PROGRAMMING QUANTUM COMPUTERS INTUITIVELY

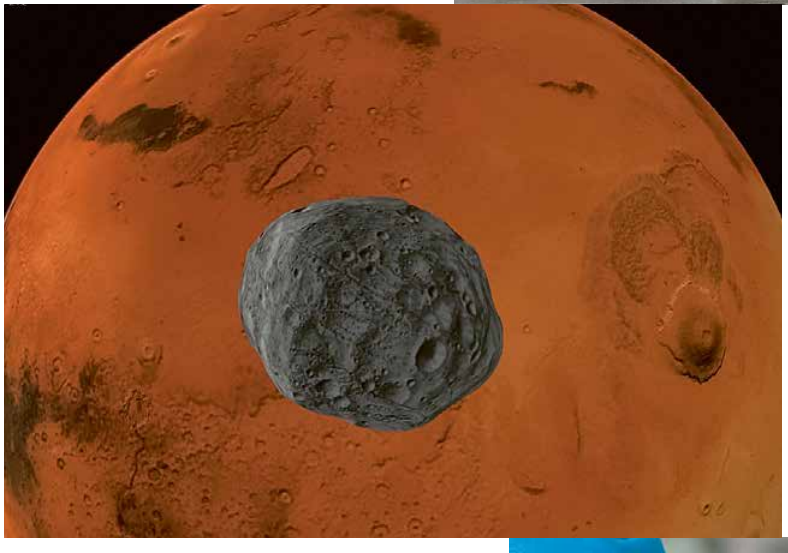
In June 2020, computer scientists in ETH's Secure, Reliable and Intelligent Systems Lab made an important breakthrough: their quantum programming language Silq can be used to program quantum computers as simply and reliably as classical computers. Because the code is more intuitive and easier for programmers to understand, they are able to utilise the potential of quantum computers more efficiently.

Ashesi University; Still from the video about the KITE award winner: www.ethz.ch/kite-award-en; ETH Zurich / Nicola Pitaro; USZ; Valentin Klaus; ETH Zurich / Heidi Hostettler, Josef Kuster



NANOSPONGE WITH EXTREME PROPERTIES

A team of engineers from ETH Zurich and the California Institute of Technology (Caltech) can now produce materials with a defined nanostructure far more quickly than with conventional 3D printing. Two liquid polymers are blended to create a network of extremely fine labyrinthine pores, which is then coated with aluminium oxide. The thin shells have no corners or junctions and therefore no internal weak points. This makes for a very lightweight nanostructure that is both as soft as a sponge but at the same time as stiff and strong as some types of steel.



SURPRISE ON MARS

The seismometer on NASA's Insight mission, equipped with electronics built at ETH Zurich, not only records marsquakes, but unexpectedly reacts to solar eclipses as well. When the Martian moon Phobos moves directly in front of the sun, the instrument tips slightly to one side because the surface of Mars cools and deforms unevenly. This effect could enable researchers to map Phobos's orbit with greater precision and estimate how elastic – and thus how hot – Mars's internal crust is.

ANTIVIRAL TREATMENT FOR TEXTILES

The ETH spin-off HeiQ Materials has developed an innovative antiviral and antibacterial treatment for textiles which has been tested effectively against pathogens such as coronavirus. Tests showed that face masks treated in this way reduce the number of infectious 229E virus particles by 99.99 percent. The treatment is suitable for all types of textile fibres. Their first customers include a Chinese mask manufacturer.

Caltech / Carlos Portela; jihemD / Wikimedia Commons / CC BY- SA 3.0; HeiQ / Shutterstock; ETH Zurich / Tom Kawara, Alessandro Della Bella, Markus Bertschi

ADMINISTRATION MOVES TO OERLIKON

ETH Zurich is growing. To create more space on the campus for teaching and research, the Executive Board domains of Infrastructure as well as Personnel Development and Leadership moved over the course of the year to the Octavo building in Oerlikon, where ETH has rented around 9,600m² of office space. The building is centrally located, close to Oerlikon railway station. The modern multi-space office premises encourage employees to explore and trial new forms of collaboration.

ETH ZURICH WINS SWISS ENERGY PRIZE

The Swiss Federal Office of Energy has awarded ETH Zurich the Swiss Watt d'Or Energy Prize for its dynamic underground storage system at the Hönggerberg campus. The campus is an urban district in its own right, consuming nearly 77 gigawatt hours of energy, 22 gigawatt hours for heating alone. Since 2013, ETH Zurich has been running its Anergy Grid: an underground storage system to heat and cool university buildings energy-efficiently and sustainably, reducing CO_2 emissions in the process.

TWO ADDITIONAL VICE PRESIDENTS

The ETH Zurich Executive Board has comprised five members since 2008. In the meantime, competition in higher education has grown stronger, while the expectations of society and the political arena have intensified and the university has grown considerably. ETH has expanded its Executive Board in order to strengthen its leadership culture and personnel development, as well as to consolidate its position as a driver of innovation in Switzerland: Julia Dannath-Schuh (r) has been appointed the new Vice President for Personnel Development and Leadership, and Vanessa Wood (l) Vice President for Knowledge Transfer and Corporate Relations.

ETH Zurich educates its students to become highly qualified and eminently employable specialists and prepares them for positions of responsibility as critically engaged members of society. Degree programmes that meet high professional and conceptual standards and encourage independence make the university an attractive place to study. To maintain the necessary educational rigour, even amid the coronavirus pandemic, ETH has continued to prioritise in-person teaching where possible, depending on the prevailing pandemic conditions.

TEACHING

ETH Zurich / Nicola Pitaro

DIRECT DIALOGUE ESSENTIAL – DESPITE CORONAVIRUS

COVID-19 forced ETH to move the majority of teaching online in 2020. While the transfer of pure knowledge is feasible by remote means, passing on interdisciplinary skills and values – inspiring students for a particular subject, for example – requires direct exchange. ETH attempted to restart on-site teaching in Autumn Semester 2020. Clear guidance from the university, reinforced by protective measures by the government, helped raise students' awareness of the infection risks. But a flexible response was essential since the course of the pandemic could have forced classes to move back online virtually overnight – which is exactly what happened on 2 November.

RESPONDING TO CORONAVIRUS

With its solid technical infrastructure and staff ready to experiment with new forms of teaching, ETH Zurich has everything in place to play a pioneering role in digital tuition. The university plans to use the know-how acquired in coping with the pandemic to deliver optimised blended learning in future.

By Ori Schipper

Things happened quickly – far too quickly. In March 2020, teaching staff only had one week to switch from learning on-site to learning online. "The shutdown in Spring Semester was the biggest disruption to teaching since our university was founded 165 years ago," comments Sarah Springman, the Rector of ETH Zurich. Thanks to a huge collective effort – from lecturers and professors, staff units and students – and an impressive display of flexibility and creativity, online teaching content was successfully delivered for a total of 1,060 courses, despite the shutdown. This ensured that no student had to lose a semester, let alone an entire year of study. This was certainly a relief for Hermann Lehner, Head of Academic Services, and his predecessor Dieter Wüest: "Fortunately, students were able to keep up their studies."

Overwhelmingly positive replies

The student survey carried out by the Educational Development and Technology (LET) department shortly after the university's shutdown in early to mid-April revealed that ETH not only came through the stress test caused by the abrupt switch to online teaching, but passed with flying colours. From a total of 1,060 online courses, students confirmed that "remote teaching in its current form"

ETH Zurich / Alessandro Della Bella

◄ ETH Zurich's Executive Board decided to suspend all classroom teaching and experimental research from Monday, 16 March 2020, due to the spread of the coronavirus. During this period of emergency operations, teaching moved online and laboratories remained closed.

worked well for 1,043 courses, or 98.4 percent of those on offer. Students also made a general suggestion: more teaching events should be recorded (rather than just streamed live) for repeated viewing later.

One of the major advantages of remote teaching is that students can work through course content at their own pace, from any location. Even so, on-site teaching is still a core component of an ETH education. Another survey organised by LET, this time of teaching staff, showed that many lecturers miss the direct verbal and non-verbal feedback they get from classroom situations. "No one likes talking to an empty lecture hall," says Gerd Kortemeyer, Head of LET. Furthermore, ETH wants to encourage students to work less in isolation and engage in more teamwork. Numerous empirical studies show that social networking skills play a vital role in students' academic performance. Direct exchange is much more intensive in the real world than online. "We all need other people around us," Kortemeyer confirms. "One of the most important lessons learned during the Spring Semester was a greater appreciation of the importance of on-campus events and face-to-face meet-ups."

Shortly after the migration – and the massive amount of work entailed – was pretty much completed, Kortemeyer noticed a sort of "institutional liberation". "Suddenly traditions were questioned, making many teaching staff more willing to experiment." This made the issue of how teaching at ETH should look in future even more pressing. A working group led by Andreas Vaterlaus, Vice Rector for Curriculum Development, is focusing on how positive aspects of the coronavirus crisis can benefit future teaching formats. "Students have a positive view of remote teaching," says Vaterlaus. "According to a representative survey, 80 percent of students can see themselves working online at least one day a week. This type of feedback is critical for the continuous development of our teaching methods."

Hybrid model of the future

The search for an ideal teaching format for ETH in future already suggests it is likely to be a hybrid model: in other words, a mix of on-site and remote teaching. When planning the Autumn Semester 2020, the Rector had to assess which teaching events could be conducted relatively well through pragmatic online solutions. She advised teaching staff to record lectures with a potential audience of over one hundred students and incorporate electronic feedback mechanisms. The survey of lecturers and professors showed that almost half want to make such recordings part of their teaching methods in future. However, an assessment was also made to determine which teaching events would have less pedagogical value if no on-site teaching were possible. This mainly concerned courses that involved group exercises, field excursions, or practical work in the laboratory or design studio. Such events should therefore have priority, for example in the allocation of teaching premises.

> **"The shutdown in Spring Semester was the biggest disruption to teaching since our university was founded 165 years ago."**
>
> **Sarah Springman**

On-site teaching is particularly important for students in their first semester. This was the conclusion of research carried out by Christoph Stadtfeld, Associate Professor of Social Networks, and his team: their Swiss StudentLife Study showed that social relationships are critical for students' well-being and learning outcomes. ETH has therefore been careful to ensure that first-year students get off to a good start on campus even during the pandemic. For Autumn Semester 2020, the university therefore organised new students into "bubbles" – groups of around two dozen people who attend all lectures and exercises together. "We had to abandon all existing plans and work with the departments over the summer to completely

▼ Swiss StudentLife Study:

▲ Social relationships are critical for students' well-being and learning outcomes.

overhaul our room planning," Lehner reports. "This was a huge amount of extra work, but was definitely worth it." The bubbles gave first-year students a solid anchor and orientation point. Many of them immediately began to organise themselves within the team, by setting up chat groups within their bubble, for example.

Before the second wave of the pandemic swept through Switzerland and ETH Zurich again had to close its buildings to most students, the first-years still had around seven weeks to get to know their fellow bubble students in real life. Despite this, the counselling sessions that Regula Christen, Head of Student Services, had with students gave her the impression that they found the second wave more difficult. "During the first wave, everyone was busy organising, and some people were quite excited by the novelty of the situation," she concludes. "But by Autumn Semester many were struggling to get motivated, which in many cases was down to the lack of structures." Sitting

"Students have a positive view of remote teaching."

Andreas Vaterlaus

at home in front of a computer, there are no bells in the corridor to signal the start or end of lectures. Christen makes it clear that her discussions only gave her some anecdotal insights into young students' state of mind. Next year the Rectorate wants to carry out a survey to gain a fuller picture.

Online learning relieves pressure on classroom teaching

"It's mainly thanks to videoconferencing that the switch to online teaching has gone so smoothly," explains Kortemeyer. "If the new virus had broken out ten years ago, the lack of bandwidth and sufficient computer power would have made it impossible to take the approach we are now following." Another important factor has been the continuous development of teaching methods at ETH, with initiatives such as Innovedum. Since the turn of the millennium, for example, some teachers had already been experimenting with novel online tutoring formats such as the flipped classroom or blended learning, and have been able to build on these experiences following the university's shutdown.

Kortemeyer strongly believes, however, that the hastily improvised "hybrid" tuition formats of the Autumn Semester are quite different from the hybrid teaching model of the future. Current online activities are very much a response to the emergency situation and ultimately consume far too many resources. By contrast, online tuition could help to relieve pressure on classroom teaching in future. Students will be able to access different study resources – such as reading materials, simulations, short instructive videos or worksheets – at any time and from any location. "Online channels will specialise in the dissemination of knowledge," Kortemeyer predicts. "And so it becomes even more important to provide effective in-person teaching to activate that knowledge."

Students attending the ETH campus in future should no longer simply listen and passively consume lectures, but also become more personally involved in interactive exercises and teamwork. Given the extremely solid technical infrastructure at ETH and the willingness of its teaching staff to experiment, both Springman and Kortemeyer are confident that the university has all the necessary prerequisites to play a pioneering role in digital learning. Their hope is that the acceleration of digitalisation triggered by the coronavirus pandemic will soon lead to the introduction of a sophisticated hybrid teaching model.

ETH Zurich / Nicola Pitaro, Jörg Goldhahn

NEW CAS PROGRAMME

CONTINUING EDUCATION IN REAL TIME

In 2020, the Department of Environmental Systems Science launched a new CAS programme: Collaborative Decision-Making under Uncertainty. The part-time course is designed for experienced specialists. Participants use methodology developed at ETH Zurich – "integrated system and design thinking" – to learn how to structure complex problems related to sustainability and climate risks, and work with peers to find suitable solutions.

"Many other CAS programmes have been postponed or cancelled, but we stayed faithful to the spirit of our programme and tackled uncertainty head on," says Dr BinBin Pearce, programme coordinator. There are some parallels with the ways in which society finds good answers to a new virus or to global warming. "Amongst other topics, we looked at the COVID pandemic as a case study when teaching and applying our methodologies."

Participants working in two groups have developed a strategy prototype over the space of six months. Because the programme provides plenty of room for active participation, there have also been some surprising outcomes, such as a game of cards that raises players' awareness by encouraging practical involvement in combating climate change. The game won a prize at Climathon Zurich 2020.

▲ Students Sixtine Dromigny and Srikanth Chander Madani used cards depicting the Druid, Bard, Imp and Halfling to raise awareness about climate change.

► School for Continuing Education:

STUDY PROGRAMME FOR HUMAN MEDICINE

"WE ARE TRAINING YOUNG PHYSICIANS"

The plan was an ambitious one: back in autumn 2017, ETH Zurich launched a new curriculum in human medicine designed to complement existing study programmes and help remedy the shortage of doctors in Switzerland. A recent assessment confirms that the pilot phase of the Bachelor's course has been highly successful and the experiences of both teachers and students have been very positive. "ETH Zurich has quickly established itself as an expert partner for medical training, both nationally and internationally," says Rector Sarah Springman. Now the degree course will continue as a regular programme from January 2021, one year earlier than planned.

Bachelor's students continue their medical training

The formal adoption of the programme now allows ETH Zurich to offer 100 study places in human medicine every year. The first medical students already graduated with a Bachelor's degree last summer. In theory the graduates are eligible for a Master's course at ETH, but they all chose to continue their medical training at one of the three partner universities in Lugano, Basel or Zurich.

Director of Studies Christian Wolfrum interprets that as corroboration of the curriculum's objective: "We train medical professionals with a unique profile: doctors with specialist knowledge of the natural sciences and technology, whose expertise enables them to put developments in digital medicine into practice in a clinical setting." Wolfrum linked up with Professor Jörg Goldhahn to design the new study programme from scratch, in close collaboration with partner institutions.

◄ Clinical training at ETH: medical students learn examination techniques.

Stronger clinical research and teaching

Professor Wolfrum, whom the Executive Board appointed to the new role of Associate Vice President for Medicine in June 2020, sees the most important goal as strengthening clinical teaching and research at ETH. To this end, the university is continuously expanding its network of clinical and university partners.

In the mid-term, ETH also wants to become involved in further clinical training. At ETH, one or two doctors can already carry out a research project every year at MedLAB. The university is also preparing to launch an MAS course in Digital Clinical Research in Autumn Semester 2022, which will allow doctors to gain new insights into this specialist area. The programme comprises four individual CAS modules, three of which must be taken for the MAS.

▼ ETH Bachelor's in human medicine:

STUDENTS AND DEGREE AWARDS

Students	Total		Bachelor's students		Master's students		Doctoral students		MAS/MBA students		Visiting/ exchange students	
	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020
Headcount	**22,193**	**23,422**	**9,895**	**10,355**	**7,037**	**7,790**	**4,168**	**4,316**	**626**	**644**	**467**	**317**
Percentage women	32.9 %	33.2 %	33.1 %	33.1 %	31.1 %	31.6 %	33.5 %	34.3 %	42.3 %	45.2 %	38.1 %	35.6 %
Percentage international students	40.0 %	40.3 %	21.5 %	22.2 %	43.0 %	43.5 %	73.2 %	74.2 %	37.9 %	40.1 %	92.5 %	90.9 %
Total registrations	**22,699**	**24,115**	**10,306**	**10,945**	**7,055**	**7,806**	**4,168**	**4,316**	**703**	**730**	**467**	**318**
Architecture and Civil Engineering	3,586	3,651	1,739	1,799	1,205	1,247	422	437	138	121	82	47
Engineering Sciences	8,355	9,167	3,903	4,183	2,795	3,278	1,441	1,525	34	50	182	131
Natural Sciences and Mathematics	5,565	5,887	2,500	2,744	1,613	1,685	1,144	1,179	196	211	112	68
System-oriented Natural Sciences	4,281	4,438	2,124	2,173	1,107	1,196	878	893	112	124	60	52
Management and Social Sciences	912	972	40	46	335	400	283	282	223	224	31	20
New students	**8,006**	**8,301**	**3,128**	**3,357**	**2,927**	**3,119**	**958**	**1,021**	**263**	**256**	**730**	**548**
Architecture and Civil Engineering	1,184	1,282	456	553	444	491	93	92	66	57	125	89
Engineering Sciences	2,984	3,119	1,174	1,193	1,165	1,303	339	373	21	19	285	231
Natural Sciences and Mathematics	2,043	2,000	828	896	728	680	265	259	51	64	171	101
System-oriented Natural Sciences	1,451	1,529	652	697	475	487	197	222	28	32	99	91
Management and Social Sciences	344	371	18	18	115	158	64	75	97	84	50	36
Country of education												
Switzerland	14,754	15,689	8,823	9,317	4,253	4,695	1,161	1,156	477	484	40	37
EU	5,262	5,430	1,254	1,398	1,668	1,745	1,951	1,946	130	135	259	206
Rest of Europe	594	776	130	140	233	312	197	277	15	23	19	24
Asia	1,461	1,614	68	61	671	815	589	645	40	50	93	43
America	478	452	21	19	175	171	214	234	25	22	43	6
Africa	107	121	9	9	36	50	46	47	12	13	4	2
Australia and New Zealand	43	33	1	1	19	18	10	11	4	3	9	0

Degrees and diplomas	Total		Bachelor's		Master's		Doctorate		MAS		Teaching diploma/ MAS SHE		Teaching certificate	
	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020
Degrees	**5,229**	**5,075**	**1,758**	**1,843**	**2,335**	**2,260**	**866**	**781**	**197**	**129**	**48**	**31**	**25**	**31**
Architecture and Civil Engineering	884	930	307	377	421	439	84	70	72	44	0	0	0	0
Engineering Sciences	1,793	1,659	592	613	890	784	302	253	5	2	1	3	3	4
Natural Sciences and Mathematics	1,308	1,148	442	353	565	568	267	203	0	2	31	20	3	2
System-oriented Natural Sciences	972	1,101	397	492	361	385	167	187	12	4	16	8	19	25
Management and Social Sciences	272	237	20	8	98	84	46	68	108	77	0	0	0	0

► Student statistics:

A TEACHING OVERVIEW

PULLING TOGETHER THROUGH TWO WAVES OF THE PANDEMIC

Last spring, about a month into the semester, ETH Zurich had to switch to online teaching in a matter of days. Classroom teaching partially recommenced in Autumn Semester, but soon the university had to switch back almost entirely to remote learning. This was a huge challenge for all those involved, whose extraordinary efforts ensured that ETH continued to function without interruption.

The COVID pandemic unexpectedly disrupted teaching. Even so, ETH members successfully met the challenge and activities continued through both semesters, albeit with some constraints. This was made possible through excellent cooperation between everyone involved in teaching. Professors, lecturers, assistants and students completed the switch to online learning in just a week. Working in the background, our technical and administrative staff in the departments and central administrative units ensured everything ran smoothly in both semesters, providing crucial help with aspects such as recording and broadcasting technology, advice, support and exam planning. By following a strict safety protocol, students were still able to attend the summer exams in person in the break between the first and second pandemic waves. Autumn Semester 2020 kicked off with some classroom teaching, but had to switch back almost entirely to remote teaching just a few weeks later as infection rates picked up.

Student surveys conducted over both semesters showed that most ETH members coped extremely well with the switch to blended learning, even though the conditions were not ideal for students or teachers. Unfortunately, remote tutoring does not provide much opportunity for personal dialogue – either generally between fellow students or between students and teaching staff during online sessions (see pages 16–18).

Student numbers continue to grow

One remarkable aspect has been the continuing rise in student applications and new matriculations. There was no evidence of a potential coronavirus effect, such as reduced interest from international students because of travel restrictions.

More new courses developed

Another striking trend was the ongoing development of new courses as planned, despite the difficult circumstances. The new Bachelor's degree programme Biochemistry – Chemical Biology was launched in the Autumn Semester, along with the continuing education programmes MAS in Fire Safety Engineering, CAS in Applied Manufacturing Technology and CAS in Entrepreneurial Leadership. The latter specifically targets ETH scientists who see an opportunity for their research to be commercialised. A doctoral school has also been set up in the field of materials and processes, with the participation of professorships from nine departments.

Educational developments

The main topic at the Future-Ready Graduates teaching retreat in January was the future development of teaching at ETH. The Rector met directors of studies, study coordinators, educational developers, as well as representatives of students, scientific staff and the Rectorate, to discuss three key topics: the first year of study, computational competencies and transferable skills. Significant progress has been made in all three areas. During the first year, it is now possible throughout the university for the first-year examination to be split into two exam blocks. In the area of computational competencies, the Executive Board came up with a concept to strengthen these skills in all study programmes, and around a quarter of academic departments are ready to roll this out as a pilot scheme. By giving basic approval to the skills grid, the Executive Board also laid the foundation for strengthening transferable skills in teaching activities.

KITE Award 2020

A record number of 34 teaching concepts were submitted for the KITE Award (Key Innovation in Teaching at ETH) in 2020, the third year that the Lecturers' Conference has presented the prize. The award went to a team led by Christian Pohl for the Tackling Environmental Problems course (see page 10). The programme allows Bachelor's students at the Department of Environmental Systems Science to begin acquiring skills to tackle complex sustainability issues in their first year of study. Other finalists were also honoured at the award ceremony: the introductory lecture, Fundamentals of Theoretical Computer Science; the Practical Methods in Biofabrication course; and the online bridging course in mathematics.

ETH research provides the basis for future innovations and the development of our society. Thanks to its modern infrastructure and highly qualified staff, ETH Zurich is able to conduct both basic and applied research at the highest level. Technology platforms and centres of excellence support cooperation, while internal research support structures provide the necessary space for achievement. The areas of research ethics and scientific integrity provide a normative framework.

RESEARCH

CARRIED TO THE VIRUS BY SOUND ENERGY

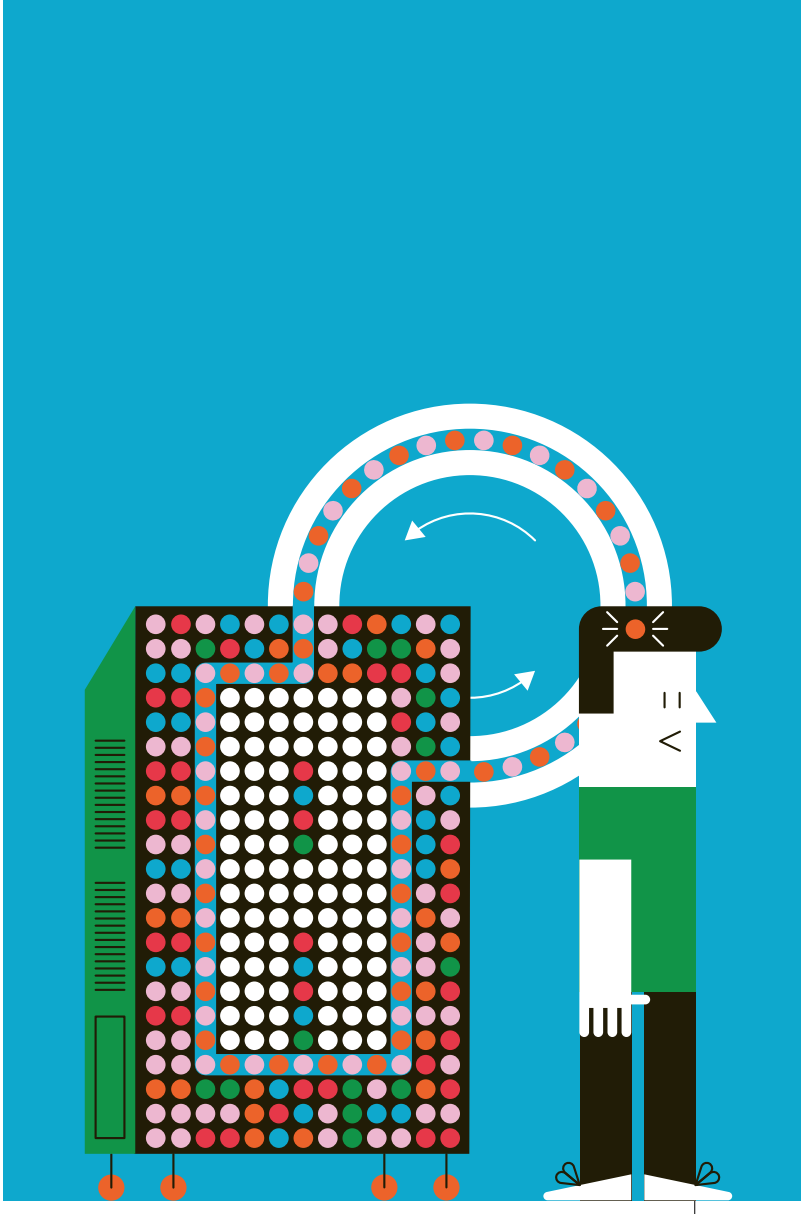
With the university in emergency operations, ETH used the research infrastructure of the NEXUS Personalized Health Technologies platform for various COVID-19 projects. For example, Tijmen Booij and David Keller from the Theragnostics Discovery Unit, working under ETH Professor and Head of the Toxicology Laboratory Shana Sturla, searched for small molecules that inhibit reproduction of SARS-CoV-2. They did this using an "echo liquid handler" that transferred the molecules to the virus's protein via sound energy in a contactless, highly accurate and rapid process.

ETH Zurich / Alessandro Della Bella

FOUNDATIONS OF A TRUSTWORTHY ARTIFICIAL INTELLIGENCE (AI)

Machine learning and AI are becoming increasingly important in science, business and society. At ETH Zurich, numerous researchers are working on the basic principles and applications of this field and investigating its effects. The ETH AI Center, founded in 2020, networks their activities and paves the way for trustworthy, broadly accessible and inclusive AI for the benefit of society.

By Florian Meyer



ETH Zurich / John Devolle

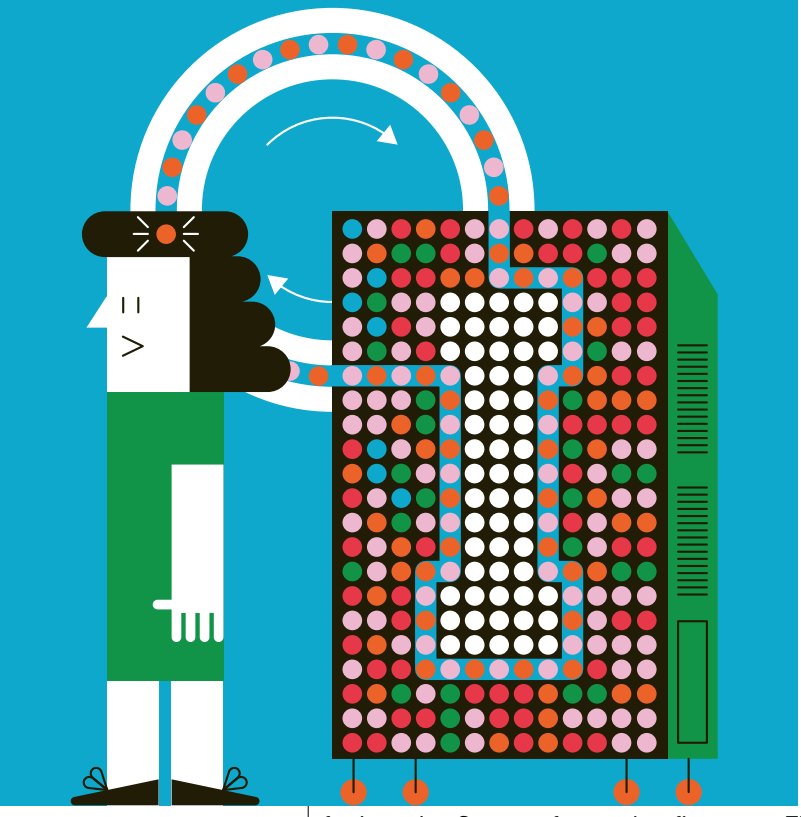
AI refers to technologies that enable computers to help humans carry out ever more complex tasks. Machine learning is an important branch of AI. It comprises various methods whereby computers independently learn to recognise patterns and regularities from training data. With very large, complex or disparate data sets, machine learning can produce valuable results.

"Reliability, interpretability and traceability of AI systems are very important, because they raise highly relevant questions about the social impact and ethics of AI," says Andreas Krause. He is Professor of the Institute for Machine Learning and Chair of the ETH AI Center, which opened at the end of October 2020.

The new centre forms the central hub for AI at ETH: it brings together AI methodologists and theoretical researchers with those who are developing AI for their field of interest or studying its impact on business and society. For example, Effy Vayena, ETH Professor of Bioethics and member of the Steering Committee, is conducting research into what constitutes ethical and trustworthy AI in medicine. The centre sees itself as a pioneer in the field of trustworthy, widely accessible and inclusive AI systems that benefit society. "We want to fundamentally rethink how we can develop AI models so they work safely and their results are explicable and fair," says Krause.

ETH AI CENTER

Having started with 29 professorships, since December the centre has 81 core and associate faculty from all 16 ETH departments, as well as 3 professors from the Universities of Zurich and St. Gallen. Alexander Ilic has been the centre's Executive Director since October. The centre also promotes AI start-ups and top talents. To consolidate their international position, ETH and the Max Planck Society have extended their joint activities in the Center



▲ Researchers are developing artificial intelligence to help humans carry out ever more complex tasks. Collaboration between different disciplines facilitates the creation of innovative, trustworthy approaches.

for Learning Systems for another five years. The ETH AI Center also forms part of the ELLIS European AI network, inaugurated in September, which comprises 30 top research institutes.

New division of labour between researchers and computers

AI and machine learning change the way in which work is divided between researchers and computers. "AI methods enhance researchers' creativity, often yielding surprising suggestions that they hadn't thought of themselves," says Gisbert Schneider, Professor of Computational Drug Discovery, Director of the Singapore-ETH Centre from January 2021 and founding Director of the ETH RETHINK "think-and-do" tank. He uses AI to develop new drugs on the computer. "We have an AI model for virtual medicinal chemistry that autonomously generates molecular structures possessing one or more desired properties," he says. This method allows the team to obtain new substance classes and then test them for their pharmacological efficacy as drugs.

Machine learning supports medicine

Many ETH researchers are likewise applying AI methods in medicine, and some achieved important breakthroughs last year. For example, Gunnar Rätsch, Professor of Biomedical Informatics at ETH and University Hospital Zurich, together with the University Hospital of Bern (Inselspital), presented a method that predicts cardiovascular failure of patients in intensive care with a high degree of reliability. This allows medical staff to intervene earlier. The approach is based on the evaluation of extensive patient data using machine-learning methods.

Machine learning has enabled Sebastian Kozerke, Professor of Biomedical Imaging at ETH and the University of Zurich, to develop a new and significantly faster approach to magnetic resonance imaging (MRI). This method produces dynamic images that show changes in vascular blood flow in order to detect cardiovascular disease. This approach, called FlowVN, speeds up the MRI process so that before long accurate images will be obtained in less than 5 minutes, rather than the current 30 minutes. The FlowVN software learns by using training data. Because the method combines training with prior knowledge of the measurement, it does not need thousands of training examples to deliver reliable results.

An app from Julia Vogt, Professor of Medical Data Science, demonstrates AI's value for diagnosis. Jaundice is one of the most common diseases in newborn babies. With hospital stays after birth getting shorter, the symptoms may not appear until the baby is already at home. Thanks to AI, the app needs just 4 indicators to predict the disease in babies 48 hours before the first symptoms appear. Close interdisciplinary collaboration between AI researchers and medical professionals was crucial to the success of this app.

Innovating by connecting research fields

Interdisciplinary cooperation in general is vital to the development of new AI approaches. "Across the university, there's top-class research being done in AI fundamentals in a variety of individual disciplines – bringing this activity together gives us huge potential to develop innovative AI methods that are, at the same time, reliable, comprehensible and trustworthy," explains Detlef Günther, Vice President for Research.

One of ETH Zurich's special strengths lies in its excellent basic research into the theory and practice of AI, in fields such as mathematics, statistics, computer science, information technology and data science. At the same time, the university is a strong centre for outstanding research that applies AI, and also has high-quality infrastructure. AI applications exist in the natural sciences as well as in engineering, economics and the social sciences.

Applications have also been developed in areas far removed from medicine: in the Department of Civil, Environmental and Geomatic Engineering, for example, Olga Fink and other researchers founded a collaboration platform to better exploit the potential of data science and machine learning. In her research, the ETH Professor of Intelligent Maintenance Systems uses AI to improve the safety and service life of safety-critical facilities, such as power stations or industrial plants. AI normally requires very large amounts of data to learn patterns and apply them to new situations. However, since safety-critical systems rarely fail, there is usually very little data available. Professor Fink therefore combines adaptive AI with physical models so that reliable statements can still be made about the plants.

► AI at ETH:

COVID-19 RESEARCH

RESEARCH ROSE TO THE CHALLENGE

In 2020, the ETH Zurich research community demonstrated its ability to cope with difficult conditions in flexible and innovative ways.

More than 60 COVID-19 studies covering a wide range of research areas were launched over the course of the year. The majority of these come from disciplines such as medical technology, pharmacy, immunology and epidemiology, and many of them have a direct bearing on political decisions.

One example of ETH researchers' special social commitment during the pandemic comes from computer science. Researchers from this department made key contributions to the development of the SwissCovid app, which was an international pioneer in terms of concept, data protection and interfaces.

The ETH research community has not only continued to produce excellent and relevant research, but has also demonstrated its cohesion in difficult times. Many of the COVID-19 studies mentioned above are interdisciplinary or involve several departments. One example is the CoV-ETH study, a collaboration between D-HEST, D-BIOL and D-USYS, supported by the Executive Board. It also deals with resilience, this time as the subject of scientific study: the topic of the longitudinal study is the long-term development of immune protection against SARS-CoV-2, with ETH staff and their family members forming a cohort.

► COVID-19 research:

◄ The workshop helps doctoral students to understand which issues regarding integrity may be important in research and how they might solve potential problems.

INTEGRITY AND ETHICS

ETHICAL RESPONSIBILITY IN RESEARCH

To familiarise doctoral students with ETH Zurich's integrity guidelines as early as possible, a Workshop on Research Integrity was launched as part of their induction programme. In the medium term, a compulsory course on the topic is also planned, which will cover scientific integrity as well as general and subject-specific aspects of research ethics.

The awareness-raising measures implemented in recent years in the area of scientific integrity have had an effect on many ETH researchers. The election of a third confidant has also strengthened the resources for counselling and conflict resolution.

Since August 2020, ETH members wishing to conduct research with humans have had to reflect more deeply on the long-term political and societal risks of their research project in their applications to the ETH Ethics Committee and weigh them against the expected benefits to society.

Various measures are in place at ETH to ensure that laboratory animals are handled competently and responsibly. In 2020, for example, the animal welfare officers gave more robust advice to researchers and carried out more inspections.

RESEARCH FOCUS

ETH ADVANCES ITS MEDICINE STRATEGY

How can medical research become even more firmly established at ETH Zurich? And how can the conduct of clinical trials be better supported? Strategies designed to address these questions will become increasingly important.

With the appointment of Professor Christian Wolfrum (D-HEST) as Associate Vice President for Medicine in spring 2020, ideas from the departments and research groups at ETH can now be pooled centrally and strategies further developed. The plan is to establish closer partnerships with Swiss hospitals in order to support research and teaching at a higher level and expand the medical network for researchers and spin-offs at ETH. A start was made on this in September 2020 with a cooperation agreement between ETH and Kantonsspital Baden as a new clinical partner.

▲ Visualisation of the Partnerhaus II building on the new healthcare campus of Kantonsspital Baden (KSB).

Furthermore, internal infrastructures to support ETH researchers and spin-offs with their clinical studies will also be significantly expanded in the coming year. For example, a Digital Trial Intervention Platform is being developed in 2021 to provide central support for clinical studies from concept to medical treatment.

► Collaboration with Kantonsspital Baden:

KSB

DRIVING FORWARD CUTTING-EDGE RESEARCH IN EUROPE

In 2020, many ETH Zurich researchers again applied for prestigious grants from the European Research Council (ERC). Twenty-six ETH members were successful, receiving 25 grants worth a total of 55 million Swiss francs. The ERC grants show the importance of relations with Europe for Switzerland as a centre of research. The previous framework programme, known as Horizon 2020, expired at the end of 2020. Whether and in what form Switzerland will participate in the successor programme, Horizon Europe, is currently unclear.

SYNERGY GRANTS

are awarded to teams. ETH researchers are leading one of the two award-winning projects.

Professor Lukas Novotny and **Professor Romain Quidant,** D-ITET and D-MAVT, together with researchers from the Universities of Innsbruck and Vienna, are conducting a Q-Xtreme project in which they will put a particularly large object with a diameter of 100 nanometres into a quantum superposition state for the first time. The necessary experiments could be used in future to analyse the influence of gravity on quantum superpositions. They should also enable the development of sensitive measuring instruments for acceleration, rotation or gravity.

Professor Klaus Ensslin, D-PHYS, together with researchers from the Université Paris-Saclay, the University of British Columbia and Ben-Gurion University of the Negev, is conducting a Quantropy project to develop new measurement procedures in order to better understand complex correlated quantum states in solids. To achieve this, the team is using thermodynamic measurement quantities, in particular entropy. The researchers hope to learn more about novel states in which interacting electrons exhibit counter-intuitive properties and are at the same time technologically promising. The scientists also hope to gain new insights into other effects such as the recently discovered superconductivity in twisted graphene layers.

ADVANCED GRANTS

support established researchers, enabling them to carry out large projects in collaboration with other researchers in Europe. Two ETH projects were supported with funding of around 2.6 million Swiss francs each.

Professor Jean-Christophe Leroux, D-CHAB, is working on a project to find ways to suppress the cellular defence systems that sequester or degrade intruding genetic material inside cells. This could make modern gene therapy against cancer or hereditary diseases, in which genetic material is introduced into cells, safer and more effective. Such gene therapies are currently inefficient, and only a few have been approved so far.

Professor Julia Vorholt, D-BIOL, plans to use her second Advanced Grant to develop artificial cell compartments in order to introduce new metabolic characteristics into cells on a modular basis. Numerous biotechnology applications could benefit from this. Professor Vorholt's project is inspired by cells that live symbiotically inside other cells in a process known as endosymbiosis. Over the course of evolution, this gave rise to compartments with their own metabolic functions inside higher cells.

CONSOLIDATOR GRANTS

help researchers to build up their research groups. The grants are worth around 2.1 million Swiss francs on average.

Professor Paolo Arosio, D-CHAB, will use phase-separating biomolecules to create, outside of cells, new types of microcompartments with different, tailor-made properties. They could one day be used for drug research.

Dr Núria Casacuberta Arola, D-USYS, will use different radioactive tracers to study the fluxes, circulation timescales and mixing processes of waters in the Arctic and subpolar North Atlantic oceans. In this way, the environmental scientist hopes to find answers to questions about water mass transport in the polar region and the underlying physical mechanisms.

Professor Torsten Hoefler, D-INFK, aims to develop a productive and efficient programming model to address the increased demand for computing power from data science and artificial intelligence. The new model is based on a novel spatial viewpoint that takes the computational structure of applications into account.

Professor Lucio Isa, D-MATL, is conducting a project to develop a new class of microparticles that can adapt their shape and properties to the environment, and thus also change the way in which they move and interact with neighbouring particles. Applications include targeted drug delivery in the body.

Professor Martin Pilhofer, D-BIOL, intends to develop new cryo-electron tomography methods to study complex samples from the natural environment. The methods will be applied to investigate the diversity and evolution of cell–cell interactions in microbial ecosystems and to discover new molecular structures and their functions in bacteria.

Professor Olga Sorkine-Hornung,
D-INFK, aims to develop computer-aided design tools for professionals in the textile and garment industry. A computer graphics specialist, her goal is to create algorithms and software that will support a transition from mass-produced clothing in standardised sizes to tailor-made garments that fit each individual perfectly.

Professor Tanja Stadler,
D-BSSE, is investigating the basic rules of population dynamics in a project that applies mathematical and statistical tools to phylogenetic trees. Her aim is to develop new phylodynamic models that she hopes will become established outside of evolutionary research and epidemiology.

STARTING GRANTS

help researchers to establish themselves at the beginning of their careers.

Professor Athina Anastasaki,
D-MATL, is researching new depolymerisation strategies, i.e. the degradation of polymers to monomers. She would like to reuse monomers both in similar polymers and in new materials with tailor-made properties. Her goal is to develop advanced polymer recycling methods.

Professor Whitney Behr,
D-ERDW, is investigating whether deposition of sediment near subduction trenches influences the style of subduction-zone earthquakes and the speed at which plates converge. Subduction zones host the largest earthquakes and are important drivers of tectonic plate motion, so a better understanding of how they work is fundamental to both short-timescale seismic hazard forecasting and very long-timescale planetary dynamics.

Professor Alessandro Carlotto,
D-MATH, conducts research in differential geometry, which is the area of mathematics that concerns the study of shapes through the notion of curvature. His project is built around a network of problems that are partly "pure" in nature and partly stem from general relativity theory, which describes gravity in terms of the curvature of space–time.

Professor Yiwen Chu,
D-PHYS, is investigating how to combine two important quantum technologies: performing complex computations in electrical circuits using the laws of quantum mechanics and using light to carry quantum information over long distances. Her aim is to build on these technologies to create a type of quantum telecommunications network.

Professor Rachael Garrett,
D-GESS, wants to understand how the management of supply chains by food companies can contribute to better protection of rainforests and livelihoods in the tropics. To address these questions, she will compare systems in Brazil, Indonesia and West Africa. This should lead to recommendations for companies and policymakers on how to conserve tropical forests while at the same time protecting climate stability, biodiversity and food production.

Professor Bernhard Häupler,
D-INFK, is working on a project to develop the first universally-optimal distributed message-passing algorithms. Such algorithms adapt optimally to any network during their execution. This leads to exponentially faster performance compared to current state-of-the-art algorithms. Although enormously promising for distributed computing and large-scale graph processing, such universally optimal algorithms do not exist, yet.

Dr Jordon Hemingway,
D-ERDW, is conducting a project to explore the oxygen isotope composition of marine sulphate (SO_4) in the geologic past. These isotopes are indicators of how the oxygen content of the atmosphere has developed over the Earth's history. Hemingway hopes to achieve a more mechanistic understanding of these indicators and thus gain a more precise estimate of atmospheric oxygen content in the Earth's past.

Dr Anne Hultzsch,
D-ARCH, aims to show that female perception is just as relevant to the history of architecture as construction and design itself. To this end, she is looking for women who described cities and their architecture in the 18th and 19th centuries. Using historical travelogues, handbooks, newspaper reports and scientific texts, Hultzsch is exploring the role that architecture has played in certain historical moments.

Professor Andreas Moor,
D-BSSE, aims to explore the consequences for cell functions of the fact that messenger RNA molecules are not evenly distributed but tend to accumulate locally. He also wants to understand how the concentration gradient of messenger RNA is maintained in cells. In particular, he would like to gain a better understanding of how cells function in healthy and diseased states, especially in the case of mucosal cells of the digestive tract.

Dr Joaquim Serra,
D-MATH, is examining partial differential equations. These describe many natural phenomena such as waves, heat, electric and gravitational potentials, fluid dynamics and quantum mechanics. His project will study interfaces or separating surfaces that behave in a similar way to two immiscible liquids of the same density. They are described using delicate equations. They often have many solutions, but are rarely stable enough to be observed in nature. Serra's objective is to understand the properties of these observable solutions.

Dr Bjarne Steffen,
D-GESS, is working on a project to examine how countries' fiscal policy measures affect the deployment of new technologies, for example in the energy and transport sectors. Steffen plans to use a combination of methods from innovation studies and financial economics. He aims to show how green financial policies can help to close funding gaps in the upcoming transformation of the economy.

Dr Judit Szulágyi,
D-PHYS, will use complex computer simulations to investigate the formation of planets, moons and entire planetary systems. One of her questions is how we can observe nascent planetary systems with today's telescopes. She would also like to better understand how our solar system came into being and how planetary systems form in the universe.

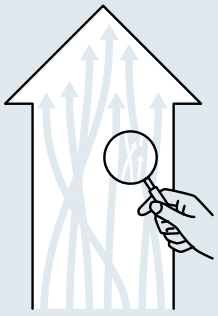
PROOF OF CONCEPT GRANTS

provide researchers who have already received an ERC grant with top-up funding of 160,000 Swiss francs each. ETH received two of these grants in 2020.

RESEARCH OVERVIEW

WHAT ARE THE MAIN FOCUS AREAS OF ETH'S RESEARCH?

The four main focus areas defined in ETH Zurich's Strategy and Development Plan 2017–2020, namely Medicine, Data, Sustainability and Manufacturing Technologies, are directly reflected in its research. Important structural developments took place in all fields in 2020.



Medicine

ETH is steadily expanding its activities in the field of medical research. Ten new professorships were created in this area in 2020, for example in quantitative biomedicine, tumour and stem cell dynamics, and global health engineering.

A key event was the opening of The LOOP Zurich, a translational medical research centre dedicated to transforming scientific findings into applications, with an initial focus on personalised healthcare. The centre brings together not only different fields of research, but also institutions: besides ETH Zurich, the University of Zurich and four hospitals and clinics in Zurich are founding members. As part of The LOOP Zurich, a professorship in the field of biomedical informatics is being funded at ETH.

The third programme of the Singapore–ETH Centre, Future Health Technologies, also began in 2020. It aims to use digital technologies to enable greater prevention in the healthcare system, while at the same time making the system more patient-centric. The National Centre of Competence in Research (NCCR) Microbiomes launched in 2020. Its research on microbial communities is relevant not only to the medical field but also to sustainability. ETH is the Leading House of the NCCR.

Data Science

A groundbreaking announcement from the main focus area of data science concerned the opening of the ETH AI Center (see pages 24–25).

The Swiss Support Center for Cybersecurity, founded in 2020, has a different focus. It is a joint initiative of ETH Zurich and EPFL, together with the federal government, to support Swiss public administration, the economy and civil society on issues of cybersecurity. Other cooperation partners may gradually join. To maintain contacts with policymakers, the centre has an office in Bern, the Swiss capital.

Several new professorships also strengthened this in 2020. There are eight in total, including those in system security, computational physics and social networks.

Sustainability

ETH's strong commitment to ecological research is reflected in the appointment of seven new professorships in fields including plant ecology, climate finance and policy, and environmental chemistry of anthropogenic materials.

ETH is participating in the establishment of a new centre for climate research in Davos, which was founded jointly with the Swiss Federal Institute for Forest, Snow and Landscape Research (WSL) and the Canton of Graubünden and will research social and economic issues relating to climate change, extreme events and natural hazards in mountain regions. The two professorships connected to the centre are affiliated with ETH and WSL.

The World Food System Center is a centre of excellence that successfully contributes to the focus area of sustainability, and to some extent healthcare, with its diverse research on food production and nutrition. The accreditation of the centre, founded in 2011, was extended for another four years in 2020.

The NCCR Catalysis, for which ETH is the Leading House, started work in 2020. The aim of this NCCR is to lay the foundations for a more sustainable chemistry.

Manufacturing Technologies

In 2020, the new Center for Augmented Computational Design in Architecture, Engineering and Construction (Design++) was launched at ETH. The first milestone of this initiative was the opening of the Immersive Design Lab in December 2020, which brings together computational design and augmented reality (XR).

A new professorship for digital construction technologies was created in the focus area of manufacturing technologies.

INDUSTRY AND SOCIETY

For ETH Zurich, open dialogue forms an important part of social responsibility, because complex issues require the sharing of information between science, industry and society. In this way, the university makes socially relevant research topics accessible to a broader public. The campus will again become a place of direct interaction as soon as circumstances allow. ETH also supports the transfer of scientific findings to industry and fosters scientific collaboration with national and international corporations and SMEs.

FINDING SOLUTIONS TOGETHER

The past year has seen various ETH initiatives underscoring solidarity in the battle against COVID-19, including helpfulETH and Students4Hospitals. The first, helpfulETH, develops engineering solutions to cater for urgently needed health-care equipment. The second, Students4Hospitals, is an internet platform set up by ETH students that assigns students from across Switzerland to assist in hospitals. "The enthusiasm and determination of everyone involved shows that motivated students can make a valuable contribution to society," says Rahel Schmidt, one of the initiative's co-founders.

► Students4Hospitals:

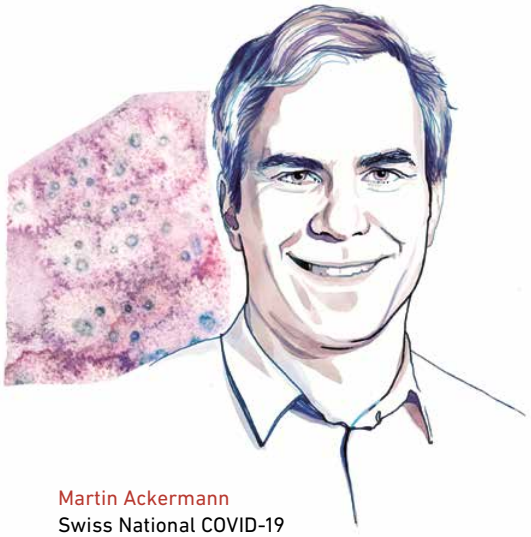
ETH Zurich / Alessandro Della Bella

UNITED AGAINST COVID-19

In a united response to the pandemic, scientists from many different disciplines have come together to form an advisory group for Switzerland. Twelve ETH researchers have prominent roles in this national body.

By Franziska Schmid

Annette Oxenius
Advisory Panel



Martin Ackermann
Swiss National COVID-19 Science Task Force (Chair)

The world was shaken to the core by the pandemic in 2020. It soon became clear that the crisis could only be overcome by pulling together, with science playing a particularly vital role. Switzerland was quick to respond, establishing a new group of prominent scientists at the end of March: the Swiss National COVID-19 Science Task Force. A crucial point: although the mandate for the task force originates from the federal government, its 70 or so members are volunteers and receive no form of compensation – so they are completely independent.

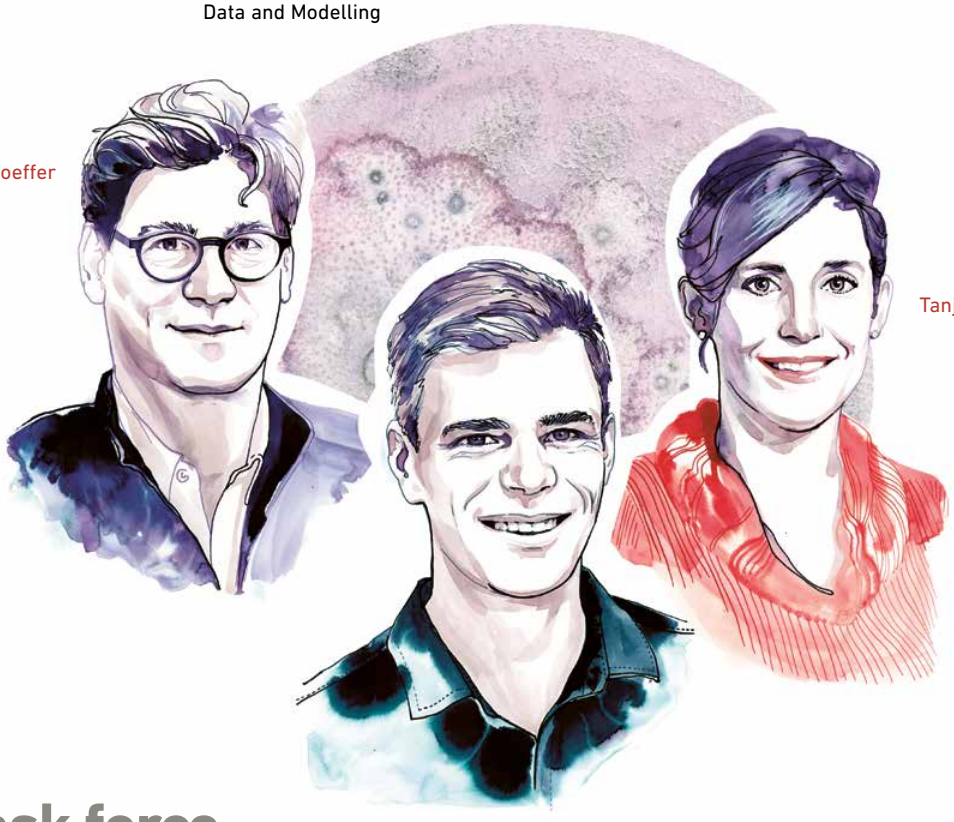
Answers to the most burning questions

The job of the task force is to advise the federal government and other public authorities during the COVID-19 crisis. In its policy briefs, it provides an expert opinion on totally new challenges facing the authorities. The range of topics is extremely broad: minimum specifications for different types of face masks, the role of children and young people, aerosols, and recommendations for economic support. The task force also publishes status reports on the current situation in Switzerland – a particularly important function during the second wave of the pandemic in autumn 2020. The task force also updates the public on the latest scientific findings. Its experts are very much in the public spotlight and strive to satisfy the strong demand for information from the Swiss media and the general population.

As of: 19 December 2020

ETH Zurich / Irene Sackmann

Expert Group on
Data and Modelling



Sebastian Bonhoeffer
(Chair)

Tanja Stadler

Thomas Van Boeckel

“The task force recommends; the politicians decide.”

Martin Ackermann

Expertise in many areas

One of the task force’s strengths is its broad interdisciplinary expertise: a total of ten “expert groups” concentrate on the most pressing issues raised by the pandemic. The task force has a high proportion of ETH scientists, some whom chair expert groups.

Martin Ackermann has been chair of the task force since 1 August 2020. The Professor of Molecular Microbial Biology at ETH and Eawag is inspired by the level of commitment and cooperation in the expert groups: “There tends to be an element of competition in the scientific world, but our priority in the Task Force is to work together to find the best possible solution for Switzerland.” He notes that chairing the Task Force can obviously be challenging as well, because of his role as intermediary between politicians, public authorities and scientists. Ultimately, however, the respective roles are clearly defined: “The task force recommends; the politicians decide.” The task force management team is supported by a panel of advisory experts, including Annette Oxenius, ETH Professor for Immunology.

The **Data and Modelling** expert group, chaired by Sebastian Bonhoeffer, analyses and assesses the current pandemic situation in Switzerland based on epidemiological data and mathematical modelling. The ETH Professor of Theoretical Biology not only advises the authorities on the key issues of which data should be collected and the best methods for doing so, but explores other aspects, such as the effectiveness of quarantine measures. This group includes two other ETH members: Tanja Stadler, Professor for Computational Evolution, and Thomas Van Boeckel, Professor of Health Geography and Policy. Their group analyses infection trends and calculates the reproduction (R) rate, which shows the number of people on average who will be infected by someone with the virus. This value applies to the whole of Switzerland and is crucial for assessing and combatting the virus. Thomas Van Boeckel has set up a web-based platform for monitoring intensive care unit occupancy. Working closely with the government’s Coordinated Medical Services, his team models and analyses ICU bed capacity in different hospitals.

“We’re all able to benefit from each other’s knowledge.”

Roman Stocker

Expert Group on
Exchange Platform

Eleonora Secchi

Roman Stocker
(Chair)

Mirko Meboldt

Jan-Egbert Sturm
Expert Group on
Economics
(Chair)

The **Exchange Platform** expert group is chaired by Roman Stocker, Professor of Groundwater and Hydromechanics at ETH. Other ETH members in this group include Mirko Meboldt, Professor for Product Development and Engineering Design, and Dr Eleonora Secchi, a lecturer in Stocker’s research group. This expert group focuses on three key areas. The online platform Academic Resources for COVID-19 takes requests for equipment, consumables and resources – as well as specialist personnel – required by Swiss diagnostic laboratories and matches them with supplies from Swiss academic groups. Avoiding red tape streamlines the whole process. HelpfulETH, a joint initiative between ETH Zurich and EPFL, provides short-term engineering solutions for needs in the healthcare sector that have been created by the COVID-19 pandemic. On the international level, the group also collaborates with other scientific advisory groups, such as Germany’s Robert Koch Institute, in areas such as the infection risk for children. “The desire to help each other and exchange ideas is incredible. We’re all able to benefit from each other’s knowledge,” Stocker stresses.

Markus Stoffel
Expert Group on
Diagnostics and
Testing

Manfred Kopf
Expert Group on
Immunology

Effy Vayena
Expert Group on
Digital Epidemiology

The task force also has a high-ranking expert group for economic issues. The **Economics** group is chaired by Jan-Egbert Sturm, Professor for Applied Macroeconomics and Director of the KOF Swiss Economic Institute at ETH. This group is particularly important in view of the repeated claims that the task force does not pay enough attention to the economic consequences of the recommended measures. Sturm explains: "We see there can be no trade-off between the economy and public health. To get the economy and society back on their feet, the virus must be effectively contained – and this is precisely the goal the task force is working towards."

Markus Stoffel, ETH Professor for Molecular Health Sciences, is a member of the **Diagnostics and Testing** expert group, which deals with the different types of coronavirus tests and the overall testing strategy.

Manfred Kopf, Professor of Molecular Biomedicine at ETH Zurich, belongs to the **Immunology** expert group, which has an important advisory role on vaccines.

Effy Vayena, ETH Professor for Bioethics, works in the **Digital Epidemiology** expert group. She focuses on the ethical aspects of the digital challenges presented by the pandemic. One key topic, for example, is the use of the SwissCovid app.

Total commitment thanks to full support

All the scientists involved in the task force share the same high level of personal dedication. One thing is clear, however: their involvement is only possible thanks to the university's full support. "The huge appreciation and support provided by ETH mean a lot to us. Our colleagues have stepped in to cover the additional workload created through our involvement in the task force. This solidarity cannot be taken for granted," comments Martin Ackermann, task force chair. The pandemic has brought the scientists together and led to the creation of a unique network. Even so, everyone involved hopes it won't be too long before the task force is no longer needed.

SPARK AWARD 2020

ILLUMINATING TUMOUR TISSUE

Making tumours visible to help surgeons cut only as much as necessary: that is the goal of an invention by Helma Wennemers and Matthew Aronoff. They have developed a fluorescent marker that illuminates cancer tumours. For their achievement they have received the ETH Spark Award, which recognises the most innovative and commercially promising invention of the past year.

The invention is not something the two scientists stumbled upon by accident. "We have been researching the collagen protein for ten years to understand it better at the molecular level and thus lay the foundation for medical applications," ETH Professor Wennemers explains. The body needs collagen to create tissue. But in cases of cancer and various chronic conditions, tissue production goes into overdrive. To make this abnormal production of tissue visible, the two researchers turned to the enzyme LOX, which initiates the cross-linking of collagen proteins in tissue. Their marker accumulates where LOX is active. "Our invention has now reached a point where it is realistic to hope that it will help patients."

The patent application process is already underway and the researchers are looking into the possibility of founding a spin-off.

▲ The winners of the Spark Award 2020: Helma Wennemers and Matthew Aronoff.

▼ Spark Award 2020:

CYBATHLON 2020 GLOBAL EDITION

OVERCOMING OBSTACLES

Second edition, new format: Cybathlon 2020 – a unique competition in which people with disabilities compete with the aid of modern assistive technology – was held virtually due to the COVID-19 pandemic. Fifty-one teams from 20 countries competed in their respective home countries after years of preparation. Viewers from all over the world were able to follow the emotionally charged races on 13 and 14 November 2020 via live stream. The programme also featured background reports on inclusion and technology.

As at the Cybathlon première in 2016, the teams battled it out in six disciplines: a virtual race with mind-controlled tasks, a bike race with electronic muscle stimulation, and obstacle courses for those racing with arm prostheses, leg prostheses, robotic exoskeletons and motorised wheelchairs. Each team was allowed to complete the obstacle course three times within three hours, the best run being counted. Between 5 and 13 teams competed for victory in each discipline. Switzerland sent a total of ten teams to the competition, five of which have ties to ETH Zurich.

Around 70 people were involved in planning and holding the event, which proved very challenging due to the pandemic. The next Cybathlon is scheduled for 2024. "Universities have social responsibilities. Technology should serve people – not the other way around. The Cybathlon is a particularly impressive example of how humans and technology can create unity," said ETH President Joël Mesot.

▲ People and technology go all out to win this virtual competition.

▼ Cybathlon 2020:

UNIVERSITY OF ST. GALLEN STUDY

SPIN-OFFS EXTREMELY SUCCESSFUL

ETH spin-offs boost innovative strength and create more jobs on average than other Swiss start-ups. ETH's support is crucial in this respect: besides the technology transfer office ETH transfer, networking opportunities and the Pioneer Fellowships funding programme are proving to be success factors. This was the finding of a study conducted by the University of St. Gallen.

The analysis assessed human resource factors, impact on the economy and innovation, financial matters and operational aspects. According to the study, 95 percent of the companies are still located in Switzerland and have generated about 30 jobs on average – more than twice the average number for Swiss start-ups. The frontrunners are companies in the electronics sector, with over 2,000 full-time equivalents. These firms also boast the largest number of patents per company. The overall equity value of all spin-offs examined is almost 5 billion Swiss francs. Biotech and pharmaceutical companies receive the most investor funds.

The spin-offs even defied the coronavirus pandemic. Climeworks raised 100 million francs in a financing round for its technology that filters carbon dioxide from ambient air. The online ticket service GetYourGuide was able to secure around 120 million francs, while DeepCode, which has built an AI platform to support coding, was acquired by Snyk, a leader in the field of code security analysis.

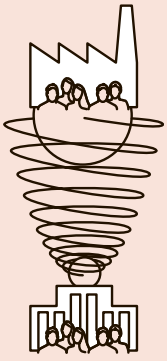
► Spin-off study:

ETH Zurich / Martin Rütsche, Alessandro Della Bella

OVERVIEW OF INDUSTRY AND SOCIETY

A DIRECT LINE TO THE ECONOMY AND SOCIETY

ETH Zurich makes a key contribution to Switzerland's development through knowledge and technology transfer. Interaction with industry and business has become even more important in recent times.



In addition to its core tasks of educating specialists and conducting research, ETH makes a significant contribution to the innovation ecosystem of the greater Zurich area and to Switzerland's economic success. The university's primary aim is to **transfer knowledge and technologies to the marketplace,** leading to the creation of new companies, products and jobs.

Effective transfer requires platforms and partnerships. For example, the **technology transfer office, ETH transfer,** alone concludes around 1,000 new contracts with third parties each year, most of them industrial partners. To help put research ideas into practice, ETH transfer also supports the spin-off of young companies.

The pandemic did nothing to dampen the desire to set up your own company – on the contrary: with 34 new spin-offs, more ETH members than ever before took the leap into the corporate world. ETH spin-offs were able to raise venture capital totalling 400 million Swiss francs. Particularly impressive were the financing rounds of GetYourGuide, which raised 120 million Swiss francs, Climeworks with 100 million and Scandit with 80 million francs. HeiQ was the first ETH spin-off to go public on a foreign stock exchange (London). Several young ETH companies were successful in national competitions, including the Swiss Technology Award (hemotune, HeiQ), the Grand Prize of the >>venture>> competition (Oxyle), the Swiss Economic Award (ANYbotics), the De Vigier Award (FenX, Microcaps, Oxara) and the ZKB Pionierpreis Technopark (Microcaps). Also doing great things is the company Ubique, founded by ETH graduates, which developed the SwissCovid app in partnership with EPFL and ETH.

To encourage creativity and inventiveness within the university, ETH also presents the annual **Spark Award** for scientific ideas: in 2020, the prize went to Helma Wennemers and Matthew Aronoff for their promising invention of a new method for making tumour tissue visible (see page 36).

With its **Pioneer Fellowships,** ETH helps young researchers to develop new products and services. The scholarships contribute significantly to the conversion of innovative research ideas into products or services. Since 2010, a total of 106 scholarships have been awarded, and 62 spin-offs have emerged from them to date. Fourteen Pioneer Fellows are currently in the funding programme. They also benefit from the support of the **Innovation & Entrepreneurship Lab** (ieLab).

Platforms allowing regular interaction between science and industry are very important. **Industry Day,** which has been a regular fixture since 2013, provides for such interaction and was held as an online event (e-Week) for the first time in 2020. In addition, ETH is active in various national innovation networks, including the **Swiss Technology Transfer Association** (swiTT) and **Innosuisse.** ETH also leads the **ESA Business Incubation Centre Switzerland** (ESA BIC CH), which supports start-ups related to space technologies. Since it was founded in 2016, ESA BIC CH has already supported more than 35 young high-tech companies from all over Switzerland. The Swiss BIC has advanced rapidly to become a flagship incubator within Europe.

To assess the economic importance of innovative strength, the University of St. Gallen conducted a study on behalf of ETH. The survey of spin-off companies showed that they have created **around 4,500 direct jobs** in recent years, 97 percent of them in Switzerland (see page 36).

The pandemic forced ETH to move many public events and meeting opportunities into cyberspace during 2020, including the autumn **Treffpunkt Science City** programme on climate change. The health crisis increased the need for scientific advice, exemplified by ETH's involvement in the **Swiss National COVID-19 Science Task Force.** Through the task force, several ETH researchers put their expertise at the service of the federal authorities and society as a whole (see pages 32–35).

The many awards won by ETH scientists year after year shows that the university offers the right environment for cultivating academic excellence. In 2020, ETH received a series of prestigious prizes, including the Swiss Science Prize Marcel Benoist, and also awarded prizes itself, such as the Rössler Prize.

HONOURS AND AWARDS

ETH Zurich / Gian Marco Castelberg

PRESTIGIOUS AWARD FOR PROTEOMICS PIONEER

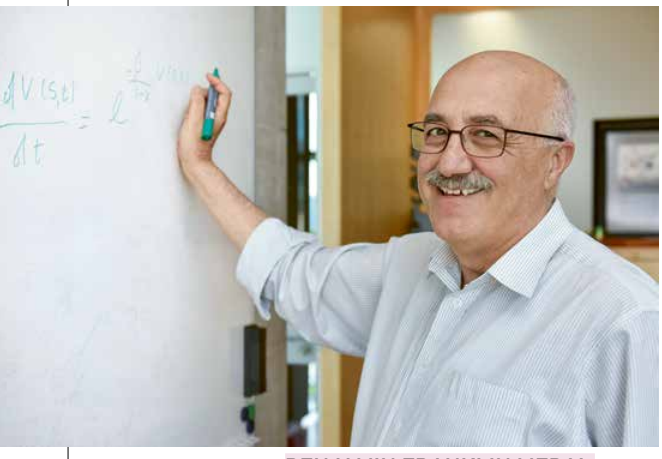
Ruedi Aebersold is the 100th winner of the Swiss Science Prize Marcel Benoist, worth 250,000 Swiss francs. Emeritus professor since 2020, Aebersold was honoured for the part he played in founding and advancing the study of proteomics, a branch of biology that is seen as fundamental to the personalised medicine of the future. Aebersold has devoted his research career to recording all the proteins of a cell or living organism at a given point in time – the proteome – both qualitatively and quantitatively.

► Marcel Benoist Prize 2020:

AWARD-WINNING ETH RESEARCHERS

In 2020, many scientists from ETH Zurich were again honoured with prizes for their outstanding achievements. We report on five award-winning ETH researchers.

By Claudia Hoffmann



BENJAMIN FRANKLIN MEDAL

CREATING THE BASIS FOR COMPUTER SIMULATIONS

Great ideas are rarely born in a quiet room, but rather come from sharing knowledge with others. This was certainly true of the method that ETH physicist **Michele Parrinello** developed in 1985 together with chemist Roberto Car from Princeton University. Coming from different scientific backgrounds – Parrinello in molecular dynamics, Car in quantum mechanics – the two men brought together two seemingly incompatible areas of physics: density functional theory, which describes the behaviour of electrons, and molecular dynamics. The result was the Car–Parrinello method, whereby molecular states can be simulated realistically on the computer, based on quantum mechanical calculations.

The groundbreaking work came at a time when the best high-performance computers had less computing power than a standard PC today.

This method has been continuously developed by its inventors and many other researchers and is now widely used in chemistry, biology and materials science. It helps, for example, to find new active ingredients for drugs, to simulate interactions between proteins and to develop new materials.

The two researchers have won countless accolades for their invention. Parrinello has received awards including the prestigious Swiss Science Prize Marcel Benoist (also known as the "Swiss Nobel Prize") in 2011 and the Dreyfus Prize in 2017. In 2020, Parrinello received the Benjamin Franklin Medal – again jointly with Roberto Car – which the American Franklin Institute awards to outstanding researchers in natural sciences and engineering. The award ceremony will not take place until 2021 due to the COVID pandemic.

Parrinello has been a professor at ETH's Institute for Computational Science in Lugano since 2001. Today, his group continues to simulate the behaviour of atoms and molecules on the computer – but with far more computing power than at the birth of the Car–Parrinello method over 35 years ago.

Valentina Mazza; Keren Bisaz, Studio Mirages

CHORAFAS PRIZE

KEEPING ONE STEP AHEAD OF ART FORGERS

Laura Hendriks is not actually that interested in art. The fact that she nevertheless spends much of her time with paintings has more to do with detective work: she is a chemist who develops new methods to combat art forgery. The long-established C-14 method can be used to determine the true age of materials and objects. However, it has not been used to date paintings up to now because it would require so much material that the painting would be damaged.

This led Hendriks – who simultaneously completed her doctorate in the Laboratory of Ion Beam Physics and ETH's Laboratory of Inorganic Chemistry – to adapt the C-14 method. This meant that a tiny fibre of the canvas was now enough to determine its age. The only catch was that forgers often paint on old canvases to make their copy appear genuine. "In such cases, you wouldn't be able to recognise the forgery from the age of the canvas," says Hendriks. She therefore went a step further and focused on the binding agents used to mix the paints. By combining the C-14 method with chemical analyses, she was able to show, using a known case, that the binding agent was too modern for the alleged age of the painting, and thereby confirm the forgery. More cases could soon come to light thanks to the new method: the Laboratory of Ion Beam Physics is already analysing binders in paintings on behalf of clients.

Hendriks received the Chorafas Prize 2020 for her outstanding dissertation. The 30-year-old is now continuing her research thanks to funding from a Branco Weiss Fellowship at ETH. At the School of Engineering and Architecture of Fribourg, she will develop further dating methods, this time for paint pigments. It is a race, she says, because counterfeiters quickly learn how they might be exposed. "That's why we always have to be one step ahead of them."

CHORAFAS PRIZE

The Chorafas Prize is worth 5,000 US dollars and is awarded every year for outstanding dissertations in medicine, engineering and natural sciences that have high application potential. The prize is awarded by a foundation established by the Greek engineer, author and philanthropist Dimitris N. Chorafas (1926–2014). One or two students are selected from each of the foundation's 21 partner universities worldwide, including ETH Zurich, EPFL, Massachusetts Institute of Technology (MIT) and Tokyo Institute of Technology (Tokyo Tech).

CHORAFAS PRIZE

EXTRA-SENSITIVE DRONES

Working at great heights – cleaning skyscraper façades or inspecting wind turbines, for example – is not without its dangers. Accidents often occur. "We want to make such work safer in the future," says **Mina Kamel,** co-founder and CEO of ETH spin-off Voliro. The young company has developed an autonomous flying robot that can not only fly very close to objects, but also touch them. It scans surfaces with the aid of sensors or carries out work on them – even in the most inaccessible places and at great heights. The highly manoeuvrable drone has already been used to do things like spray new paint over an entire building at Limmattal Hospital.

Kamel came up with the original idea together with colleagues during a student project at ETH. As part of his doctoral thesis in the laboratory of Roland Siegwart, Professor of Autonomous Systems at ETH Zurich, he continued the project and optimised the drone's control technology. In 2020 his work won him the Chorafas Prize, which is awarded annually to two outstanding doctoral students at ETH (see box).

The Wyss Translational Center Zurich – a joint accelerator of the University of Zurich and ETH – offered the perfect platform for founding Voliro. As CEO, Kamel now has his hands full: he looks after customers and investors around the clock. Voliro offers the flying robot as a service, where trained personnel control and maintain the drone. "This way we can optimally tailor the operation to the customer's requirements," Kamel explains.

EMS PRIZE

UNDERSTANDING COMPLEX PHENOMENA MATHEMATICALLY

Explaining natural phenomena using formulas: this is the goal of mathematician **Joaquim Serra.** His research interests include partial differential equations which describe the behaviour of superconductors, liquid crystals, electric potentials and other phenomena. Despite great scientific progress, many questions in this field remain unanswered: "It is very challenging to understand such complex phenomena mathematically," says Serra. It's a challenge that the 34-year-old is clearly equal to: in 2020, he received one of the prestigious EMS prizes for his work. This award from the European Mathematical Society honours young researchers for outstanding contributions to mathematics every four years.

Serra took his degree and PhD at the Polytechnic University of Catalonia in Barcelona. He then worked in a start-up advising clients on "big data". He found it an interesting experience to apply his knowledge to practical issues, but his true passion is for basic research. Thanks to an Ambizione project of the Swiss National Science Foundation, Serra joined Alessio Figalli's group as a postdoc in 2018. ETH Professor Figalli is a recipient of the Fields Medal, also known as the "Nobel Prize in Mathematics". The two have already published several scientific papers together. "It's fantastic working with him," says Serra. There has been great progress in mathematics in recent years – partly because researchers are collaborating more, even across disciplines, he says, and ETH provides ideal conditions for this.

The award of the EMS Prize encourages him to continue his high-level research. The future is looking bright: for a project on stable interfaces – for example between immiscible liquids – Serra has just been awarded one of the European Research Council's generous ERC Starting Grants. This will allow him to pursue his research over the next five years in his new post as Assistant Professor of Mathematics at ETH Zurich.

RÖSSLER PRIZE

FASTER DETECTION OF SICK PROTEINS

Proteomics plays an important role in understanding diseases such as cancer or Alzheimer's. It investigates the proteome, i.e. the entire set of protein molecules that occur in a particular cell or tissue, some of which may be pathologically altered. This field has made enormous progress in recent years. **Paola Picotti,** Professor of Molecular Systems Biology at ETH Zurich, has made a significant contribution. The multi-award-winning researcher is developing methods that make proteome analyses easier and faster than ever before. They make it possible, for example, to detect structural changes in thousands of proteins at the same time, or to investigate the effects that drugs have.

Picotti develops new processes based on mass spectrometry, which she learned while working on her doctoral thesis at the University of Padua. The young researcher immediately realised the potential of this method for proteome analysis. That is why she came to ETH Zurich in 2007, working in the laboratory of Ruedi Aebersold (see page 39), who is considered a pioneer in proteomics: to learn the necessary skills from him. She found the collaboration inspiring and motivating.

Today, Picotti and her own research group are investigating how Parkinson's disease can be detected earlier in patients based on protein changes. She uses "limited proteolysis mass spectrometry" to detect changes in the structure of many proteins simultaneously. For developing this method, Picotti received the Rössler Prize in 2020. At 200,000 Swiss francs, the prize is ETH's most valuable award and is presented annually to young professors for scientific excellence and outstanding achievements. Picotti intends to use part of the prize money for her own research, but will donate another part to the Corona Impulse Fund, which the ETH Foundation has launched to combat the pandemic.

ETH Zurich / Nicola Pitaro, Gian Marco Castelberg

SPECIAL AWARDS TO ETH MEMBERS

ETH ZURICH LATSIS PRIZE

Professor Lavinia Heisenberg, Assistant Professor in the Department of Physics, was awarded the prize for her systematic approach to finding solutions to the problems of general relativity. Gravitation still cannot be explained with a single theory. Heisenberg's approach is multidisciplinary: the quality of her theories is measured by the extent to which mathematical equations can explain the data from particle physics experiments or from cosmological and astrophysical observations.

BREAKTHROUGH OF THE YEAR AWARD

Professor Metin Sitti of the Department of Information Technology and Electrical Engineering (affiliated) received the Breakthrough of the Year award from the Falling Walls Foundation in the Engineering and Technology category. His microrobots open up new possibilities for non-invasive medical diagnoses and treatments. One of the greatest challenges is the measured and precise control of tiny robots in turbulent body fluids and pulsating organs.

LOPEZ-LORETA PRIZE

Dr Jochen Mueller, former doctoral student in the Department of Mechanical and Process Engineering, was honoured for his research project, "Next-generation prosthetics: towards the end of disability via digital fabrication". The Lopez-Loreta Prize, worth 1 million euros, is awarded annually to researchers from a small circle of technical universities. Mueller continues his scientific work at the Harvard School of Engineering, USA.

PFIZER RESEARCH PRIZE

Dr Daniela Latorre, lecturer in the Department of Biology, was honoured, together with Dr Ulf Kallweit from Witten/Herdecke University, in the category Neurosciences and Diseases of the Nervous System. The researchers received the prize for their study on the role of the immune system in narcolepsy. With their study, they were able to prove that narcolepsy is an autoimmune disease: T cells – white blood cells that aid in mounting an immune response – destroy the neuropeptide hormone hypocretin, which influences sleep–wake regulation.

SWISS ARCHITECTURAL AWARD

Professor Alexandre Theriot of the Department of Architecture and Stéphanie Bru received the award for three projects by their architectural studio Bruther. The award-winning buildings were designed for locations on the periphery of French cities (Saint-Blaise Cultural and Sports Centre, Paris [2010–2014], New Generation Research Centre, Caen [2013–2015], and Residence for Researchers Maison Julie-Victoire Daubié, Paris [2014–2018]). Their goal is to help restore dignity to socially deprived areas through high-quality architecture. The projects thus meet the award's aim of encouraging public debate on the role of architecture. The award is presented by the Università della Svizzera italiana with the participation of ETH and EPFL.

► Honours and awards for ETH members:

► ETH Day 2020:

HONORARY DOCTORATES

By awarding honorary doctorates, ETH Zurich honours individuals for their outstanding scientific work and recognises their important contribution to science, education and practical applications, or to the synthesis of research and practical work. ETH awarded the following honorary doctorates in 2020:

Professor Stephen R. Quake for his pioneering work in microfluidics and his groundbreaking technological innovations and entrepreneurial spirit at the interface between biology, biotechnology, medicine and physics.

Professor Frans A. Spaepen for his outstanding contribution to the basic understanding of the structure and properties of melts and amorphous materials, and his significant impact on materials science and applied physics.

HONORARY COUNCILLORS

The title of Honorary Councillor is awarded to individuals who foster key scientific activities or fields of work at ETH, or who support the university as a whole. The following people were appointed honorary councillors of ETH Zurich in 2020:

Calvin F. Grieder for his extraordinary personal commitment to the promotion of teaching and research at ETH Zurich, in particular for his outstanding ability to combine technical and entrepreneurial knowledge in order to realise innovative, visionary ideas.

Adrian U. Weiss for his extraordinary personal commitment to the promotion of teaching and research at ETH Zurich, in particular for his work in the areas of architecture, electrical engineering and computer science, as well as in student talent and entrepreneurial spirit.

HUMAN RESOURCES AND INFRASTRUCTURE

WHEN THE CAMPUS WAS DESERTED

A seemingly normal weekday in April 2020: blue skies and glorious sunshine – but not a soul to be seen on the ETH campus. COVID-19 had the world in its grip and the university was forced into lockdown. In mid-March, ETH took all processes that could realistically be transferred online and migrated them, virtually overnight. The aftermath: deserted bus stops and streets, empty squares and gardens, unoccupied buildings and student workplaces, closed restaurants with chairs stacked on tables. Only the occasional ETH employee was left on site to maintain the infrastructure in standby mode and keep essential services running.

► ETH in emergency operations:

ETH continues to grow – both in terms of physical space and staff numbers. Strategic portfolio management plays a key role in this expansion. On the technology front, demands on infrastructure are becoming increasingly specialised. With almost 13,000 employees from Switzerland and abroad, the university is one of the biggest employers in the greater Zurich area. It offers stimulating and attractive jobs in teaching, research and support roles. Outstanding performance at every level keeps ETH at the top of world rankings, so it expects a lot from its employees. As a responsible employer, the university offers attractive terms of employment and good working conditions, which it continuously seeks to improve.

ETH Zurich / Alessandro Della Bella

THE CHALLENGE OF WORKING FROM HOME

In a year dominated by the COVID-19 pandemic, remote working (commonly referred to as "home office" at ETH) was one of biggest adjustments to make. How did that affect ETH members and what lessons can be learned, and what are the consequences for working practices of the future? Professor Gudela Grote carried out an employee study looking into the issues raised by remote working.

By Andrea Lingk

"Human Resources has offered guidelines and an information sheet on flexible and mobile working since 2016. In the past, the level of interest shown by staff and managers in this topic was fairly manageable," comments Lukas Vonesch, Head of the HR department. Four years later, the reality at ETH Zurich looked quite different: the new coronavirus forced members to work from home from mid-March to the end of the year, except for a temporary easing of restrictions over two months in late summer.

To find out how ETH members are coping with remote working, the Executive Board commissioned Gudela Grote, Professor of Work and Organisational Psychology, to carry out a staff study. Over the period from 30 March to 2 June, almost 1,700 employees provided a weekly report on their personal work situation. There was an even balance between male and female respondents, and between scientific and technical/administrative staff. Managers made up 20 percent of total participants.

Well-being, cooperation and work performance

Scores on three key benchmarks – well-being, cooperation and work performance – indicated that most employees had adjusted quite well to the new arrangements, although some responses differed considerably from the average. Feedback on well-being, and on stress in particular, produced scores that spanned both ends of the scale. One positive aspect was the relatively low level of stress on average. On the other hand, stress levels were found to be considerably higher among doctoral students and postdocs.

Online cooperation was said to function well overall. The fact that most teams knew each other before the university went into emergency operations was certainly one reason for this. Another important and unexpected finding: feelings of social isolation actually eased slightly over the course of the study.

Respondents claimed their work performance had not been affected by working from home. The blurring of the boundary between work and private life posed a major challenge, however. Although staff reported that

Positive experiences include: team spirit and group cohesion • virtual collaboration tools • efficiency • learning, temporal flexibility • appreciation of own work • work-related success • prospect of going back to "normality"

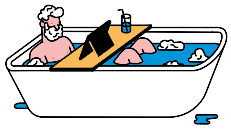
"Extremely high understanding by colleagues/supervisors for the difficult situation between home office and homeschooling, also with regards to changes in the possible task/work volume."

"Zoom offers fantastic communication possibilities. Research seminars take place all over the world via Zoom, so suddenly there is a greater exchange in the global research community."

"The writing of a publication went much faster (as expected) in the home office than in the office. Concentration was much better because there were almost no sources of interference."

"Home office allows me to connect my personal life and work life more effectively. I still see colleagues every day in virtual meetings, but also spend lunch with family."

"I have been preparing Moodle-based exams for the first time. So far it has been a rewarding experience as I had an opportunity to learn something new."



PUTTING THE STUDY IN PERSPECTIVE

Although the findings of the study were positive overall, it should be noted that the general conditions at the start of the pandemic were different from the second half of the year. Initially it was springtime, the whole situation was new and widely interpreted as a temporary emergency. But as the pandemic dragged on, it soon became clear that a return to on-site working would take a while. Responses recorded at a later point in time are therefore likely to be more negative. A second review started at the end of 2020.

the ability to keep both worlds separate got a little easier over time, this also depended on the individual's living situation and family circumstances. In addition, employees had the feeling over the entire study period that they had to be available outside normal working hours. "I see this as an alarm bell for managers," says Grote. "No one should require an employee to be available 24/7."

The study produced thousands of personal stories – both positive and negative. Many said they felt comfortable working from home. They found they were more efficient and felt motivated by the opportunity to self-organise. On the other hand, there were just as many negative comments. Difficulties with time management or work organisation was a particular source of stress. Some staff missed the support normally provided by their managers. For their part, managers found it difficult to get a clear idea of how well their staff were coping.

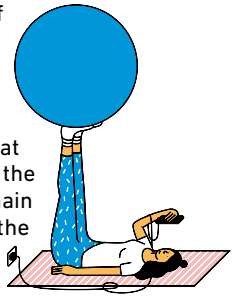
Personality factors and working conditions

Two personality factors also affected how respondents experienced – and coped with – the novel situation. Learning-oriented people who generally enjoy new tasks seemed to encounter fewer problems with remote working. Employees who prefer teamwork, on the other hand, found it hard to work in isolation. "Focusing attention on differences linked to personality would be misplaced, however, since such differences cannot really be influenced. Much greater flexibility can be achieved by the way tasks are organised and the work itself," explains Nadine Bienefeld, a senior scientist assisting with the study. Working arrangements can be adjusted to suit individuals: employees who prefer teamwork could be assigned interconnected tasks requiring cooperation, thereby creating an opportunity for dialogue. Conversely, more autonomy is associated with less stress, conflict and social isolation. "But autonomy should not be considered a free pass. When it comes to work performance, it may be necessary to clarify expectations and deadlines more explicitly than when working on site, where it's easier to monitor the situation." In principle, many managers trusted their staff to work just as efficiently at home as on campus, although employees rate this trust slightly higher than the managers themselves.

▼ Findings of the study:

Recommendations for future working practices

Asked to comment on the post-coronavirus era, staff expressed wishes like more flexibility in choosing their place and time of work. Most of them can imagine working from home two days a week. At the same time, cooperation online must be complemented by personal contacts, and measures should be put in place to strengthen social cohesion and trust. Professor Grote's team proposes a dialogue within the departments to produce hybrid working models that satisfy the wishes of staff, but also meet work requirements, with the Human Resources department standing ready to provide all units with appropriate advice and support. Good IT support is also essential, she says, and guidelines on remote working would be helpful too. A deliberate choice of the most suitable communication channels, for example, is important: not every conversation warrants a Zoom meeting. And the sense of belonging to an organisation can be reinforced through gestures and rituals: a birthday card or friendly chat during a coffee break can smooth integration into the team and ultimately into the ETH community. The main thing is to remain flexible and not to search for the perfect solution.



Negative experiences include: limits of virtual collaboration • social isolation • difficulties with self-management • difficulties with boundary management • lack of manager support, inadequate COVID-related ETH communication and regulations • work-related interpersonal conflicts • work-related uncertainty and stress • inadequate home office setup

"Teaching to a camera, in an empty lecturing hall. It's frustrating and boring for everyone, and I fear to miss many of my students' problems as I'm no longer able to read the room."

"I find working from home extremely unproductive, as you cannot feel any 'switches' between home and work mood. This makes it really hard to focus on one of them."

"I was informed by my boss that even though I have very small kids (and no help) I need to keep up with my work. Thus, I am working very late hours and I'm exhausted and stressed all the time."

"The insecurity about my future employment due to fixed-term contract. The current crisis times seem like stealing our time but in practice everything is due as usual, this adds stress to daily work."

"I do not have an office at home. Therefore, space for work is shared among family and for me it is very small. Especially challenging meeting discussions are difficult."

ON CAMPUS AND BEHIND THE SCENES

"ETH went through an accelerated process of extensive decentralisation and digitalisation, but still managed to keep functioning efficiently," summarises Ulrich Weidmann, Vice President for Infrastructure and head of the university's coronavirus crisis management team. This would have been impossible without the huge efforts of everyone – from the COVID-19 task force to the students, teachers, researchers and staff. The situation was particularly challenging for those working mainly behind the scenes, such as the departments of Safety, Security, Health and Environment; IT Services; Human Resources; and the staff units. Despite emergency operations and the obligation to work from home, some tasks could only be performed by staff on site, including security, mail and logistics services, cleaning, support for critical research facilities and, not least, research and initiatives to tackle COVID-19.

Security Service

The Security Service had to keep watch over buildings that were barely used.

Safety, Security, Health and Environment

"We monitored the course of the pandemic, worked with other members of the ETH task force to draw up recommended areas of action and regulations which were then fed into the university's master plan for managing the pandemic, and submitted regular reports to the task force. On top of that, we answered a wide range of queries submitted to the coronavirus hotline. We backed this up by publishing information sheets and Q&As on the coronavirus website."

Reto Suter, Deputy Head of the Safety, Security, Health and Environment department

Human Resources

"We had to deal with hundreds of queries in a very short space of time and had to find a solution for many individual cases. One major issue was employees starting work, and their employment contracts. Here, travel restrictions led to particularly difficult situations. Another problem was how to categorise working hours for staff unable to work from home."

Lukas Vonesch, Head of the Human Resources department

ETH Library

Library employees ensured ETH members were still able to access information during emergency operations, for example by mailing out magazines and books, or scanning individual articles or chapters.

IT Services

"We had to triple our VPN capacities virtually overnight and come up with a solution for recording and broadcasting teaching events. We already had some software licences for Zoom, which we were fortunately able to add to very quickly. In addition, we experienced a sharp rise in the number of tickets at the start of emergency operations in March 2020, as many ETH members needed support in setting up their home office."

Rui Brandao, Director of IT Services

Logistics Centre

The ETH Logistics Centre in Oerlikon ensured mail processing and transport services continued to function during emergency operations.

INCLUSIVITY AT ETH

ACCESS FOR ALL

In autumn 2020, the Executive Board gave the green light to implement a barrier-free project designed to make all areas of the university accessible to everyone. In future, people with physical limitations or special needs – whether students, lecturers, researchers, staff or visitors – should benefit from greatly improved access to ETH buildings and to the university's digital and analog offerings and services.

"Society rightly expects inclusivity to be a given at a prestigious institution such as ETH. By that I mean the removal of all types of barriers and obstacles," says Ulrich Weidmann, Vice President for Infrastructure. A step at a main entrance, a lack of wheelchair-friendly WCs, web content that is impossible to access for those with impaired vision – all these barriers need to disappear. "The aim of this programme is to make the university entirely barrier-free in the coming years."

To implement the measures, the Executive Board has approved a master plan comprising 15 packages of measures, falling under the categories of construction (9), technology (4) and organisation (2).

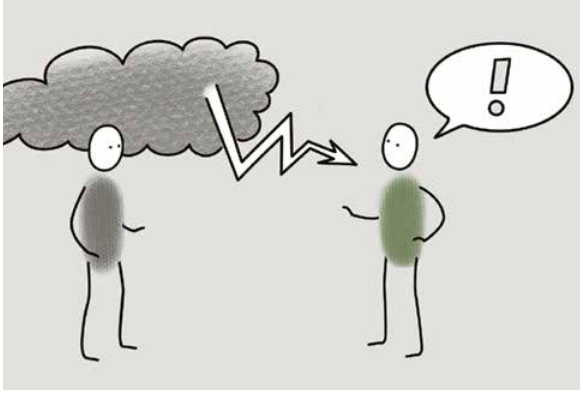
► The Barrier-free at ETH Zurich project focuses strongly on mobility without obstructions in ETH buildings.

As well as modifications to existing buildings, a core aim of the ETH-wide programme is to establish an open, welcoming culture. "Barrier-free at ETH Zurich" should not simply be a slogan, but rather a principle that is practised every day. To this end, ETH is drafting and publishing a mission statement on openness and inclusivity to ensure this principle is firmly rooted within the institution.

Teaching materials also need to be barrier-free in future. Here, the focus is mainly on people with impaired vision or hearing. In addition, signage will be redesigned, and barrier-free evacuation routes mapped out in an app. Depending on the financial situation, it will only be possible to make the necessary modifications to buildings in stages over the next 15 years. Renovations to historical buildings are particularly challenging because of preservation orders. Here, ETH will work with building specialists and disability organisations to come up with suitable solutions.

According to current estimates, the entire implementation programme and the relevant subprojects will cost between 85 and 90 million Swiss francs. There will also be additional costs for many existing buildings that still need to be accurately assessed.

▼ Barrier-free at ETH Zurich:



▲ The ETH Respect Code of Conduct was supplemented in 2020 by a regulation defining inappropriate behaviour and how to deal with it.

► Respect:

OVERCOMING CONFLICT

A CULTURE OF MUTUAL RESPECT

With over 30,000 members of the university community, conflicts and missteps are unavoidable. The crucial point is how staff and students handle such situations. ETH Zurich does not tolerate bullying, harassment, discrimination or threatening behaviour of any kind. The university likewise encourages its staff and students not to tolerate inappropriate behaviour and to take firm action against it. This means not looking the other way if witnessing misconduct.

A new regulation on inappropriate conduct and how to deal with it came into force in November 2020. The regulation has been widely communicated and sets out exactly what constitutes inappropriate behaviour and the procedures for dealing with it. It also provides details of the internal and external contacts and advisory services to approach. The new regulation complements the university's existing Code of Conduct.

In the initial informal phase, anyone needing advice can approach the ombudspersons, university groups or various contact and advice services within the department. The party alleged to have acted inappropriately only becomes involved in the process with the agreement of the person affected. If an amicable solution cannot be reached, the person affected can escalate the matter to the formal phase by submitting a written report to the Reporting Office Conflict Management. If an agreement can still not be reached, this phase may ultimately lead to sanctions such as disciplinary measures or action being taken under personnel law.

ETH Zurich / Alessandro Della Bella, Nicola Pitaro; still from the video explaining how to deal with inappropriate behaviour: www.ethz.ch/misconduct

STAFF BY FUNCTION

ETH Zurich (consolidated)

Full-time equivalents (FTEs) at the end of 2020 (reporting date) or annual average	FTEs annual average						FTEs on reporting date at y/e
					Increase		
	2019 Total	2020 Total	Women	International	Absolute	in %	2020 Total
Total staff [1]	**9,845.0**	**10,098.1**	**34.6 %**	**57.2 %**	**253.2**	**2.6 %**	**10,352.8**
of which permanent members of staff	3,097.3	3,192.4	37.0 %	30.2 %	95.2	3.1 %	3,260.6
Professors [2]	**502.3**	**522.6**	**18.0 %**	**66.8 %**	**20.3**	**4.0 %**	**524.5**
Full professors	403.9	414.5	15.1 %	64.1 %	10.6	2.6 %	413.7
Assistant professors	98.4	108.1	29.0 %	77.4 %	9.7	9.9 %	110.9
Scientific staff	**6,281.9**	**6,402.8**	**31.9 %**	**72.3 %**	**120.9**	**1.9 %**	**6,575.4**
Permanent scientific staff	261.7	271.7	14.0 %	48.1 %	10.0	3.8 %	276.7
Temporary scientific staff	5,565.4	5,692.0	32.4 %	76.3 %	126.6	2.3 %	5,843.8
Senior assistants, scientific staff (temporary)	710.1	731.4	26.5 %	76.7 %	21.4	3.0 %	727.5
Postdoctoral researchers, scientific assistants II	1,182.0	1,195.5	31.2 %	90.6 %	13.5	1.1 %	1,253.0
Scientific assistants I	3,673.3	3,765.0	34.0 %	71.6 %	91.7	2.5 %	3,863.3
Teaching/research assistants	454.9	439.2	35.6 %	36.6 %	–15.7	–3.4 %	454.9
Technical and administrative staff	**2,891.6**	**3,003.1**	**43.6 %**	**26.2 %**	**111.4**	**3.9 %**	**3,077.9**
of which permanent members of staff	2,434.1	2,507.4	43.1 %	22.7 %	73.4	3.0 %	2,571.2
Technical and IT staff	1,556.1	1,615.9	20.7 %	32.1 %	59.8	3.8 %	1,650.7
Administrative staff	1,335.5	1,387.1	70.3 %	19.3 %	51.6	3.9 %	1,427.3
Apprentices	**169.2**	**169.7**	**29.5 %**	**7.4 %**	**0.5**	**0.3 %**	**175.0**

1 Including 118.4 FTEs at ETH Singapore SEC Ltd. on average in 2020, 106.8 FTEs on the reporting date; all scientific staff were fully allocated to the different categories of temporary scientific staff. Technical and administrative staff at ETH Singapore SEC Ltd. were also allocated to temporary staff.

2 Headcount 2020: 565 (incl. professors with appointments at other institutions).

► Staff statistics:

STAFF BY AREA

Total staff

Full-time equivalents (FTEs) at the end of 2020 (reporting date) or annual average [1]	FTEs annual average						FTEs on reporting date at y/e
					Increase		
	2019 Total	2020 Total	Women	International	Absolute	in %	2020 Total
ETH Zurich (consolidated)	**9,845.0**	**10,098.1**	**34.6 %**	**57.2 %**	**253.2**	**2.6 %**	**10,352.8**
Academic departments total	**7,882.0**	**8,078.7**	**33.6 %**	**63.9 %**	**196.7**	**2.5 %**	**8,295.1**
Architecture and Civil Engineering	994.3	1,026.3	36.0 %	59.4 %	32.0	3.2 %	1,057.2
Architecture	404.9	424.0	41.8 %	58.0 %	19.1	4.7 %	439.9
Civil, Environmental and Geomatic Engineering	589.3	602.3	31.9 %	60.3 %	13.0	2.2 %	617.2
Engineering Sciences	2,346.5	2,470.4	22.9 %	69.5 %	123.9	5.3 %	2,604.3
Mechanical and Process Engineering	701.0	746.8	21.4 %	63.9 %	45.8	6.5 %	799.6
Information Technology and Electrical Engineering	615.5	647.7	19.5 %	68.9 %	32.2	5.2 %	678.9
Computer Science	471.3	522.4	19.5 %	71.3 %	51.1	10.8 %	580.3
Materials	244.3	237.6	28.1 %	65.3 %	−6.7	−2.7 %	227.9
Biosystems Science and Engineering	314.4	315.9	35.0 %	84.0 %	1.5	0.5 %	317.6
Natural Sciences and Mathematics	2,346.9	2,348.8	32.6 %	62.9 %	1.9	0.1 %	2,354.3
Mathematics	296.8	299.4	25.3 %	62.1 %	2.6	0.9 %	278.2
Physics	641.2	665.8	20.7 %	59.4 %	24.6	3.8 %	670.4
Chemistry and Applied Biosciences	807.5	790.5	32.7 %	64.1 %	−17.0	−2.1 %	807.0
Biology	601.3	593.0	49.5 %	65.6 %	−8.2	−1.4 %	598.8
System-oriented Natural Sciences	1,552.6	1,580.2	47.1 %	61.3 %	27.6	1.8 %	1,623.2
Earth Sciences	334.0	336.9	35.0 %	66.7 %	2.9	0.9 %	343.2
Environmental Systems Science	672.4	679.2	49.0 %	58.9 %	6.8	1.0 %	703.6
Health Sciences and Technology	546.2	564.2	52.1 %	60.9 %	18.0	3.3 %	576.4
Management and Social Sciences	641.7	652.9	41.3 %	60.0 %	11.2	1.7 %	656.0
Management, Technology, and Economics	343.0	345.3	41.5 %	63.7 %	2.3	0.7 %	347.5
Humanities, Social and Political Sciences	298.7	307.7	41.2 %	55.8 %	8.9	3.0 %	308.5
Teaching and research facilities outside the academic departments, others [2]	**571.1**	**580.8**	**35.2 %**	**60.7 %**	**9.7**	**1.7 %**	**564.8**
Executive Board, staff units and administrative departments	**1,391.9**	**1,438.7**	**40.0 %**	**18.3 %**	**46.7**	**3.4 %**	**1,493.0**
Executive Board and staff units	153.3	164.7	61.3 %	28.0 %	11.4	7.4 %	173.4
Administrative departments	1,238.6	1,274.0	37.2 %	17.1 %	35.4	2.9 %	1,319.6
Corporate Communications	27.4	29.6	57.1 %	23.2 %	2.2	8.0 %	29.4
Academic Services	63.9	65.3	64.5 %	15.5 %	1.4	2.2 %	63.5
Educational Development and Technology	35.3	37.7	41.0 %	30.5 %	2.4	6.8 %	40.0
Student Services	15.8	17.0	79.0 %	3.9 %	1.2	7.3 %	17.4
Controlling	23.8	24.2	48.2 %	12.4 %	0.5	1.9 %	24.7
Financial Services	19.0	18.4	31.9 %	9.1 %	−0.6	−3.0 %	17.9
Accounting	44.5	43.5	47.6 %	18.8 %	−1.0	−2.2 %	40.2
Facility Management	193.2	193.3	18.1 %	17.7 %	0.1	0.0 %	198.9
ETH Library	222.0	218.1	60.0 %	17.2 %	−4.0	−1.8 %	221.3
Real Estate Management	75.8	80.4	33.7 %	15.3 %	4.5	6.0 %	80.3
IT Services	296.3	311.2	12.1 %	20.3 %	14.9	5.0 %	327.0
Human Resources	73.2	74.0	68.5 %	9.0 %	0.8	1.1 %	76.5
Services	103.9	115.1	43.1 %	12.4 %	11.1	10.7 %	136.0
Safety, Security, Health and Environment	42.3	43.2	32.3 %	15.1 %	0.9	2.2 %	45.0

1 The average number of employees at the end of both the reporting year and the previous year is based on the current organisational structure of ETH Zurich as at 31 December 2020. Since 2017, both the headcount and the calculation are reported on a consolidated basis; the figures shown in the table therefore include the staff at ETH Singapore SEC Ltd.

2 "Teaching and research facilities outside the academic departments, others" refers to the Institute of Science, Technology, and Policy (ISTP), Collegium Helveticum, Congressi Stefano Franscini, Institute for Theoretical Studies (ITS), Good Manufacturing Practice Facility (GMP Facility), Functional Genomics Center Zurich (FGCZ), NEXUS Personalized Health Technologies, FIRST Lab, B&R Nanotechnology Center, ScopeM, ETH Phenomics Center, Swiss Seismological Service (SED), Swiss National Supercomputing Centre (CSCS), AgroVet-Strickhof, Swiss Data Science Center (SDSC), Wyss Translational Center Zurich and other central projects. The headcount of the fully consolidated unit ETH Singapore SEC Ltd. is also included (118.4 FTEs as at 31 December 2020 and 106.8 FTEs on average in 2020).

NEW PROFESSORSHIPS

New appointments in 2020

FULL PROFESSORS

Professor Beatrice Acciaio,
Mathematics, D-MATH, formerly Associate Professor at the London School of Economics and Political Science, United Kingdom

Professor Andrea Alimonti,
Experimental Oncology and Translational Cancer Medicine, D-HEST, also Full Professor at the Università di Padova, Italy, and at the Università della Svizzera italiana, Lugano, Switzerland

Professor Markus Bambach,
Advanced Manufacturing, D-MAVT, formerly Full Professor at the Brandenburg University of Technology, Cottbus-Senftenberg, Germany

Professor André Bardow,
Energy and Process Systems Engineering, D-MAVT, formerly Professor at RWTH Aachen University, Germany

Professor Andrea Carminati,
Physics of Soils and Terrestrial Ecosystems, D-USYS, formerly Professor at the University of Bayreuth, Germany

Professor Laura De Lorenzis,
Computational Mechanics, D-MAVT, formerly Professor at the Technical University of Braunschweig, Germany

Professor Teresa Galí-Izard,
Landscape Architecture, D-ARCH, formerly Associate Professor at Harvard University Graduate School of Design, Cambridge, USA

Professor Janneke Hille Ris Lambers,
Plant Ecology, D-USYS, formerly Full Professor at the University of Washington, Seattle, USA

Professor Dennis Hofheinz,
Computer Science, D-INFK, formerly Full Professor at Karlsruhe Institute of Technology, Germany

Professor Georg Holländer,
Developmental Immunology, D-BSSE, also Full Professor at the University of Basel and Director of the Botnar Research Center for Child Health (BRCCH), Switzerland, as well as Full Professor at Oxford University, United Kingdom

Professor Silke Langenberg,
Construction Heritage and Preservation, D-ARCH, formerly Professor at Munich University of Applied Sciences, Germany

Professor James Mitchell (†),
Healthy Ageing, D-HEST, formerly Adjunct Professor at Harvard School of Public Health, Boston, USA

Professor Dylan Possamaï,
Mathematics, D-MATH, formerly Assistant Professor at Columbia University, New York, USA

Professor Romain Quidant,
Nanophotonics, D-MAVT, formerly Professor at the Institute of Photonic Sciences (ICFO), Barcelona, Spain

Professor Ursula Renold,
Education Systems, D-MTEC, formerly head of the Comparative Education Research division at the Swiss Economic Institute (KOF) at ETH Zurich, Switzerland

Professor Christian Rüegg,
Physics, D-PHYS, also Full Professor at EPFL, Professor at the University of Geneva and Director of the Paul Scherrer Institute (PSI), Villigen, Switzerland

Professor G.V. Shivashankar,
Mechano-Genomics, D-HEST, formerly Professor and Deputy Director of the Mechanobiology Institute of the National University of Singapore, Singapore

Professor Metin Sitti,
Physical Intelligence, D-ITET, also department director at the Max Planck Institute for Intelligent Systems in Stuttgart, Germany

PROMOTIONS

Professor Jürgen Biela,
High Power Electronics, D-ITET, formerly Associate Professor at ETH Zurich, Switzerland

Professor Gion A. Caminada,
Architecture and Design, D-ARCH, formerly Associate Professor at ETH Zurich, Switzerland

Professor Christian Degen,
Spin Physics, D-PHYS, formerly Associate Professor at ETH Zurich, Switzerland

Professor Christian Franck,
High Voltage Engineering, D-ITET, formerly Associate Professor at ETH Zurich, Switzerland

Professor Torsten Hoefler,
Scalable Parallel Computing, D-INFK, formerly Associate Professor at ETH Zurich, Switzerland

Professor Jonathan Home,
Experimental Quantum Information, D-PHYS, formerly Associate Professor at ETH Zurich, Switzerland

Professor Steven Johnson,
Physics, D-PHYS, formerly Associate Professor at ETH Zurich, Switzerland

Professor Maksym Kovalenko,
Functional Inorganic Materials, D-CHAB, formerly Associate Professor at ETH Zurich, Switzerland

Professor Maria Schönbächler,
Isotope Geochemistry, D-ERDW, formerly Associate Professor at ETH Zurich, Switzerland

Professor Marcy Zenobi-Wong,
Tissue Engineering and Biofabrication, D-HEST, formerly Associate Professor at ETH Zurich, Switzerland

ASSOCIATE PROFESSORS

Professor Bernd Bodenmiller,
Quantitative Biomedicine, D-BIOL, also Associate Professor of Quantitative Cell Biology at the University of Zurich, Switzerland

Professor Filippo Coletti,
Experimental Fluid Mechanics, D-MAVT, formerly Associate Professor at the University of Minnesota, Minneapolis, USA

Professor Nicolas Noiray,
Combustion and Acoustics for Power and Propulsion Systems, D-MAVT, formerly Assistant Professor (tenure track) at ETH Zurich, Switzerland

Professor Sereina Riniker,
Computational Chemistry, D-CHAB, formerly Assistant Professor (tenure track) at ETH Zurich, Switzerland

Professor Giovanni Sansavini,
Reliability and Risk Engineering, D-MAVT, formerly Assistant Professor (tenure track) at ETH Zurich, Switzerland

Professor Christoph Stadtfeld,
Social Networks, D-GESS, formerly Assistant Professor (tenure track) at ETH Zurich, Switzerland

Professor David Steurer,
Theoretical Computer Science, D-INFK, formerly Assistant Professor (tenure track) at ETH Zurich, Switzerland

Professor Christoph Studer,
Integrated Information Processing, D-ITET, formerly Associate Professor at Cornell University, Ithaca, USA

Professor Shinichi Sunagawa,
Microbiome Research, D-BIOL, formerly Assistant Professor at ETH Zurich, Switzerland

Professor Konrad Tiefenbacher,
Synthesis of Function Modules, D-BSSE, formerly Assistant Professor (tenure track) at the University of Basel and ETH Zurich, Switzerland

Professor Laurent Vanbever,
Networked Systems, D-ITET, formerly Assistant Professor (tenure track) at ETH Zurich, Switzerland

Professor Rico Zenklusen,
Mathematics, D-MATH, formerly Assistant Professor (tenure track) at ETH Zurich, Switzerland

ASSISTANT PROFESSORS

Professor Daniel Ahmed,
Acoustic Robotics for Life Sciences and Healthcare, D-MAVT, formerly Senior Scientist at ETH Zurich, Switzerland

Professor Nicholas Bokulich,
Food Systems Biotechnology, D-HEST, formerly postdoctoral researcher at Northern Arizona University, Flagstaff, USA

Professor Ryan Cotterell,
Computer Science, D-INFK, formerly Lecturer at the University of Cambridge, United Kingdom

Professor Annapaola de Cosa,
Particle Physics, D-PHYS, formerly research fellow at the University of Zurich, Switzerland

Professor Kristy Deiner,
Environmental DNA, D-USYS, formerly research associate at the Museum of Natural History, London, United Kingdom

Professor Helmuth Gehart,
Tumour and Stem Cell Dynamics, D-BIOL, formerly postdoctoral researcher at the Hubrecht Institute, Utrecht, Netherlands

Professor Niao He,
Computer Science, D-INFK, formerly Assistant Professor at the University of Illinois at Urbana-Champaign, USA

Professor Robert Katzschmann,
Robotics, D-MAVT, formerly Chief Technology Officer at Dexai Robotics, Boston, USA

Professor Ana Klimovic,
Computer Science and Engineering, D-INFK, formerly doctoral student at Stanford University, Palo Alto, USA

Professor Stefano Mintchev,
Environmental Robotics, D-USYS, formerly postdoctoral researcher at EPFL, Lausanne, Switzeland

Professor Denise M. Mitrano,
Environmental Chemistry of Anthropogenic Materials, D-USYS, formerly research fellow at Eawag, Dübendorf, Switzerland

Professor Andreas Moor,
Systems Physiology, D-BSSE, formerly Assistant Professor at the University of Zurich, Switzerland

Professor Gabriel Neurohr,
Cell Size in Cell Homeostasis, D-BIOL, formerly postdoctoral researcher at Massachusetts Institute of Technology, Boston, USA

Professor Kaveh Razavi,
Secure Systems Engineering, D-ITET, formerly Assistant Professor (tenure track) at the Vrije Universiteit Amsterdam, Netherlands

Professor Mrinmaya Sachan,
Machine Learning and Natural Language Processing, D-INFK, formerly Research Assistant Professor at the Toyota Technological Institute at Chicago (TTIC), USA

Professor Sebastian Schemm,
Atmospheric Circulation, D-USYS, formerly senior scientist at ETH Zurich, Switzerland

Professor Thomas Schutzius,
Multiphase Thermofluidics and Surface Nano-engineering, D-MAVT, formerly senior scientist at ETH Zurich, Switzerland

Professor Shweta Shivaji Shinde,
Computer Science, D-INFK, formerly postdoctoral researcher at the University of California, Berkeley, USA

Professor Benedikt Soja,
Space Geodesy, D-BAUG, formerly postdoctoral researcher at the NASA Jet Propulsion Laboratory, Pasadena, USA

Professor Outi Supponen,
Multiphase Fluid Dynamics, D-MAVT, formerly Assistant Professor of Experimental Fluid Mechanics at McGill University, Montreal, Canada

Professor Siyu Tang,
Computer Vision, D-INFK, formerly research group leader at the Max Planck Institute for Intelligent Systems, Tübingen, Germany

Professor Yuko Ulrich,
Experimental Epidemiology, D-USYS, formerly research fellow at the University of Lausanne, Switzerland

Professor Fanny Yang,
Computer Science, D-INFK, formerly postdoctoral researcher at ETH Zurich, Switzerland, and Stanford University, Palo Alto, USA

Professor Maksym Yarema,
Nanoscale Memory Devices, D-ITET, formerly senior scientist at ETH Zurich, Switzerland

Professor Fisher Yu,
Computer Vision, D-ITET, formerly postdoctoral researcher at the University of California, Berkeley, USA

ADJUNCT PROFESSORS

Professor Fadoua Balabdaoui,
D-MATH, formerly senior scientist at ETH Zurich, Switzerland

Professor Dominik Brunner,
D-USYS, formerly research group leader at Empa, Dübendorf, and lecturer at ETH Zurich, Switzerland

Professor Paolo Crivelli,
D-PHYS, formerly senior scientist at ETH Zurich and laboratory head at CERN, Geneva, Switzerland

Professor Peter Derlet,
D-MATL, formerly senior scientist at the Paul Scherrer Institute (PSI), Villigen, Switzerland and lecturer at ETH Zurich, Switzerland

Professor Lukas Paul Gallmann,
D-PHYS, formerly lecturer at ETH Zurich, Switzerland

Professor Martin Gossner,
D-USYS, formerly lecturer at ETH Zurich as well as group leader and senior scientist at WSL, Birmensdorf, Switzerland

Professor Martin Mächler,
D-MATH, formerly lecturer at ETH Zurich, Switzerland

Professor Salvador Pané i Vidal,
D-MAVT, formerly senior scientist and lecturer at ETH Zurich, Switzerland

Professor René Michel Rossi,
D-HEST, formerly lecturer at ETH Zurich and deputy head of the Materials Meet Life department at Empa, Dübendorf, Switzerland

Professor Giacomo Scalari,
D-PHYS, formerly senior scientist at ETH Zurich, Switzerland

OVERVIEW OF HUMAN RESOURCES AND INFRASTRUCTURE

SERVING THE UNIVERSITY

Human Resources and Infrastructure provides integral, state-of-the-art infrastructures and services for teaching, research, knowledge transfer and dialogue with the public.

With its core expertise in sustainable sourcing, facilities management, refurbishment and maintenance, the Human Resources and Infrastructure area works towards a common vision and mission: **promoting excellence in research, teaching and knowledge transfer through highly qualified and motivated staff, excellent infrastructure, proven technology and efficient services.**

The **Real Estate Management** department is responsible for developing the university's various sites. It looks after ETH Zurich's real estate portfolio and assures the availability of the required facilities and building infrastructure in a timely and cost-effective manner. The real estate strategy published in 2020 sets out the vision and strategic principles for the future real estate portfolio. The further development and capacity expansion of the Hönggerberg campus reached another important milestone in November 2020, as the Municipal Council of the City of Zurich approved the legal planning framework, with partial amendment of the building and zone regulations and special building regulations. ETH also created the basis for the complete refurbishment of the Main Building, canteen and multipurpose building under the Polyterrasse. Despite the pandemic, major construction projects (such as the new GLC building in Zurich and the BSS building in Basel) as well as renovation and expansion projects (such as the ML/FHK and HIF) continued. As part of the district management scheme for the Zurich City University District, ETH was involved in activities including the planning and implementation of improvements for streets and green spaces.

The **Facility Management** department, which looks after the technical and infrastructure management for all buildings and facilities used by ETH, drew up a cross-departmental facility management strategy for the next four years. Its staff have also supported the university's emergency operations since the start of the COVID crisis.

The **Human Resources** department actively supports the career development of all ETH members. In November, it became the central unit of the new Vice President of Personnel Development and Leadership, after interim leadership by the Vice President for Infrastructure. The regulation on ETH Zurich members reporting inappropriate behaviour came into force in 2020. This should create clear and fair procedures and enable the establishment of a conflict management system. In addition, the mandate of the ombudspersons was revised and an external ombudsperson was appointed.

The **Safety, Security, Health and Environment** department focuses on safety in the workplace and classroom by reducing pollution and offering advice, prevention and training. For the first time, an occupational physician systematically addressed work-related health problems and occupational illnesses among ETH employees. The COVID situation presented extraordinary challenges for the department. The management team and the occupational physician formed the core of the crisis organisation, together with Corporate Communications, Academic Services and the Vice President for Infrastructure and his staff. It ensured operational connections with the academic departments and set up a COVID hotline.

IT Services provides services relating to information and communication technology and also runs the extensive infrastructure, IT systems and applications required for this. The department developed focus areas and measures for its 2021–2024 strategy. The surge in the use of collaboration tools and the shift to online teaching caused by the pandemic kept IT Services particularly busy during 2020.

ETH Library is the largest public technical and scientific library in Switzerland and a national centre for information on the natural sciences and engineering. It ensures the comprehensive digital provision of information by digitising its collections and archives. Since December, library users have been able to access all academic media via the new "swisscovery" platform. Replacing previous portals, it was founded by 15 universities (including ETH), and 475 libraries have already joined.

The **Services** department provides information and services to internal and external customers on the university campus. Its new strategy and the sub-strategies for Logistics and Print + Publish clearly present the focus and activities of the various services. An important step towards low-emission campus mobility was taken with the arrival of three fully electric buses that have been running between the Zentrum and Hönggerberg campuses since November.

GOVERNANCE AND SUSTAINABILITY

With an Executive Board chaired by the ETH President and a solid system of participation, ETH Zurich has a sound leadership structure that has played a key role in delivering successful outcomes for the university. As part of overall governance, the risk management system takes account of potential internal and external risks. Appropriate measures are in place to reduce risk exposure to an acceptable level and increase the risk awareness of ETH staff. ETH Zurich is not only one of the world's top-ranking universities in energy, environmental and sustainability research, but also integrates sustainability principles in all areas of campus development.

ETH Zurich / Nicola Pitaro

BETWEEN EMERGENCY AND "NEW NORMAL" OPERATIONS

In October, the second COVID-19 wave obliged the Executive Board to put stricter protective measures back in place. "With the new master plan, we made use of every available opportunity to maintain operations despite the tight constraints," said Vice President Ueli Weidmann, who heads the university's coronavirus task force. Although buildings remained open, people were required to work and study from home again wherever possible. Exceptions were made for experimental research and for spin-off companies based on campus. Workplaces remained available to students to provide the best possible mix of on-site and online teaching.

SETTING A COURSE FOR THE UNIVERSITY'S STRATEGIC DEVELOPMENT

ETH Zurich is plotting a course for continuing success in the future. It adopted the Strategic and Development Plan 2021–2024 (SDP) and continued to advance the "rETHink" project even under difficult conditions during the pandemic year. This led to a process of real cultural development encompassing all areas of the university and involving all the relevant groups.

By Martina Märki

With the SDP, ETH has set a course for itself and its members over the next four years. It defines the direction that ETH intends to take in training and development, research and the transfer of knowledge and technology to society.

The SDP follows on from the strategic action areas that defined the university's priorities in the last four-year period: data and information, health and medicine, materials and manufacturing technologies, and responsibility and sustainability. ETH is thus building on existing strengths and developing them further. The action areas reflect ETH's self-image and its aspiration to promote prosperity and welfare in Switzerland and to work for the preservation of global livelihoods, working with social stakeholders. Through basic research, combined with cross-disciplinary cooperation in strategically relevant fields of activity, ETH continues to develop research for the benefit of society.

ETH also follows this approach in teaching and combines knowledge from different disciplines to deliver a holistic education. The university also plans to increase flexibility in all degree programmes and create more space for curiosity and creativity. This will allow ETH to lay the foundation for students' independent, entrepreneurial thinking and lifelong learning – thus also making a significant contribution to meeting the growing demand for qualified graduates. At the same time, ETH aims to continue developing as a learning organisation.

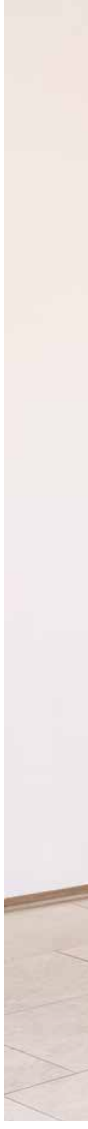
Focus on values

The university is guided by the principle that the whole is greater than the sum of its parts. For this reason, and because it is people who drive progress and deliver success, the values that ETH members adhere to are vitally important. The SDP has therefore defined values such as excellence, responsibility, diversity, openness and team spirit to guide the university's activities.

The development of the SDP is in line with ETH's participatory culture: it is the result of a broadly based, bottom-up process with significant contributions from the Strategy Commission, the various university groups and the academic departments. This process involved critically examining the opportunities and challenges of the future, and then consolidating the discussions during an internal consultation process. Thanks to the commitment of all ETH members, the resulting strategy reflects both the complexity and the diversity of ETH.

Participation at all levels

The participatory principle also shapes the rETHink development project that ETH President Joël Mesot and the Executive Board initiated in 2019. rETHink seeks to optimise university processes, services, structures and instruments, and was implemented with great vigour in 2020, despite slight delays caused by the COVID pandemic. "With rETHink we want to ensure that we continue to deliver excellence for society in the next 20 years," says Mesot. It will optimise interaction between professorships, academic departments and central administrative units. Ultimately, it is about researchers and teachers being able to perform their core tasks even better. "This also includes a leadership culture that empowers all ETH members to perform at their best, thereby safeguarding our position as a driver of innovation in Switzerland,"



ETH Zurich / Markus Bertschi

▲ The first outwardly visible result of the rETHink project is the expansion of the Executive Board to include Vice Presidents for Knowledge Transfer and Corporate Relations, and Personnel Development and Leadership. Members of the Executive Board, from left to right: Vanessa Wood (new, from 1 January 2021), Detlef Günther, Julia Dannath-Schuh (new), Ulrich Weidmann, Joël Mesot, Sarah Springman and Robert Perich. Far right: Secretary General Katharina Poiger Ruloff.

explains Mesot. As part of the rETHink project, participants also reflect on the university culture and the values developed in the SDP.

The project has already led to detailed discussions and work with participants from all university groups, especially in the workstreams on professorships and culture development, and has already produced substantial, concrete results.

rETHink takes shape

The first outwardly visible result is the expansion of the Executive Board: Julia Dannath-Schuh took office as the new Vice President for Personnel Development and Leadership on 1 November. These two areas – strengthening the leadership culture and developing all ETH employees – will receive even more focused attention than before. This also includes the increased and targeted advancement of women. Furthermore, the area of knowledge transfer has been given its own Executive Board domain, in recognition of its importance: Vanessa Wood took up her post as Vice President for Knowledge Transfer and Corporate Relations on 1 January 2021.

rETHink is increasingly taking shape within the university, too. In autumn 2020, over 130 members of ETH drawn from all the university groups – teaching staff at all levels, students and employees – assembled in various focus groups to discuss fundamental issues around the development of a common understanding of the professorship of the future. They discussed the current and future duties of a professorship, in light of the increasing demands of society. They also considered the importance of autonomy for professorships and examined issues of leadership and supervision, as well as numerous other aspects such as cooperation within academic departments and with administrative units. The initial focus was on analysing situations as the basis for developing solutions.

The results of the focus groups are now being evaluated and consolidated to identify possible measures that could be incorporated into the ongoing discussion. Building on these results, further groups will discuss what consequences this should have for ETH structures, in particular for the organisation and the duties, authorities and responsibilities of academic departments and central administrative units.

With rETHink, the Executive Board has launched a wide-ranging discussion on the university's values: How should the values developed for the SDP be put into practice on a day-to-day basis? Are other values essential for good collaboration? Following initial discussions in the workshops, ETH launched a blog that invited all members of ETH to respond to these questions. The discussion of values will be systematically rolled out on a university-wide basis during 2021 with the aim of stimulating the broadest possible reflections on ETH culture.

ETH ZURICH EXECUTIVE BOARD 2020/2021

Joël Mesot (1964)
was appointed Adjunct Professor at ETH Zurich in 2007 and a year later became Full Professor. Since August 2008 he has held a joint professorship in physics at ETH Zurich and EPFL. From 2008 to 2018 Mesot was Director of the Paul Scherrer Institute (PSI) in Villigen. He became President of ETH Zurich in January 2019.

Sarah Springman (1956)
has been Full Professor of Geotechnical Engineering at ETH Zurich since January 1997, heading the institute from 2001 to 2005 and again from 2009 to 2011. She also served as Joint Deputy Head of the Department of Civil, Environmental and Geomatic Engineering from 2013 to 2014. Since January 2015 she has been Rector of ETH and acts as deputy to the President.

Detlef Günther (1963)
was appointed Assistant Professor in October 1998 and Associate Professor in July 2003. He became Full Professor of Trace Element and Microanalysis at the Laboratory of Inorganic Chemistry at ETH Zurich in February 2008. From 2015 to 2019 he served as Vice President for Research and Corporate Relations. He served as interim Vice President for Knowledge Transfer and Corporate Relations in 2020 and has been Vice President for Research since 2020.

Secondary employment
(as of 31 December 2020)

Member of the Senate of the Helmholtz Association of German Research Centres; Member of the Foundation Board and Second Vice Chair of the Marcel Benoist Foundation; Member of the Global Network Advisory Board WEF Centre for the Fourth Industrial Revolution; Member of Governing Board, Geneva Science-Policy Interface

none

Member of the Board of Directors of GRS Gemresearch Swisslab AG; Member of the University Council of the Technical University of Darmstadt

Remuneration

In 2020, the salaries of the six members of the Executive Board, including the employer's social security contributions, came to CHF 2.25 million (last year: CHF 2.16 million). The total sum includes CHF 0.41 million (last year: CHF 0.40 million) for pension benefits and CHF 0.13 million (last year CHF 0.12 million) for other social security contributions.

Vanessa Wood (1983)
was Assistant Professor from 2011 to 2015 and Associate Professor from 2015 to 2019. She has been Full Professor of Materials and Device Engineering at ETH Zurich since 2019. She was Head of the Department of Information Technology and Electrical Engineering from 2018 to 2020. As of 2021, in addition to her full professorship, she is also Vice President for Knowledge Transfer and Corporate Relations.

none

Robert Perich (1961)
has a doctorate in business administration and has been Head of ETH's Finance and Controlling division since 2003 and Vice President for Finance and Controlling since October 2008. Before that, he worked for 11 years in the financial services industry, most recently as CFO and Member of the Executive Board of the Private Banking Switzerland division of a leading Swiss bank.

Member of the University Council of the University of Cologne; Guest Lecturer on the CAS University Leadership and Governance at the University of Zurich

Ulrich Weidmann (1963)
has been Full Professor of Transport Systems at ETH Zurich since June 2004, and also served as Head of the Department of Civil, Environmental and Geomatic Engineering from 2013 to 2015. He was Vice President for Human Resources and Infrastructure from 2016 to 2019 and interim Vice President for Personnel Development and Leadership until November 2020. He has been Vice President for Infrastructure since 2020.

Member of the Board of Directors: VBG Verkehrsbetriebe Glattal AG, Auto AG Schwyz. Member of the Arbitration Panel: Ceneri Base Tunnel (Rail Technology and Overall Coordination, Railtrack and Logistics). Trustee of the Board: Fachstelle für behindertengerechtes Bauen (buildings for the disabled)

Julia Dannath-Schuh (1977)
holds a doctorate in psychology and was a research assistant in behavioural psychology in the Department of Humanities, Social and Political Sciences at ETH Zurich in 2006. She has been Vice President for Personnel Development and Leadership since November 2020. Previously she worked for 12 years in consulting, most recently as the CEO of a consulting company, supporting organisations from Europe, Asia and the USA in developing their leadership and corporate culture.

Member of the Supervisory Board: Asklepios Kliniken GmbH & Co. KGaA, Mediclin AG, Rhön Klinikum AG. Founding Partner and Member of the Board of Directors of Alsia & Partners AG

ORGANISATION CHART

As of 31 December 2020

◀ **Ombudspersons**

MANAGEMENT AND CENTRAL ADMINISTRATION

Executive Board and General Secretariat

President
Professor Joël Mesot

Rector
Professor Sarah Springman

Vice President for Research
Professor Detlef Günther

Vice President for Knowledge Transfer and Corporate Relations
Professor Detlef Günther
(a.i.; from 1.1.2021 Vanessa Wood)

Vice Rectors (VRs) and Associate Vice Presidents (AVPs)

AVPs for:
– ETH Global
– Equal Opportunities
– Sustainability
– Digital Transformation

VRs for:
– Study Programmes
– Curriculum Development
– Doctoral Studies
– Continuing Education

– AVP for Medicine

Staff units

– Office of the President
– Office for Faculty Affairs

– Rector's Staff

– Office of Research

– Office of Knowledge Transfer and Corporate Relations

Administrative departments

– Corporate Communications

– Academic Services
– Student Services
– Educational Development and Technology

ACADEMIC DEPARTMENTS

Architecture and Civil Engineering

Architecture

Civil, Environmental and Geomatic Engineering

Engineering Sciences

Mechanical and Process Engineering

Information Technology and Electrical Engineering

Computer Science

Materials

Biosystems Science and Engineering

Natural Sciences and Mathematics

Mathematics

Physics

Chemistry and Applied Biosciences

Biology

University Assembly ▶

Vice President for Finance and Controlling **Dr Robert Perich**	Vice President for Infrastructure **Professor Ulrich Weidmann**	Vice President for Personnel Development and Leadership **Dr Julia Dannath-Schuh**	Secretary General **Katharina Poiger Ruloff**
– Office of Finance and Controlling	– Office of Infrastructure	– Office of Personnel Development and Leadership	– Legal Office
– Controlling – Accounting – Financial Services	– Real Estate Management – Facility Management – IT Services – ETH Library – Services – Safety, Security, Health and Environment	– Human Resources	

System-oriented Natural Sciences	**Management and Social Sciences**
Earth Sciences	Management, Technology, and Economics
Environmental Systems Science	Humanities, Social and Political Sciences
Health Sciences and Technology	

► For centres of excellence and teaching and research facilities outside the academic departments:

RISK MANAGEMENT

A SYSTEMATIC PROCESS

ETH Zurich's university-wide risk management system takes a holistic approach that considers both potential internal and also external risks. The systematic process is based on the internationally established risk management standard ISO 31000. The purpose of risk management is to protect the tangible and intangible assets on which the success of ETH Zurich depends, in particular human capital, infrastructure and reputation.

Legal basis and governance

Based on the autonomy granted to each of the ETH Domain's six institutions by the ETH Act and the mandate for teaching, research and service provision, each institution is individually responsible for managing risks and periodically reports the current risk situation to the ETH Board in its role as the university's supervisory body. The essential parameters of risk management and risk financing are laid down in the ETH Board's directive on risk management at ETH and the research institutions.

As the officeholder with overall responsibility for risk management at ETH Zurich, the ETH President informs the ETH Board on an annual basis about the core risks. The President also informs the ETH Board without delay of any exceptional changes to the risk profile or any instances of loss or damage.

Organisation and process

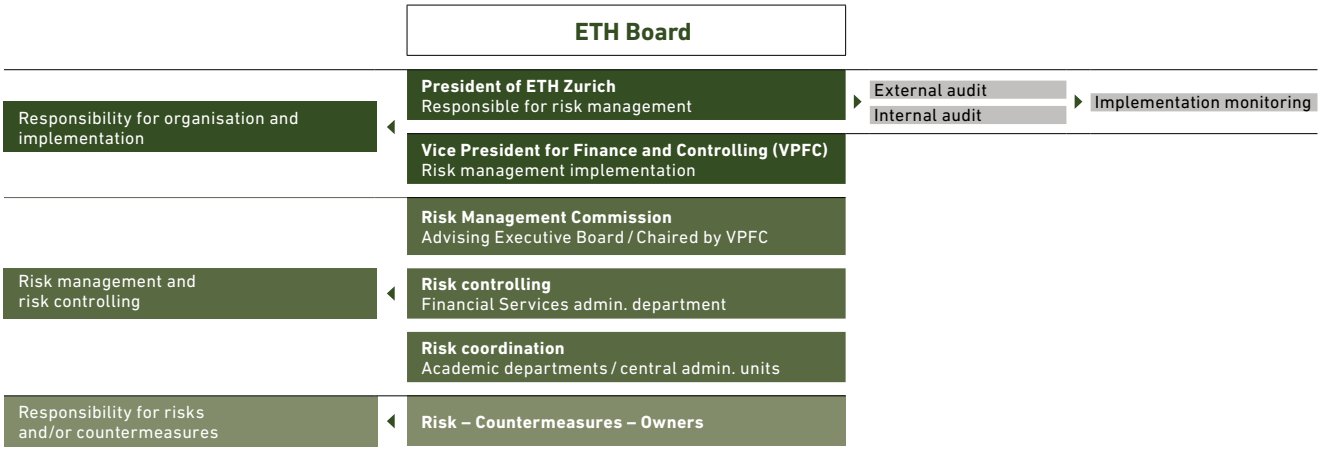
Whereas the President has overall accountability for risk management, responsibility for implementation lies with the Vice President for Finance and Controlling. The latter chairs the Risk Management Commission, which advises the President and the Executive Board on matters concerning risk management, risk financing and insurance. The commission decides what action to take in relation to reporting, assessing, minimising and controlling risk, while overseeing the process as a whole. The Executive Board is informed regularly about any substantive risks. ETH Zurich has nominated one or more officers responsible for each core risk and relevant control measures.

IMPLEMENTATION OF A WEB APPLICATION AS A RISK MANAGEMENT TOOL

The tool introduced in spring 2020 to support risk controlling enables review, new entry and reporting by the responsible decentralised units (risk coordination). This will further increase not only the quality of risk assessments but also general awareness in the area of risk management.

COVID-19 PANDEMIC

The COVID-19 pandemic also affected ETH's operational processes (teaching, research and administration). Targeted measures are regularly proposed and implemented by a task force created to lead the university through the crisis. Together with the Coordination Conference (composed of leading members of the units and university groups), it prepares phased master plans for the Executive Board. The Executive Board holds special meetings two to three times a week. The measures include closures or partial closures in teaching, research and administration, with the wide-scale use of online tools allowing operations to continue to a large extent. Thanks to these measures, infection rates at ETH are well below average.



INTERNAL CONTROL SYSTEM

An important instrument in relation to risk management is the internal control system (ICS), which evaluates relevant financial processes and corresponding risks, assures adherence to internal and external rules, and minimises risks through appropriate control measures. The ICS encompasses those procedures and measures that ensure accurate bookkeeping and accounting, which in turn form the basis of sound financial reporting.

As an independent external auditor, the Swiss Federal Audit Office verifies the existence of the ICS implemented at ETH Zurich as part of the statutory audit of the annual financial statements.

CORE RISKS

Risks with potentially damaging impacts on the finances or reputation of ETH as a whole are designated as core risks.

- ETH's highly educated lecturers, researchers, students and support staff are a key factor for its success. The risk that persistent and structural factors could have a lasting **negative impact on academic performance in research and teaching** is therefore weighted correspondingly high.

- The **loss of financial resources** due to a significant reduction in allocated federal funding or a sustained drop in third-party contributions would have immediate consequences for the quality and quantity of ETH's teaching and research, and therefore represents a correspondingly high level of risk.

- ETH Zurich is tasked with providing innovative, research-based and skills-oriented education, training and development at the highest level. A severe deterioration in the quality of teaching, for example **due to changes in education policy or resource adjustments,** would represent a reputational risk. A shift in priorities in the field of education policy, followed by declining financial resources, would lead to a drop in the quality of teaching, falling student numbers and a decline in new academic talent.

- **Research integrity** is a key prerequisite for robust and subsequently sustainable scientific success. Lack of integrity can lead to data manipulation, plagiarism, non-disclosure of conflicts of interest and dereliction of duties of care towards junior scientists. Support from confidants and the work of ETH's delegates for good scientific practice actively promote integrity in research and its implementation in everyday practice.

- All of ETH Zurich's business processes are reliant on a fully functioning data network and secure data storage media. **Data losses, network failures or unauthorised data access** present considerable risks to ETH's business processes. A panel of technical experts and the Chief Information Security Officer continuously review the measures implemented to achieve the protection targets defined as part of IT security, and adjust them as necessary.

- **Rapid and open communication** about the core tasks of research, teaching and technology transfer, as well as institutional matters, strengthens trust among stakeholders, ensures social relevance and enhances the reputation of ETH Zurich. Failures of communication can lead to a loss of credibility and acceptance, incurring a loss of trust among key stakeholders in politics and society.

- **Violence or threats against the person** are not limited to actual physical aggression, but also manifest in threats of violence, abuse of power and any forms of sexual harassment. Through preventive measures and constant reassessment of the current level of threat based on standardised instruments, the ETH Threat Management Team defuses problems and conflicts at an early stage before they escalate into violence. Also, the Respect advice and conciliation service is on hand to address tensions and situations involving sexual harassment.

- **Large-scale damage to the real estate used by ETH Zurich but owned by the federal government** entails the risk that the infrastructure necessary for research, teaching and the management of ETH may be unavailable for an extended period, resulting in cancellation of important research and teaching activities in whole or in part. Measures to safeguard and increase the safety of buildings are an integral part of every new-build or modernisation project, with the aim of averting major incidents.

- **Significant impairments of ETH operations due to a major event** (e.g. pandemic) entail the risk that the core business of ETH is completely or partially impaired (e.g. general obligation to work from home; teaching, research, knowledge transfer and/or management moved online or suspended).

- **Adequate premises, in terms of both quantity and quality,** are crucial for teaching and research and allow growth targets to be implemented. Partial or total loss of infrastructure within a room or an entire building can pose a threat to ETH Zurich's teaching and research activity. Lack of space and viable building plots jeopardises the achievement of growth targets.

- A new system to survey the views of scientific staff is among the new measures to ensure the **early detection of conflicts** arising from incorrect management and supervisory behaviour. This allows continuous monitoring of the satisfaction, supervision and development of doctoral students, postdoctoral researchers and senior assistants. In the area of prevention, the main focus is on the training and support of staff in management functions, as well as on the structured onboarding and supervision of doctoral students, postdocs and other staff.

COMMITTED TO SUSTAINABILITY

ETH Zurich is an international centre of excellence and a flagship for sustainability research, incorporating the principles of sustainable development in the core areas of research, education, campus, and dialogue with society.

Sustainability is one of ETH Zurich's strategic objectives. It aims to maintain and expand its international reputation in the fields of environmental, climate and nutritional research. To this end, it defines thematic priorities that allow dynamic cooperation across disciplines. In research and teaching, on campus and in dialogue with society, ETH Zurich is a trendsetter when it comes to sustainability.

1. Research
Through its research activities, ETH Zurich furnishes the scientific and technical knowledge required for a sustainable society. To highlight and support this commitment, ETH Zurich has defined sustainability as one of five main focus areas in its Strategy and Development Plan 2017–2020. In addition to the broad spectrum of cutting-edge research in the academic departments, ETH Zurich can draw on the interdisciplinary expertise of its various centres of excellence in order to address major societal challenges such as future cities and the sustainable design of living spaces, food security, energy supply and climate change.

2. Education
ETH Zurich trains the next generation of specialists and experts to ensure they actively integrate sustainability aspects into their professional lives. In past decades, ETH has not only developed internationally acclaimed study programmes and other teaching formats, but has also established new academic departments and institutes to teach sustainability knowledge to its students. Moreover, ETH Zurich is keen to encourage intellectual agility by providing its students with the tools that will enable them to tackle socially and ethically relevant aspects in their studies, in their professional careers and as responsible members of society.

3. Campus
On campus, ETH Zurich lives and promotes the principles of sustainable development with respect to social, environmental and financial aspects. As an employer, ETH Zurich aims to provide the best possible working conditions, including enabling and maintaining a participatory, respectful and diverse environment. The university endeavours to serve as a "living lab" which develops, implements and tests pioneering solutions that preserve natural resources and reduce environmental impacts. Finally, as a publicly funded university, ETH Zurich places great value on transparent budgeting and controlling, financial accountability, and adequate risk management.

4. Dialogue with society
ETH regularly informs the public about its latest research findings. It makes its scientific knowledge publicly available so as to make a significant contribution to the public debate around sustainable development. In accordance with its mandate, ETH Zurich has developed a range of formats and communication tools to provide information to the public in an accessible and comprehensible way. The university also provides a number of services for the federal government and makes its expertise available for decisions to be taken based on scientific facts.

▼ The 2019/2020 report documents ETH's commitment to sustainability, including around 50 sustainability goals.

TRANSPARENCY AND CREDIBILITY

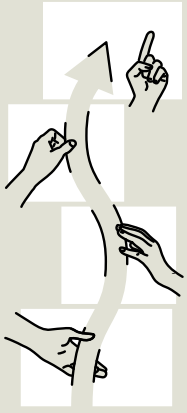
ETH documents its commitment to sustainability. Its energy report, first published in 2002, was developed into a broader environmental report in 2005. Since 2009/2010, the report has included ecological, economic and social aspects. The Sustainability Report 2019/2020 provides an insight into developments, successes and challenges in the areas of research, education, campus and dialogue with society. Highlights from the reporting period and around 50 objectives complete the picture. The report also describes how ETH Zurich is helping to achieve the Sustainable Development Goals (SDGs) of the United Nations. These sustainability reports are notable for their high degree of stakeholder involvement; for their local, national and global reach; and for being certified by external auditors. All the sustainability reports are compiled in accordance with the ISCN Sustainable Campus Charter of the International Sustainable Campus Network and comply with the international Global Reporting Initiative standard.

► Sustainability report:

GOVERNANCE AND SUSTAINABILITY OVERVIEW

FREEDOM TO SUCCEED

The management structure of ETH Zurich combines a presidential system with an Executive Board, broad participation rights and freedom of action.



Freedom and individual responsibility, entrepreneurial spirit and open-mindedness: ETH Zurich stands on a bedrock of true Swiss values. At ETH Zurich, students discover an ideal environment for independent thinking, and researchers a climate which inspires top performance. Connected with Europe and the world, ETH develops solutions for the global challenges of today and tomorrow.

Together with EPFL and the four research institutes Eawag, Empa, PSI and WSL, ETH Zurich forms part of the **ETH Domain,** a closely cooperating network which places Swiss research in an excellent position at international level. The **ETH Board** is the ETH Domain's strategic management and supervisory body.

Within ETH Zurich, the **President** bears overall responsibility, specifically in the areas of strategy, appointments and finance. They nominate vice presidents (members of the Executive Board) and professors for appointment by the ETH Board. This is counterbalanced by a well-established system of participation, which guarantees acceptance of the decisions taken as a form of quality assurance across the whole institution. The Executive Board, the academic departments and the University Assembly (a university-wide body in which the teaching staff, scientific staff, students and administrative and technical staff are equally represented) are involved in this broad-based decision-making process.

The **Executive Board** acts with the aim of ensuring that the university fulfils its social and economic responsibilities. It is composed of seven members: the President, the Rector (Vice President for Education, nominated by the professors), and Vice Presidents for Research; Finance and Controlling; Infrastructure; Knowledge Transfer and Corporate Relations; and Personnel Development and Leadership.

The Executive Board issues study directives and regulates the organisation of the university. It decides on the establishment, merger and closing down of academic departments and other units. It also elects the vice rectors and associate vice presidents with special duties, and makes employment decisions for ETH staff. The Executive Board works with various participatory bodies. In particular, it holds regular discussions with the University Assembly.

ETH Zurich has deliberately chosen a flexible departmental structure with department heads who are committed to science. This ensures diversity, professional depth and the freedom necessary for long-term scientific success. The **16 academic departments** of ETH Zurich report to the Executive Board. These bring together members of the university who are active in a specific scientific field at the organisational level and ensure teaching, research and services in the field in question. They are divided into institutes or laboratories, professorships and departmental facilities.

The academic departments are responsible for their own strategic planning, running their degree courses and coordinating their research. The principal authority within each academic department is the Department Conference. It includes all professors, representatives of the other teaching staff and representatives of the students, scientific staff and administrative and technical staff. It is responsible for planning and defining the scope of professorships, adopting study programme regulations, nominating department heads and electing directors of studies.

Institutional dialogue between the Executive Board and the academic departments takes place through the Conference of the Heads of Department and the Conference of the Directors of Study, as well as through dialogue between departmental management and the Executive Board.

FINANCE

Maintaining strategic and financial freedom of action as well as independence in teaching and research is vital for ETH Zurich. Only in this way can the university strengthen its position as a national centre of research, compete against the world's leading institutions for technology-intensive research and keep its place at the top of global rankings. The total contribution from the federal government (global budget), growing at a steady rate, provides a secure foundation for this. Targeted diversification of funding sources and responsible funding management allow more reliable planning and help ensure sustainable development. This allows ETH Zurich to respond quickly to issues impacting society today and tomorrow – as with the research initiatives triggered by the COVID-19 pandemic.

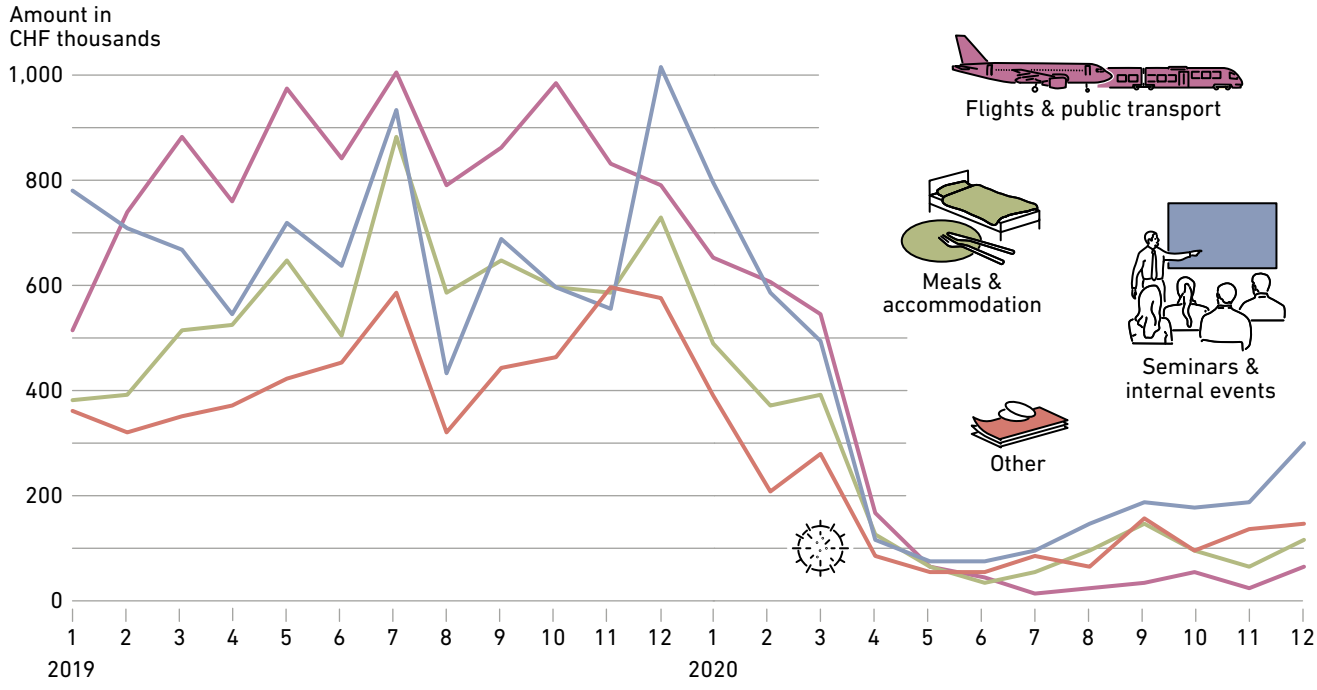
ETH Zurich / Alessandro Della Bella

EFFICIENCY BUILDS ON EXISTING RESOURCES

The supply of personal protective equipment (PPE) to hospitals became a critical factor in the pandemic. For example, face shields were urgently needed for medical staff treating COVID-19 patients. This is where the helpfulETH initiative came into its own: the first face shields, developed by ETH in consultation with doctors, were delivered as early as the end of March. A student workshop was able to produce 200 pieces per day, and increased the number by working with the Eastern Switzerland University of Applied Sciences and industrial partners Geberit Vertriebs AG and SwissPrimePack AG. ETH Zurich was in a position to provide help swiftly, thanks to existing infrastructures and – as with this project – solidarity, money from reserves and the support of the ETH Foundation.

► Face shields:

Business expenses fell sharply by over 70 percent p.a.
Trend of business expenses at ETH Zurich during the course of the COVID-19 pandemic so far.



WELL EQUIPPED TO DEAL WITH THE CRISIS

ETH Zurich is well positioned to address the challenges presented by COVID. Even during emergency operations, the university was largely able to continue functioning and thus remained a reliable partner. The prudence of past years paid off in this period.

By Corinne Johannssen-Hodel

ETH began digitalising its financial management 15 years ago. The highly acclaimed "refine" project finished successfully in 2019. Yet when the second generation of the ETH Information and Support portal (ETHIS 2.0) launched last year, no one had any idea that it would soon be subjected to a tough real-life test: on 17 March 2020, the Executive Board felt compelled to switch to emergency operations because of the pandemic. Keeping a university with almost 13,000 employees and over 20,000 suppliers running in this exceptional situation was an immense challenge.

Robert Perich, Vice President for Finance and Controlling, believes the digitalised finance and resource platform passed the test: "Emergency operations showed that the entire resource management system also works remotely." He sees several reasons for this success: "We did not have to start from scratch, but were able to build on existing structures. And it helped that we were familiar with this technology."

Having the confidence to take a risk

This extreme situation showed that ETH had made its past investments with a view to the future. "We recognised early on that ETH needed to digitalise its processes, as the university was seeing an increasing number of transactions and greater variety of business cases," Perich reflects. "It was a risk, and it took both time and confidence." The strategy of digitalising administrative processes has been a success. This is by no means just about invoicing and payment processing. Ordering and procurement, HR processes and logistics are also affected. ETH Zurich is not only very dynamic, but also has a distinctly decentralised organisation. There are more than 550 professorships, each of which functions much like an SME. The different disciplines require a wide range of products and services.

Timely settlement of transactions was a very high priority. "ETH also remained a reliable partner during the crisis," the head of finance stresses. Business was able to continue

ETH Zurich / 1kilo

as normal for the most part, despite the challenging situation. A look at the invoice payment statistics shows that transactions continued to be processed without interruption.

Major cost shifts

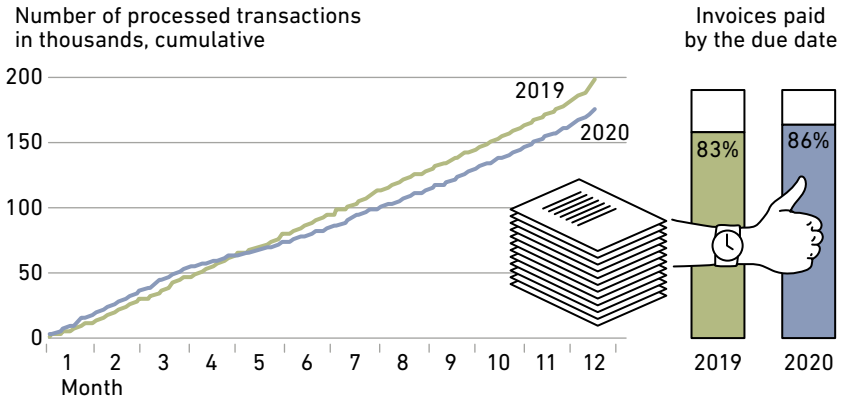
Financially, the pandemic produced two opposing effects at ETH. On the one hand, some budgets could not be spent at all. For example, business, travel and conference expenses virtually collapsed owing to the sudden massive restriction of mobility. In the area of human resources, new appointments could not be made or had to be postponed because the recruited staff could not enter the country. With buildings closed during the spring lockdown, energy, water and sewerage costs fell significantly compared to the same period last year. On the other hand, considerable additional and special costs were incurred in some cases, such as contract extensions for doctoral students who had graduated but were unable to take up their new position at the scheduled time or return to their home countries. There were cancellation and downtime costs, additional expenses for implementing necessary contingency plans, and also drastic revenue losses and business interruptions, as in the campus restaurants. But at the same time, construction work could be carried out more quickly or ahead of schedule, for example, because there were hardly any people in the buildings and some construction companies had free capacity. Robert Perich sums up: "Because of these unusual circumstances, costs have shifted like almost never before."

Avoiding individual cases of hardship

Together with Detlef Günther, Vice President for Research, the head of finance did everything possible to prevent individual cases of hardship, for example in research. Especially at the beginning of a research career, young talents can be heavily dependent on individual external third-party donors. Financial uncertainty, already considerable, was exacerbated by the COVID crisis.

Some stability was provided by the fact that the Swiss National Science Foundation, Innosuisse and the EU quickly adapted their rules, for example by extending project funding. Initially, however, there was greater uncertainty with regard to private-sector donors. Some industry partners, private individuals and foundations were obliged to halt project funding, although fortunately this was only temporary in most cases. And so, at the end of April, Robert Perich issued a directive or "hardship regulation" on how to deal with COVID-related funding gaps in research projects reliant on third-party funding. "The risk of funding shortfalls was real. We had to do something to protect young researchers in particular," Perich explains. "Luckily, in the end, help was only actually needed in a few isolated cases."

Continuous processing of transactions over the year 2020 and cumulative number of transactions only marginally lower than in the previous year – despite COVID-19.



Slowing the growth strategy of recent years

In view of the profound impact that COVID is likely to have on the federal budget, the head of finance is aware that ETH will be expected to show solidarity by sharing the burden. In its medium-term planning, it has therefore already set its sights on curbing the pronounced growth of recent years. In line with the steady growth in student numbers, around 160 new professorships were created at ETH between 2007 and 2020 alone. "We have become accustomed to the strong growth of recent years and achieved a great deal in that way. For the next phase, however, it will be even more important to (re-)prioritise, to decide and act even more selectively, and to postpone worthwhile projects or do without them altogether for the time being." However, Perich generally avoids talk of retrenchment. Instead, the Vice President refers to the many innovative ETH+ projects and other initiatives for which ETH has already set aside dedicated reserves: "These times show how necessary certain financial reserves are. They allow room for manoeuvre and provide a measure of planning certainty." Here, too, ETH acted very prudently in the past, which is now paying off. Overall – and the head of finance attaches great importance to this – the university is financially sound and has a very solid equity base.

"Costs have shifted like almost never before."

Robert Perich, Vice President for Finance and Controlling

SOURCES OF FUNDS

At a political level, the ETH Domain is managed through strategic objectives set by the Federal Council, the term and content of which are tailored to the federal government-approved funding. Based on the strategic objectives, the ETH Board enters into target agreements with the two federal institutes of technology and the four research institutes and allocates the federal funds.

In 2020, the federal financial contribution granted to ETH Zurich (global budget) amounted to 1,315 million Swiss francs. The global budget is used, firstly, to cover basic teaching and research equipment (expenditure credit or federal financial contribution in the narrower sense) and, secondly, to fund investments in the properties used by ETH Zurich (investment credit), most of which are owned by the federal government. These properties are managed within the central federal administration by the Federal Office for Buildings and Logistics (FOBL).

Global budget (CHF million)

	2020	2019	Absolute change
Expenditure credit (ETH Zurich financial statements)	1,151	1,158	– 7
Investment credit (FOBL/Federal Government financial statements)	164	140	24
Federal financial contribution (global budget)	**1,315**	**1,298**	**17**
Dedicated reserves released (+) / recognised (–) (investment credit, FOBL / federal government financial statements) [1]	30	10	20
Total (recognised in income)	**1,345**	**1,308**	**37**

1 For the portion of the investment credit remaining in 2018 (40 million Swiss francs) as a result of delays to a new building in Basel, dedicated reserves in the same amount were recognised for the first time in the FOBL's financial statements following parliamentary approval. In 2018, these reserves were not recognised in income for ETH Zurich. In 2020, the Federal Finance Administration approved the release of 30 million Swiss francs (previous year: 10 million) of these dedicated reserves, which were available to ETH Zurich in the reporting period as income for a specified purpose.

Consolidated third-party funding income amounted to 559 million Swiss francs and consisted of project-oriented research contributions, grants and self-generated revenues. Together with the global budget of 1,345 million Swiss francs recognised in income, ETH Zurich's total income came to 1,904 million Swiss francs in 2020.

Rounding differences: the totals of the figures given on this page may not correspond precisely to the total amounts shown in the tables or graphics because they are calculated on unrounded amounts.

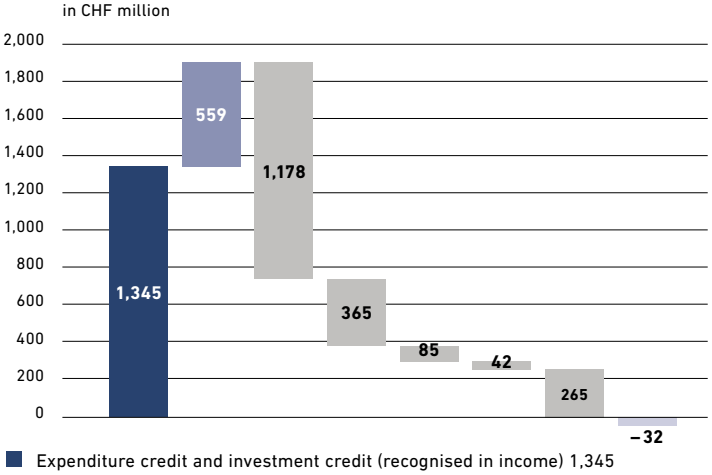
USE OF FUNDS

Funds are used, firstly, to cover personnel expenses for teaching, research and administration and, secondly, to finance construction spending, other operating expenses and investments in movable assets. This produced a negative consolidated net income of 32 million Swiss francs in 2020 (previous year: +52 million Swiss francs).

Construction spending in connection with the development and management of the property portfolio amounted to a total of 308 million Swiss francs in 2020 and was financed through the investment credit (194 million Swiss francs), the expenditure credit (103 million Swiss francs) and third-party funding income (11 million Swiss francs).

The extensive and varied property portfolio managed by ETH Zurich comprises a large number of dedicated teaching and research buildings designed with their particular purpose in mind and fitted out to suit their specific teaching and research requirements. In total, it contains 175 buildings and facilities and 66 plots of land. The carrying amount of the plots of land was 693 million Swiss francs at the end of 2020. The buildings were stated in the accounts at a value of 1,258 million Swiss francs at the end of 2020 and their replacement cost (gross cost) was 3,612 million Swiss francs.

Income (CHF 1,904 million) and its use



Expenditure credit and investment credit (recognised in income) 1,345
Third-party funding income (consolidated) 559
Use (consolidated)
Personnel expenses 1,178
Other operating expenses excl. construction spending (not capitalised) 365
Other operating expenses excl. construction spending (capitalised) [2] 85
Construction spending (not capitalised) 42
Construction spending (capitalised) [2] 265
Net income (consolidated) [1] – 32

1 Consolidated net income (– 32 million Swiss francs) was 82 million Swiss francs lower than the consolidated surplus in accordance with IPSASs (51 million Swiss francs) due to specific effects of accounting requirements (mainly revenues on an accrual basis, effects of IPSAS 39 and the share of surplus or deficit of associated entities).
2 Under IPSASs, investment expenditure (350 million Swiss francs) is capitalised, presented in the balance sheet and depreciated over the useful life of the asset, with the charges recognised in surplus or deficit.

RESPONSIBLE FUNDING MANAGEMENT

ETH Zurich requires financial flexibility and reliable planning to be able to respond appropriately to developments in teaching and research. Secure long-term funding is essential to achieving this. In this context, it is vital for the university to selectively diversify its sources of funding and manage funds responsibly and cost-effectively.

Against the backdrop of the COVID pandemic, ETH Zurich faced particular challenges in 2020. Nevertheless, the number of students rose by more than 1,200, or 5.5 percent compared with 2019, bringing the total increase over the last 10 years to around 40 percent. The university's mission to deliver high quality and excellence presents continuous challenges, which it meets by developing and expanding teaching and research capacity, selectively investing in asset maintenance and continuing to expand its infrastructure.

Consolidated operating expenses in accordance with IPSASs reflected the growth, but, given the impact of the COVID pandemic, increased only moderately compared to the previous year, reaching 1,837 million Swiss francs (up by 2 percent). Total consolidated revenue in accordance with IPSASs, on the other hand, declined slightly to 1,888 million Swiss francs. Lower net finance income and reduced income from the share of surplus or deficit of associated entities were offset by higher operating revenue. Details on the annual consolidated financial statements can be found on page 77 onwards.

Strategic and financial freedom are essential if ETH Zurich is to compete internationally and successfully navigate the expected growth, particularly in terms of the number of students. This freedom is underpinned to a large extent by a long-term, sustainable financial policy, based on a financial plan covering a period of several years, long-term balance sheet management, and a modern approach to financial governance. The federal financial contribution (global budget) and its stable trajectory provide a reliable basis for this. Selective diversification of funding sources, together with the third-party funding reserves accrued through responsible, cost-effective funding management, allow for more reliable planning. The reserves ensure strategic flexibility; one way they are put to use is through supporting initiatives like ETH+/ Open ETH, which aim to expand interdisciplinary engagement, address new strategic topics, and create additional professorships in cutting-edge fields of knowledge in line with requirements.

Some of the third-party funding not required immediately for ETH Zurich's operations is invested in the financial market in accordance with the applicable treasury agreement and the investment guidelines stipulated by the ETH Board. The investment strategy places the focus on a return reflecting an adequate risk profile for ETH Zurich (low volatility) in combination with sustainability and cost efficiency. ETH Zurich defines sustainability in accordance with current ESG (environmental, social, governance) criteria and prefers investment solutions that are as sustainable as possible, without neglecting its other strategic goals and regulatory framework. ETH Zurich is keen to extend its sustainability endeavours in a rapidly evolving market for sustainability-related products. As investments are primarily made in passively managed mandates, new developments in the area of indexed fund products with a sustainability focus are of particular interest.

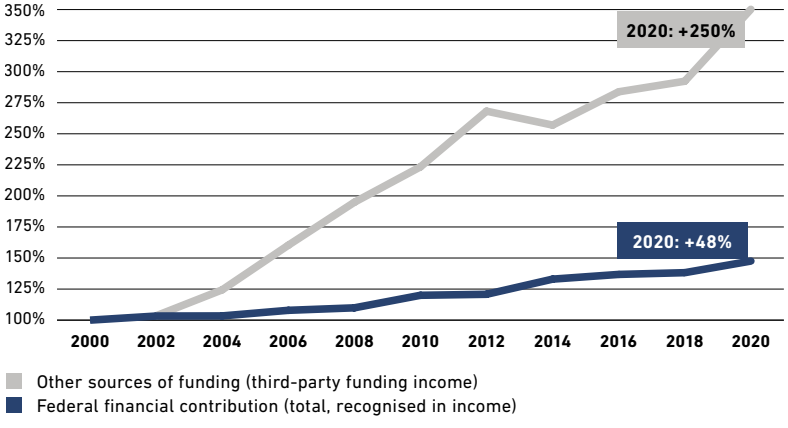
The diversification of the funding base is reflected in the steady increase in third-party funding income (2020: 559 million Swiss francs) as a proportion of total income (2020: 1,904 million Swiss francs). This is documented by an increase from 15 percent in 2000 to almost 30 percent in 2020, underscoring the growing importance of third-party funding income for the university.

Currently, more than two thirds of third-party funding income comes from competitive research funding projects at national and European level. Competitive research funding from national organisations such as the Swiss National Science Foundation (SNSF) or Innosuisse and from EU programmes (Horizon 2020, ERC grants) is of major relevance, as are collaborations with industry. Research funding in connection to policy research projects with the federal government (Ressortforschung), as well as projects with cantons, local authorities and various international organisations are also of importance.

Third-party funding income also includes grants (donations, legacies/bequests). By far the largest share of the grants comes through the ETH Zurich Foundation. A further portion of third-party funding income is attributable to self-generated revenues. These include tuition fees, various items of service revenue and net finance income.

It is vital for ETH Zurich to manage the third-party funding income entrusted to it responsibly and in conformity with its strategy. Its top priority is to maintain its independence in teaching and research. Defined guidelines with clearly communicated principles, such as the ETH Zurich Code of Conduct for Scientific Collaboration, the ETH Zurich Code of Conduct for Dealing with Contributions or the ETH Zurich Foundation Code of Conduct, ensure that it does so.

Development of ETH Zurich income structure (2000 = 100%)



FINANCIAL ACCOUNTING AND REPORTING IN ACCORDANCE WITH IPSASs

ANNUAL CONSOLIDATED FINANCIAL STATEMENTS IN BRIEF

The annual consolidated financial statements were prepared in accordance with International Public Sector Accounting Standards (IPSASs). ETH Singapore SEC Ltd. and the Rübel Geobotanical Research Institution Foundation are consolidated in the annual financial statements. The ETH Zurich Foundation and several independent foundations are reported as investments in associated entities.

A consolidated surplus of 51 million Swiss francs was reported for 2020 (a decrease of 42 million Swiss francs or 46 percent compared with the previous year). It comprised the operating deficit of 2 million Swiss francs (an improvement of 14 million Swiss francs), the share of surplus/deficit of associated entities of 33 million Swiss francs (a decrease of 43 million Swiss francs) and net finance income of 20 million Swiss francs (a decrease of 13 million Swiss francs).

The operating revenue generated in 2020 amounted to 1,835 million Swiss francs (an increase of 46 million Swiss francs or 3 percent compared with the previous year). The total federal contribution, which is made up of the federal financial contribution (in the narrower sense) and the contribution to accommodation, dropped to 1,293 million Swiss francs (a decrease of 6 million Swiss francs). Revenue from donations and bequests was up sharply year on year to 120 million Swiss francs (an increase of 56 million Swiss francs or 86 percent). Revenue from research contributions remained almost unchanged at 356 million Swiss francs.

Operating expenses rose to 1,837 million Swiss francs (an increase of 33 million Swiss francs or 2 percent). This rise was the result of higher personnel expenses (up by 54 million Swiss francs or 5 percent), which climbed primarily because of the rise in average full-time equivalents by 253 FTEs to 10,098 FTEs (an increase of 3 percent) and pay adjustments in the reporting period. Other operating expenses fell slightly (by 7 million Swiss francs or 2 percent) and reflect, amongst other factors, opposing effects of the COVID pandemic: while out-of-pocket expenses dropped sharply due to severely restricted mobility, for example, expenses for IT equipment rose due to the transition from in-person to remote teaching, and expenses were also incurred for the necessary safety protocols and measures.

Total consolidated assets rose by 198 million Swiss francs (7 percent) to 3,091 million Swiss francs at the end of 2020. Consolidated liabilities were down by 537 million Swiss francs on the previous year to 1,623 million Swiss francs. This was due primarily to the reduction in the net defined benefit liability to 515 million Swiss francs (a decrease of 630 million Swiss francs), which in turn was mainly attributable to the increase in the discount rate (following the change to corporate bonds as the new basis of calculation) and the first-time inclusion of risk sharing in the measurement of net defined benefit liabilities.

Consolidated equity rose by 735 million Swiss francs to 1,467 million Swiss francs. This change was mostly the result of the sharp reduction in negative valuation reserves (which narrowed by 683 million Swiss francs) due to actuarial gains arising from the above-mentioned remeasurement of the net defined benefit liability. Dedicated reserves rose (by 107 million Swiss francs) mainly as a result of an increase in reserves for teaching and research, as well as donations and bequests. Conversely, free reserves were depleted by a further 129 million Swiss francs. This reduction reflects funds required in addition to the total federal contribution in the course of operating activities as well as financial commitments made by the Executive Board in order to promote strategic projects. As a result of these effects, the reported equity ratio rose from 25 percent in the previous year to 47 percent at the end of 2020.

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Rounding differences: The figures presented in this document may not add up precisely to the total amounts presented in the tables. Changes are calculated on unrounded amounts and may differ from a figure that is based on the rounded amounts presented in the tables.

CONSOLIDATED STATEMENT OF FINANCIAL PERFORMANCE

CHF million	Note	2020	2019
Federal financial contribution		1,151	1,158
Federal contribution to accommodation		142	140
Total federal contribution	4	1,293	1,298
Tuition fees, continuing education	5	31	28
Swiss National Science Foundation (SNSF)		129	125
Swiss Innovation Agency (Innosuisse)		22	21
Special federal funding of applied research		25	36
EU Framework Programmes for Research and Innovation (EU-FP)		72	67
Industry-oriented research (private sector)		60	61
Other project-oriented third-party funding (incl. cantons, municipalities, international organisations)		49	46
Research contributions, mandates and scientific services	6	356	357
Donations and bequests	7	120	64
Other revenue	8	36	42
Operating revenue		**1,835**	**1,789**
Personnel expenses	9	1,226	1,172
Other operating expenses	10	489	496
Depreciation	18, 20	95	110
Transfer expenses	11	27	27
Operating expenses		**1,837**	**1,804**
Operating result		**–2**	**–15**
Net finance income/expense	12	**20**	**33**
Share of surplus/deficit of associated entities and joint ventures	17	**33**	**75**
Surplus (+) or deficit (–)		**51**	**93**

CONSOLIDATED BALANCE SHEET

CHF million	Note	31.12.2020	31.12.2019
Assets			
Cash and cash equivalents	13	914	168
Current receivables from non-exchange transactions	14	305	306
Current receivables from exchange transactions	14	34	24
Current financial assets and loans	19	323	1,063
Inventories	15	6	6
Prepaid expenses and accrued income	16	32	22
Total current assets		**1,614**	**1,588**
Property, plant and equipment	18	572	477
Intangible assets	18	3	4
Non-current receivables from non-exchange transactions	14	648	604
Non-current receivables from exchange transactions	14	0	0
Investments in associated entities and joint ventures	17	202	168
Non-current financial assets and loans	19	6	5
Co-financing	20	45	47
Total non-current assets		**1,476**	**1,304**
Total assets		**3,091**	**2,893**
Liabilities and equity			
Current liabilities	21	113	68
Current financial liabilities	22	0	0
Accrued expenses and deferred income	23	86	74
Short-term provisions	24	49	48
Short-term liabilities		248	190
Dedicated third-party funds	26	815	776
Non-current financial liabilities	22	19	19
Net defined benefit liabilities	25	515	1,145
Long-term provisions	24	27	31
Long-term liabilities		1,375	1,970
Total liabilities		**1,623**	**2,160**
Valuation reserves		–16	–699
Dedicated reserves		1,085	978
Free reserves		202	331
Co-financing	20	45	47
Reserves from associated entities	17	202	168
Accumulated surplus (+)/deficit (–)		–50	–92
Total equity		**1,467**	**733**
Total liabilities and equity		**3,091**	**2,893**

CONSOLIDATED STATEMENT OF CHANGES IN EQUITY

CHF million	Valuation reserves	Donations and bequests	Teaching and research reserves	Infrastructure and administration reserves	Dedicated reserves	Free reserves	Co-financing	Reserves from associated entities	Accumulated surplus (+)/deficit (–)	Total equity
	a	b	c	d		e		f	g	
2020										
As of 1.1.2020	**–699**	**479**	**424**	**74**	**978**	**331**	**47**	**168**	**–92**	**733**
Surplus (+) or deficit (–)									51	51
Revaluation of net defined benefit liabilities	682									682
Revaluation of financial assets	1									1
Total items directly recognised in equity	683									683
Increase (+)/decrease (–) in reserves	0	44	53	10	107	–129	–2	33	–9	0
Total changes	**683**	**44**	**53**	**10**	**107**	**–129**	**–2**	**33**	**42**	**734**
As of 31.12.2020	**–16**	**523**	**478**	**84**	**1,085**	**202**	**45**	**202**	**–50**	**1,467**
2019										
As of 1.1.2019	**–650**	**484**	**254**	**60**	**798**	**483**	**48**	**93**	**–84**	**689**
Surplus (+) or deficit (–)									93	93
Revaluation of net defined benefit liabilities	–50									–50
Revaluation of financial assets	2									2
Total items directly recognised in equity	–48									–48
Increase (+)/decrease (–) in reserves	0	–6	170	14	179	–152	–2	75	–101	0
Total changes	**–48**	**–6**	**170**	**14**	**179**	**–152**	**–2**	**75**	**–8**	**45**
As of 31.12.2019	**–699**	**479**	**424**	**74**	**978**	**331**	**47**	**168**	**–92**	**733**

a The negative valuation reserves (CHF –16 million as of 31 December 2020) consist predominantly of cumulative net actuarial and investment losses on the net defined benefit liability (not recognised in surplus or deficit). Details can be found in note 25.

b Dedicated donation and bequest reserves rose to CHF 523 million, as new donation agreements signed exceeded funds used (previous year: CHF 479 million). The funds presented in this item are subject to contractually specified conditions or have a contractually specified purpose.

c Dedicated teaching and research reserves rose by CHF 53 million to CHF 478 million due especially to new projects and extensions to projects already in progress. The reserves included election commitments to newly appointed professors of CHF 131 million as of 31 December 2020 (previous year: CHF 119 million).

d Dedicated infrastructure and administration reserves rose as a result of the higher risk capital (CHF +10 million).

e Free reserves reflect funds that originate from self-generated revenues (including treasury) or completed research projects that show a surplus. The CHF 129 million reduction in free reserves reflects funds required in addition to the total federal contribution in the course of operating activities as well as financial commitments made by the Executive Board in order to promote strategic projects. Commitments were made, among others, for the ETH+/Open ETH initiative (CHF 14 million), in connection with National Centres of Competence in Research (CHF 12 million), for the Singapore-ETH Centre's new research programme Future Cities Laboratory (FCL) (CHF 12 million), for the HPCN strategy (CHF 9 million), to furnish the new GLC building on Gloriastrasse with research equipment (CHF 4 million) and to provide initial funding for additional professorships (CHF 10 million).

f Reserves from associated entities comprise ETH Zurich's share of the equity of the ETH Zurich Foundation and other independent foundations. Changes primarily reflect its share of the associated entities' surplus or deficit in the reporting period (see notes 17 and 32).

g The accumulated deficit is the residual of total equity less the reserve items presented separately. It shows the cumulative results at the reporting date and comprises the surplus/deficit carried forward, the surplus/deficit for the period and increases/decreases in the reserves in equity.

CONSOLIDATED CASH FLOW STATEMENT

CHF million	Note	2020	2019
Cash flows from operating activities			
Surplus (+) or deficit (–)		**51**	**93**
Depreciation	18, 20	95	110
Share of surplus/deficit of associated entities and joint ventures		–33	–75
Net finance income/expense (non-cash)		–29	–25
Increase/decrease in net working capital		37	–60
Increase/decrease in net defined benefit liabilities	25	52	39
Increase/decrease in provisions (short- and long-term)	24	–2	1
Increase/decrease in non-current receivables	14	–39	27
Increase/decrease in dedicated third-party funds	26	40	50
Reclassification and other (non-cash) income		–14	–6
Cash flows from operating activities		**158**	**153**
Cash flows from investing activities			
Investments			
Purchase of property, plant and equipment	18	–176	–138
Purchase of intangible assets	18	–1	–1
Increase in co-financing	20	0	0
Increase in loans	19	0	0
Increase in current and non-current financial assets	19	–67	–76
Total investments		**–244**	**–215**
Divestments			
Disposal of property, plant and equipment	18	0	0
Disposal of intangible assets	18	0	0
Decrease in co-financing	20	0	0
Decrease in loans	19	0	0
Decrease in current and non-current financial assets	19	833	47
Total divestments		**833**	**47**
Dividends received from associated entities and joint ventures	17	0	0
Cash flows from investing activities		**589**	**–168**
Cash flows from financing activities			
Increase in short-term and long-term financial liabilities	22	0	0
Decrease in short-term and long-term financial liabilities	22	0	0
Cash flows from financing activities		**0**	**0**
Total cash flow		**747**	**–15**
Cash and cash equivalents at the beginning of the period (1.1.)	13	**168**	**183**
Total cash flow		747	–15
Net effect of currency translation on cash and cash equivalents		**0**	**0**
Cash and cash equivalents at the end of the period (31.12.)	13	**914**	168
Contained in the cash flows from operating activities:			
Dividends received		4	4
Interest received		0	0
Interest paid		–1	–1

Note: The decrease in current financial assets mainly reflects the transfer of CHF 745 million of financial assets placed with the Federal Government to short-term deposits.

NOTES TO THE CONSOLIDATED FINANCIAL STATEMENTS

1 Business activity

ETH Zurich is one of the leading international universities for technology and the natural sciences. It is well known for its excellent education, ground-breaking fundamental research and for implementing its results directly into practice.

Founded in 1855, ETH Zurich today has 23,420 students from over 121 countries, including 4,320 doctoral students. It offers researchers an inspiring working environment and its students a comprehensive education. Twenty-one Nobel Laureates have studied, taught or conducted research at ETH Zurich, underlining the excellent reputation of the university.

2 Basis of accounting

These financial statements are consolidated financial statements covering the reporting period from 1 January 2020 to 31 December 2020. The reporting date is 31 December 2020. The reporting is prepared in Swiss francs (CHF). All figures are shown in millions of Swiss francs (CHF million) unless indicated otherwise.

Legal basis

The legal basis of ETH Zurich's accounting is formed of the version of the following (including directives and regulations) in effect in the reporting period:

- Federal Act on the Federal Institutes of Technology of 4 October 1991 (FIT Act; SR 414.110)
- Ordinance on the Domain of the Swiss Federal Institutes of Technology of 19 November 2003 (Ordinance on the ETH Domain; SR 414.110.3)
- Ordinance on the Finance and Accounting of the ETH Domain of 5 December 2014 (SR 414.123)
- Accounting Manual for the ETH Domain (Version 6.5)

Accounting standards

The annual consolidated financial statements of ETH Zurich have been prepared in accordance with the International Public Sector Accounting Standards (IPSASs). The underlying accounting provisions are set out in the Accounting Manual for the ETH Domain (Art. 34 Directives, Ordinance on the Finance and Accounting of the ETH Domain, SR 414.123).
No new standards were adopted in the reporting period.

IPSASs issued but not yet applied

The following IPSASs were issued or amended before the reporting date. They only become effective later on and have not been early adopted in these annual consolidated financial statements. The effective date is given in brackets.

IPSAS 41	Financial Instruments; replaces IPSAS 29 (1 January 2023)
IPSAS 42	Social Benefits (1 January 2023)
Various	Improvements to IPSAS, 2019 (1 January 2021 or 1 January 2023)

The effects on the annual consolidated financial statements are being systematically analysed. So far, however, no material effects on the annual consolidated financial statements are expected.

First-time inclusion of risk sharing in the measurement of net defined benefit liabilities and change to corporate bonds as the basis for the discount rate

Risk sharing between the employer and employees has for the first time been included in measuring net defined benefit liabilities in the annual consolidated financial statements of ETH Zurich. This takes account of the fact that, under Swiss pensions law, both employees and the employer contribute to pension plan funding and in the event of a restructuring. This risk sharing between the employer and employees has so far been inadequately reflected in measuring the defined benefit obligation. Rather than the total net liabilities from the pension scheme, only the portion assumed to be payable by the employer is now stated in the balance sheet. As a result, the recognised liability reflects actual circumstances.

The change is limited to the net defined benefit liabilities recognised in the annual consolidated financial statements of ETH Zurich. There is no change to the pension plan, the terms of the ETH Domain's pension scheme or the annual financial statements of PUBLICA as a result of the transition.

The change in measurement policy became effective on 31 December 2020. It resulted in a one-time transition effect of CHF 152 million (reduction in the liability) which, as a change in accounting estimate, was recognised directly in equity in accordance with IPSAS 3.

In addition, as of 31 December 2020, the discount rate was for the first time linked to the yield on high-quality fixed-rate corporate bonds. As a change in accounting estimate, this change is also recognised directly in equity.

Detailed explanatory notes can be found in note 25 Net defined benefit liabilities.

3 Accounting policies

The accounting policies are derived from the basis of accounting. The annual consolidated financial statements present a true and fair view of ETH Zurich's financial position, financial performance and cash flows.

The consolidated financial statements are based on historical cost. Exceptions to this rule are described in the following presentation of the accounting principles.

The annual consolidated financial statements of ETH Zurich are included in the consolidated financial statements of the ETH Domain.

Consolidation

The annual consolidated financial statements of ETH Zurich comprise the financial statements of ETH Zurich and of all entities which ETH Zurich controls directly or indirectly. The carrying amounts of investments in associated entities are also included in the consolidated financial statements.

Control means that, through its involvement with the entity, ETH Zurich has the power to direct the relevant activities of the entity and thus the ability to affect the nature and amount of benefits. At the same time, the controlling entity is exposed, or has rights, to variable benefits. ETH Zurich normally has the ability to control if it directly or indirectly holds more than 50 percent of the voting rights or potential voting rights of the entity. These entities are consolidated.

Entities are consolidated on the basis of the single-entity financial statements of ETH Zurich and the controlled entities. Receivables, liabilities, revenue and expenses from transactions between the consolidated entities as well as ownership interests and unrealised intra-economic entity surpluses are eliminated on consolidation. All financial statements are prepared in accordance with uniform policies and normally as at the same reporting date. Due to time constraints, it is sometimes necessary to use prior-year financial statements for controlled entities rather than the financial statements as at 31 December of the reporting period. The prior-year financial statements used make up an insignificant portion of the consolidated financial statements of ETH Zurich and are adjusted for significant transactions between the prior-year reporting date and 31 December of the reporting period.

Investments in entities newly acquired in the course of the reporting period are included in the annual consolidated financial statements if they meet the consolidation criteria and exceed the thresholds defined in the Ordinance on the Finance and Accounting of the ETH Domain two years in succession. Entities which are sold are included up until the date on which control is lost, which is usually the date of disposal.

Associated entities are entities where ETH Zurich has significant influence, but not control. ETH Zurich normally has significant influence over an associated entity if it holds a 20 to 50 percent share of the voting rights. These investments are not consolidated, but are instead accounted for using the equity method and recognised in "Investments in associated entities and joint ventures". Under the equity method, the carrying amount of an investment is its cost, which is subsequently adjusted to reflect any changes in the associated entity's net assets (in proportion to ETH Zurich's share in the associated entity).

An overview of the controlled and associated entities can be found in note 32.

Currency translation

Transactions in a currency other than the functional currency are translated using the exchange rate at the transaction date.

At the reporting date, monetary items in foreign currencies are translated at the closing rate and non-monetary items using the exchange rate at the transaction date. The resulting currency translation differences are recognised as finance income or finance expense.

Assets and liabilities of controlled entities with a different functional currency are translated at the closing rate, and the statement of financial performance and cash flow statement at the average rate. Translation differences arising on the translation of net assets and statements of financial performance are recognised in equity.

The table below shows the principal currencies and their exchange rates.

	Closing rate as of		Average rate	
	31.12.2020	**31.12.2019**	**2020**	**2019**
Currency				
1 EUR	1.0817	1.0866	1.0705	1.1125
1 USD	0.8840	0.9676	0.9381	0.9937
1 SGD	0.6698	0.7190	0.6802	0.7284

Revenue recognition

Each inflow of funds is assessed to determine whether it is an exchange transaction (IPSAS 9) or a non-exchange transaction (IPSAS 23).

In the case of an exchange transaction (IPSAS 9), the revenue is generally recognised when the goods are delivered or the services rendered. For project agreements, the performance obligation not yet performed is allocated to liabilities. The revenue is billed and reported by reference to the stage of completion of the project, based on the costs incurred in the reporting period.

In the case of a non-exchange transaction (IPSAS 23), a distinction is made between whether or not there is a performance or repayment obligation. If there is such an obligation, the corresponding amount is recognised as a liability at inception of the agreement and released to surplus or deficit according to the stage of completion based on the resources consumed. If there is neither an exchange nor a performance or repayment obligation in accordance with IPSAS 23, revenue is recognised in surplus or deficit in full in the reporting period and net assets/equity increased accordingly. This is usually the case with donations.

Revenue is structured as follows:

Total federal contribution
The contributions granted by the Federal Government to the ETH Domain are allocated to the two Federal Institutes of Technology and the four research institutions for the purpose of fulfilling the strategic objectives set by the ETH Board. The federal financial contribution granted to ETH Zurich (global budget) comprises the expenditure credit to cover basic teaching and research equipment (financial contribution in the narrower sense) and the investment credit covering its share of building investments for the Federal Government-owned property used by ETH Zurich. The investment credit is stated in the federal financial statements (Federal Office for Buildings and Logistics), while the total federal contribution in ETH Zurich's financial statements contains the federal financial contribution (in the narrower sense) and the federal contribution to accommodation. Both types of revenue are classified as non-exchange transactions (IPSAS 23). Federal contributions are recognised in the year in which they are paid.

The contribution to accommodation is equal to the accommodation expense, which is equal in amount to an imputed rent for the buildings owned by the Federal Government and used by ETH Zurich. Accommodation expense is reported within other operating expenses.

Tuition fees, continuing education
Revenue from tuition fees, contributions towards continuing and further education costs, and administration fees is classified as an exchange transaction (IPSAS 9). As a rule, revenue is accounted for on an accrual basis when the goods are delivered or the services rendered.

Research contributions, mandates and scientific services
Project-related contributions are given to ETH Zurich by various donors with the aim of promoting teaching and research. Project financing primarily relates to multi-year projects. Depending on the nature of the contributions, they are classified as either an exchange or a non-exchange transaction.

Donations and bequests
Revenue from donations and bequests is classified as a non-exchange transaction (IPSAS 23). Such grants where there is no conditional repayment risk are usually recognised as revenue in full when the agreement is signed.

Donations also include goods and services in-kind, which are distinguished as follows:

- Goods in-kind are recognised as assets in accordance with the applicable provisions when the agreement is signed.
- Donated rights to use assets in the sense of an operating lease are recognised as revenue and expense. Donated rights to use assets in the sense of a finance lease are measured at their fair value at inception of the agreement, if this is known, and depreciated over their useful life. If a performance obligation exists, it is stated as a liability and revenue recognised annually according to the services received. If there is no performance obligation, revenue is recognised upon recognition of the asset as a whole.
- Services in-kind received are not recognised, but are instead disclosed and commented upon in the notes if they are material.

Rights of use and services in-kind in connection with research agreements are not recognised due to the large number and the difficulty in recording, separating and measuring them. A general description of the research activity is merely provided in the notes to the consolidated financial statements.

Other revenue
Among other items, other revenue includes other service revenue and real estate revenue. This revenue is classified as an exchange transaction (IPSAS 9). As a rule, revenue is accounted for on an accrual basis when the goods are delivered or the services rendered.

Cash and cash equivalents

Cash and cash equivalents comprise cash-in-hand, demand and term deposits with financial institutions and funds invested with the Federal Government with an initial or remaining term of up to 90 days at the acquisition date. Cash and cash equivalents are measured at their nominal amount.

Receivables

Receivables from exchange (from goods and services) and non-exchange transactions are presented separately in the balance sheet.

In the case of receivables from non-exchange transactions (IPSAS 23), such as on SNSF and EU projects and from other donors, it is probable that there will be an inflow of funds in relation to the total contractual project volume. Therefore, the total amount of the project is usually recognised as a receivable at inception of the agreement if the fair value can be measured reliably. If the recognition criteria cannot be met, information is disclosed under contingent assets.

Non-current receivables of over CHF 10 million are stated at amortised cost using the effective interest method. Current receivables are stated at cost.

Value adjustments are recognised on receivables on the basis of experience and a case-by-case assessment.

Inventories

Inventories are measured at the lower of cost and net realisable value. Cost is calculated using the weighted average cost method. Appropriate value adjustments are recognised for slow-moving inventories.

Property, plant and equipment

Items of property, plant and equipment are stated at cost less accumulated depreciation. They are depreciated over their estimated useful life using the straight-line method. The estimated useful lives are as follows:

Asset category	Useful life
Immovable assets	
Property	unrestricted
Leasehold improvements ≤ CHF 1 million	10 years
Leasehold improvements > CHF 1 million	according to components
Buildings and structures	according to components [1]
Movable assets	
Machinery, equipment, tools, devices	5 years
Passenger vehicles, delivery vehicles, trucks, aircraft, ships, etc.	5 years
Furnishings	5 years
IT and communication	3 years

1 Useful life depends on the type of building, its purpose and the fabric of the building (20 – 100 years). Assets under construction are not depreciated.

Capitalised leasehold improvements and installations in leased premises are depreciated over the estimated useful life or over the term of the lease if shorter.

In the event of additions to property, plant and equipment, it is checked whether components with a value that is significant in relation to the total value need to be recognised and depreciated separately because they have a different useful life (components approach).

Investments that have future economic benefits or service potential over several years and can be measured reliably are recognised as assets and depreciated over the estimated useful life.

The residual value of property, plant and equipment that is scrapped or sold is derecognised at the time of the asset's physical disposal. The gains or losses resulting from the derecognition of an item of property, plant and equipment are recognised as operating revenue or operating expenses.

Movable cultural items and works of art are not recognised as assets. An inventory of these items is kept.

Intangible assets

Intangible assets are recognised at cost. Standard software is amortised over three years using the straight-line method. Other intangible assets with an amortisation period required to be determined individually are amortised over their estimated useful life using the straight-line method.

Impairments (property, plant and equipment and intangible assets)

Property, plant and equipment and intangible assets are reviewed annually for indications of impairment. If specific indications are identified, an impairment test is performed. If the carrying amount permanently exceeds the value in use or net realisable value, an impairment is recognised in surplus or deficit in the amount of the difference.

Leases

Leases of property where ETH Zurich substantially assumes all the risks and rewards incidental to ownership are treated as finance leases. At inception of the lease, the assets and liabilities under a finance lease are recognised at the fair value of the leased property or, if lower, the present value of the minimum lease payments. Each lease payment is apportioned between the reduction of the outstanding liability and the finance charge. The reduction is deducted from the recognised lease liability. A leased asset is depreciated over its useful life or, if it is not reasonably certain that ownership will transfer at the end of the lease term, over the shorter contract term.

Other leases where ETH Zurich is the lessee are recognised as operating leases. They are not carried in the balance sheet, but instead recognised as an expense in the statement of financial performance on an accrual basis.

Financial assets and loans

Financial assets are recognised at fair value if they are acquired with the intention of generating a profit from short-term fluctuations in price or if they are designated as financial assets at fair value (e.g. investments held without significant influence). Changes in value are recognised in surplus or deficit.

Other non-current financial assets that are held for an indefinite period and may be sold at any time for liquidity reasons or in response to changes in market conditions are classified as available for sale and stated at fair value or at cost if the fair value cannot be determined reliably. Unrealised gains and losses are recognised in equity and only transferred to surplus or deficit when the financial asset is sold or an impairment occurs. For instance, investments where there is neither control nor significant influence are recognised as available for sale.

Originated loans and fixed deposits are stated either at amortised cost (nominal value of less than CHF 10 million and current loans and fixed deposits of over CHF 10 million) or at amortised cost using the effective interest method (non-current loans and fixed deposits of over CHF 10 million). The effective interest method allocates the difference between the acquisition cost and the repayment amount (premium/discount) over the term of the asset using the net present value method. Impairment losses are recognised based on a case-by-case assessment.

Derivative financial instruments are used primarily for hedging or as a strategic position. Without exception, they are measured at fair value. Changes in value are usually recognised in surplus or deficit.

Investment property

Investment property is only reported separately if it is material. Otherwise, it is recognised in the balance sheet as property, plant and equipment and disclosed accordingly.

Co-financing

Co-financing is third-party funding acquired by ETH Zurich that is used to finance construction projects in property owned by the Federal Government. Co-financing is measured based on the valuation of the underlying property, which the Federal Government recognises at cost less accumulated depreciation. A property's ongoing depreciation reduces the value of the co-financing to the same degree as the underlying property.

Co-financing is reported at the same amounts on both the assets and the equity and liabilities side (equity) of the balance sheet.

Current liabilities

Current liabilities are usually recognised on receipt of the invoice. This item also includes current accounts with third parties (including social insurance institutions). Current liabilities are measured at their nominal amount.

Financial liabilities

Financial liabilities include monetary liabilities arising from financing activities, as well as negative replacement values from derivative financial instruments. Monetary liabilities are usually interest-bearing. Liabilities that are due for repayment within twelve months of the reporting date are current. They are generally measured at amortised cost. Derivative financial instruments are measured at their fair value.

Provisions

Provisions are recognised when a past event gives rise to a present obligation, an outflow of resources is probable and the amount can be estimated reliably.

Net defined benefit liabilities

The net defined benefit liabilities presented in the balance sheet are measured in accordance with the methods under IPSAS 39. They correspond to the present value of the defined benefit obligations (DBO) less the fair value of the plan assets. The description of the pension scheme and the beneficiaries at ETH Zurich can be found in note 25.

The defined benefit obligations and service cost are determined annually by external experts using the projected unit credit (PUC) method. The calculation is made based on information about the beneficiaries (salary, vested benefits, etc.) and using both demographic variables (retirement rates, disability rates, mortality rates, etc.) and financial variables (salary or pension trends, returns, etc.). The amounts calculated are discounted to the valuation date by applying a discount rate. Changes in estimates of economic conditions can significantly affect defined benefit obligations.

The defined benefit obligations were measured based on the current membership base of the ETH Domain's pension scheme as of 31 October 2020, using actuarial assumptions as of 31 December 2020 (e.g. BVG 2015 actuarial tables) and the plan provisions of the ETH Domain pension scheme. The results were then adjusted using estimated pro rata cash flows as of 31 December 2020. The fair value of the plan assets was used, including estimated performance as of 31 December 2020.

Current service cost, past service cost resulting from plan amendments, gains and losses on settlement, administrative costs and interest on the net defined benefit liabilities are presented in the statement of financial performance within personnel expenses.

Plan amendments and plan settlements are recognised immediately in surplus or deficit in the period in which they occur provided they result in vested benefits. Actuarial and investment gains and losses on defined benefit plans are recognised directly in equity in the reporting period in which they occur.

Risk sharing is included in the measurement of the defined benefit obligation in two steps and requires additional assumptions to be made. Like the other financial and demographic assumptions, these are assumptions made from the employer perspective. In the first step, it is assumed that the pension scheme's Board of Directors (*Kassenkommission*) will continue to take measures to keep the pension scheme financially balanced and counteract any systematic redistribution between active and retired members. In doing so, it is assumed that the most likely risk-mitigation measure is to reduce the conversion rate to an actuarially appropriate level. Assuming that a technical interest rate of 1.3 percent is applied in combination with period tables, the outcome is a reduction in the conversion rate to 4.7 percent. Even after assuming the future reduction in benefits (as a result of the lower conversion rate accompanied by experience-based compensation measures), there remains a structural deficit, which in the second step is apportioned between the employer and employees. In doing so, it is assumed that the employer share of the deficit is limited to 64 percent as per the current sliding scale of savings contributions under the terms of the scheme. The employee share is allocated at a flat rate between an earned portion and a portion still to be earned, based on past and expected future years of service. The portion already earned reduces the present value of the employer's defined benefit obligation, while the portion still to be earned reduces the employer's future service cost.

Following the introduction of risk sharing, effects of plan amendments that relate to assumptions about risk sharing are no longer recognised in the statement of financial performance, but directly in equity as a component of the remeasurement of the liability.

Dedicated third-party funds

Liabilities from dedicated projects that arise from non-exchange transactions (IPSAS 23) are presented in the balance sheet as dedicated third-party funds. They are allocated solely to non-current liabilities because the projects usually last for several years and the current portion of the liability cannot be determined in most cases due to the nature of the projects.

They are measured based on the outstanding performance obligations at the reporting date, which are calculated from the total contractual project volume less services performed up to the reporting date.

Equity

Net assets/equity is the residual interest in the assets of an entity after deducting all its liabilities. Equity is structured as follows:

Valuation reserves (recognition in equity)

- Revaluation reserves for available-for-sale financial assets recognised at fair value: Fair value changes are recognised in equity until the financial assets are sold.

- Revaluation reserves for net defined benefit liabilities: Actuarial and investment gains and losses on defined benefit obligations or plan assets are recognised in equity.

- Valuation reserves from hedging transactions: If hedge accounting is used, positive and negative replacement values from hedging transactions are recognised in equity and released to surplus or deficit when the hedged transaction affects surplus or deficit.

Dedicated reserves

- Donations and bequests: This item includes unused funds from donations and bequests that have certain conditions attached, but are not required to be classified as liabilities.

- Teaching and research reserves: This item indicates that various internal and external commitments exist and appropriate reserves have been recognised to cover them. They comprise reserves for teaching and research projects as well as "election commitments", i.e. funds granted to newly elected professors under contractual arrangements for the purpose of setting up their professorship.

- Infrastructure and administration reserves: These include reserves for fluctuations in the value of the securities portfolio (risk capital) and for delayed construction projects.

Dedicated reserves must (with the exception of election/appointment commitments) have been generated. They are recognised and released within equity.

Free reserves

Unused funds for which there are no contractual or internal provisions in accordance with IPSASs are presented as free reserves. They are not restricted in terms of time or purpose.

Reserves from associated entities

This item comprises reserves from the inclusion of the share of the equity of associated entities that is accounted for using the equity method. These dedicated reserves cannot be accessed directly.

Accumulated surplus/deficit

The item "Accumulated surplus/deficit" shows the cumulative results at the reporting date. It comprises the surplus/deficit carried forward, the surplus/deficit for the period and increases/decreases in the reserves in equity.

The surplus/deficit carried forward is accumulated annually as part of the appropriation of surplus/deficit. The surplus/deficit for the period includes the portion of the result not yet distributed. If currency translation differences arise on foreign consolidated entities on consolidation, they are recognised in equity, without affecting surplus or deficit.

Contingent liabilities and contingent assets

A contingent liability is either a possible obligation that arises from past events and whose existence will be confirmed only by the occurrence or non-occurrence of an uncertain future event not wholly within the control of the entity or a present obligation that arises from past events, but is not recognised because of its low probability of occurrence (less than 50 percent) or because the obligation cannot be measured reliably, as a result of which the criteria for recognising a provision are not met.

A contingent asset is a possible asset that arises from past events and whose existence will be confirmed only by the occurrence or non-occurrence of an uncertain future event not wholly within the control of the entity.

Financial commitments

Financial commitments are presented in the notes if they are based on events prior to the reporting date, they will definitely lead to obligations to third parties after the reporting date and their amount can be measured reliably.

Cash flow statement

The cash flow statement shows the cash flows from operating activities, investing activities and financing activities. It is presented using the indirect method, i.e. cash flows from operating activities are based on the surplus or deficit for the period, adjusted for the effects of transactions of a non-cash nature. "Total cash flow" represents the change in the balance sheet item "Cash and cash equivalents" including the effect of changes in foreign exchange rates.

Estimation uncertainty and management judgements

Estimation uncertainty in the application of accounting policies

Preparation of the annual consolidated financial statements depends on estimates and assumptions involved in applying the accounting policies, where management may exercise a certain degree of judgement. This applies to the following items in particular:

- Useful life and impairment of property, plant and equipment: The useful life of property, plant and equipment is defined and periodically reviewed bearing in mind the current technical environment and past experience. A change in the estimate may affect the future amount of the depreciation charges and the carrying amount. Estimates that could lead to a reduction in the carrying amount (impairment) are likewise made in the course of the regular impairment test.

- Provisions: These involve a high degree of estimation and therefore may lead to a higher or lower cash outflow depending on the actual outcome of a past event.

- Net defined benefit liabilities: The net defined benefit liabilities are calculated based on long-term actuarial assumptions for the defined benefit obligations and for the expected returns on plan assets. The determination of the discount rate and the future rates of salary and pension increase is a key element of the actuarial valuation, as are demographic trends (future mortality, disability, probable employee turnover) and assumptions about risk sharing between the employer and employees. These assumptions may differ from actual future developments.

- Recognition of donations: ETH Zurich regularly receives donations in the form of assets. Under IPSASs, donations must be recognised initially at fair value. The determination of that fair value requires management to make estimates.

- Discount rates: Uniform discount rates have been defined within the ETH Domain for use in discounting non-current receivables, liabilities and provisions. They are based on a risk-free rate and a premium for credit risk. Due to the current interest rate situation, however, these rates are subject to a certain degree of uncertainty.

Management judgements in the application of accounting policies

There were no particular or exceptional management judgements in the application of accounting policies that had a material effect on the annual consolidated financial statements in the reporting period or in the previous year.

4 Total federal contribution

The total federal contribution amounted to CHF 1,293 million in the reporting period (previous year: CHF 1,298 million). It comprises the federal financial contribution (in the narrower sense) or expenditure credit, which is used to cover basic teaching and research equipment, and the federal contribution to accommodation to cover rent charged by the Federal Government for the use of the buildings it owns. The latter is offset to an equal degree by the accommodation expense for the use of property owned by the Federal Government (see note 10).

The financial contribution declined by CHF 7 million, or 1 percent, to CHF 1,151 million in 2020. The contribution to accommodation, which comprises the depreciation charges on buildings and the return on asset value, rose slightly, by CHF 2 million to CHF 142 million.

5 Tuition fees, continuing education

This item of revenue primarily includes the tuition fees paid by students and doctoral candidates, various additional registration fees and fees for continuing education programmes.

Revenue from tuition fees and continuing education rose by CHF 3 million to CHF 31 million. The rise reflects the higher number of students and the moderate increase in tuition fees.

6 Research contributions, mandates and scientific services

CHF million	**2020**	of which revenues (IPSAS 23)	of which revenues (IPSAS 9)	**2019**	**Change absolute**
Swiss National Science Foundation (SNSF)	129	129	0	125	4
Swiss Innovation Agency (Innosuisse)	22	22	0	21	1
Special federal funding of applied research	25	9	16	36	–11
EU Framework Programmes for Research and Innovation (EU-FP)	72	72	0	67	5
Industry-oriented research (private sector)	60	22	38	61	–1
Other project-oriented third-party funding (incl. cantons, municipalities, international organisations)	49	31	18	46	3
Total research contributions, mandates and scientific services	**356**	**285**	**71**	**357**	**0**

Revenue from research contributions, mandates and scientific services remained stable overall. A rise was recorded mainly in revenue from EU Framework Programmes for Research and Innovation (CHF +5 million), of which CHF 2 million comprised federal contributions granted directly from federal funds as part of the bridge financing (Horizon 2020) (previous year: CHF 9 million). Revenue from the SNSF also increased (CHF +4 million), as did revenue from other project-oriented third-party funding (CHF +3 million, of which CHF –4 million was attributable to controlled entities). This change reflected the progress on ongoing projects. The increases in revenue mentioned above were offset by the decline in revenue from federal research mandates (CHF –11 million). This reduction was attributable to the fact that a larger volume of contracts were signed in the previous year where the total contract value was reported as revenue in 2019.

Information on receivables from non-exchange transactions and dedicated third-party funds related to projects financed through the third-party funding category in question can be found in notes 14 and 26.

7 Donations and bequests

Revenue from donations and bequests amounted to CHF 120 million (CHF +56 million). It resulted mostly from donation agreements signed in 2020. Such agreements are usually recognised in surplus or deficit in full in the year of signing and are mostly subject to certain conditions. Also included in this item were goods and services in-kind outside research collaborations in the amount of CHF 3 million (CHF +2 million), mostly in the form of rights of use.

8 Other revenue

CHF million	2020	2019	Change absolute
Licences and patents	2	2	0
Sales	5	6	–1
Refunds	1	4	–4
Other services	11	14	–3
Real estate revenue	5	7	–1
Revenue from real estate owned by the Federal Government left for use	3	3	0
Profit from disposals (property, plant and equipment)	0	0	0
Other miscellaneous revenue	8	5	3
Total other revenue	**36**	**42**	**–6**

Other revenue showed a fall (CHF –6 million). This was partly an effect of the coronavirus pandemic and due mainly to the decline in refunds (CHF –4 million). This decline was attributable, among other factors, to lower travel expense reimbursements from third parties. Revenue from other services also fell (CHF –3 million), partly as a result of lower fees for services rendered.

9 Personnel expenses

CHF million	2020	2019	Change absolute
Professors	135	129	6
Scientific personnel	482	464	17
Technical and administrative personnel, apprentices, trainees	366	352	14
IC, Suva and other refunds	–4	–4	0
Total salaries and wages	**980**	**942**	**38**
Social insurances OASI/DI/IC/MB	63	59	4
Net pension costs	168	149	18
Accident and sickness insurance Suva (BU/NBU/KTG)	4	3	0
Employer's contribution to Family Compensation Fund (FAK/FamZG)	11	11	1
Total social insurance schemes and pension expenses	**245**	**222**	**23**
Other employer contributions	0	0	0
Temporary personnel	0	0	0
Change in provisions for untaken leave and overtime	0	–1	1
Change in provisions for contributions to long-service awards	–4	2	–6
Other personnel expenses	4	6	–1
Total personnel expenses	**1,226**	**1,172**	**54**

Salaries and wages increased by CHF 38 million, or 4 percent, year on year. This was related to the rise in average full-time equivalents by 253 FTEs to 10,098 FTEs (+3 percent) and pay adjustments in the reporting period. Details on the changes in personnel can be found in the Human Resources and Infrastructure section.

Net pension costs represent the net defined benefit liability accrued and allocated on a straight-line basis over the years of service. Details on the net defined benefit liability can be found in note 25.

The change in provisions for contributions to long-service awards (CHF –4 million) reflected actuarial gains, whereas the prior-year figure (CHF 2 million) was attributable to actuarial losses.

10 Other operating expenses

CHF million	2020	2019	Change absolute
Expenses for goods and materials	70	61	8
Premises costs	204	196	8
Energy costs	30	32	–2
IT expenses	60	49	11
Expenses for consultations, expertises and guest lecturers	41	47	–7
Library expenses	19	23	–4
Other operating costs	66	88	–21
Total other operating expenses	**489**	**496**	**–7**

Expenses for goods and materials rose (CHF +8 million) due mainly to higher expenses for material goods not recognised as assets, such as furniture and equipment for research and laboratory buildings, machinery and devices.

Although the coronavirus pandemic enabled construction activity to be sped up and brought forward in the reporting period, premises costs were only moderately higher (CHF +8 million). The rise was due to higher lease expenses as a result of leasing additional space, an increase in expenses incurred for cleaning and security, and slightly higher accommodation expense for the use of property owned by the Federal Government (CHF +2 million; see note 4). Conversely, expenses incurred for maintenance and repairs were lower.

IT expenses also showed a rise (CHF +11 million), attributable in part to the additional infrastructure required as a result of the transition from in-person to remote teaching.

These effects were offset primarily by a decrease in other operating costs (CHF –21 million) and in expenses for consultations, expertise and guest lecturers. The decline was attributable mainly to the changes in the overall environment as a result of the coronavirus pandemic. Above all, it reflected a fall in out-of-pocket expenses, due to travel being severely restricted and seminars, meetings and other events being cancelled, as well as a fall in fees and guest speaker expenses.

11 Transfer expenses

CHF million	2020	2019	Change absolute
Scholarships and grants to students and doctoral students	13	15	–2
Contributions to research projects	6	5	1
Other transfer expenses	8	7	1
Total transfer expenses	**27**	**27**	**0**

Transfer expenses were unchanged year on year. An increase in research projects (CHF +1 million) and other transfer expenses (CHF +1 million) was offset by a decrease in scholarships, particularly to Bachelor's students, and grants to students and doctoral students (CHF –2 million).

12 Net finance income/expense

CHF million	2020	2019	Change absolute
Finance income			
Interest income	5	5	0
Income from investments	5	4	0
Changes in fair value of financial assets	28	30	– 1
Foreign currency gains	4	2	2
Other finance income	0	0	0
Total finance income	**42**	**41**	**1**
Finance expense			
Interest expense	1	1	0
Other financing costs for provision of capital	0	0	0
Changes in fair value of financial assets	12	1	10
Foreign currency losses	9	5	4
Impairment of loans and fixed deposits	0	0	0
Other finance expense	1	1	0
Total finance expense	**22**	**8**	**14**
Total net finance income/expense	**20**	**33**	**– 13**

Net finance income was the result of the positive performance of the asset management mandates (see also note 19), which is reflected in "Changes in fair value of financial assets" on both the income and the expense side.

Interest income resulted mostly from unwinding of the discount on material receivables.

Interest expense primarily contained the interest on the finance lease. Further information on the finance lease can be found in note 22.

13 Cash and cash equivalents

CHF million	31.12.2020	31.12.2019	Change absolute
Cash	1	1	–1
Swiss Post	35	43	–8
Bank	33	23	10
Short-term deposits (<90 days)	845	100	745
Total cash and cash equivalents	**914**	**168**	**746**

The change in cash and cash equivalents is closely related to ETH Zurich's investing and financing activities (see "Consolidated cash flow statement") and subject to foreign currency fluctuations that are not reflected in "Total cash flow". A significant portion of "Cash and cash equivalents" comprises deposits with the Federal Government that were presented as short-term deposits with an initial or remaining term of up to 90 days at the acquisition date. These rose to CHF 845 million in the reporting period (CHF +745 million). This rise was the result of the transfer of CHF 745 million of financial assets placed with the Federal Government from a custody account with a notice period of six months (current financial assets) to a custody account with no notice period (short-term deposits) in order to increase financial flexibility. Further information on financial assets can be found in note 19.

There are no restrictions on the use of cash and cash equivalents.

14 Receivables

CHF million	31.12.2020	31.12.2019	Change absolute
Receivables from project contracts and donations	943	908	35
Other receivables	10	1	9
Value adjustments	0	0	0
Total receivables from non-exchange transactions	**954**	**910**	**44**
of which current	305	306	0
of which non-current	648	604	44
Trade accounts receivable	27	24	4
Other receivables	8	0	7
Value adjustments	–1	0	0
Total receivables from exchange transactions	**34**	**24**	**11**
of which current	34	24	11
of which non-current	0	0	0

Receivables from non-exchange transactions reflect the total amount of contractual payments for mainly project-oriented research contributions which have not yet been transferred to ETH Zurich. Grants that have been promised but not yet transferred under donation agreements are also recognised as receivables from non-exchange transactions.

Receivables from SNSF projects saw the sharpest rise. Receivables for EU projects and from projects financed out of third-party funds also increased. Conversely, there was a decrease in particular in receivables for Innosuisse projects and applied research projects.

Due dates of receivables

CHF million	**Total receivables**	Not past due	Past due up to 90 days	Past due 91 to 180 days	Past due more than 180 days
31.12.2020					
Gross amount	**989**	**966**	**10**	**3**	**8**
Receivables from non-exchange transactions	954	938	5	3	7
Receivables from exchange transactions	35	29	5	0	1
Value adjustments	**–1**	**0**	**0**	**0**	**–1**
of which individually impaired	0	0	0	0	0
31.12.2019					
Gross amount	**934**	**910**	**13**	**6**	**6**
Receivables from non-exchange transactions	910	890	9	5	5
Receivables from exchange transactions	24	19	4	1	0
Value adjustments	**0**	**0**	**0**	**0**	**0**
of which individually impaired	0	0	0	0	0

Value adjustments on receivables

Value adjustments on receivables amounted to CHF 1 million (previous year: CHF 0.4 million) and related to receivables from exchange transactions.

15 Inventories

Inventories of CHF 6 million (previous year: CHF 6 million) comprise purchased inventories (there are no self-produced inventories).

16 Prepaid expenses and accrued income

CHF million	**31.12.2020**	**31.12.2019**	**Change absolute**
Interest	0	0	0
Prepaid expenses	18	16	2
Other prepaid expenses and accrued income	13	6	7
Total prepaid expenses and accrued income	**32**	**22**	**9**

This item consists mainly of the library's media purchases, advance rental payments and advance payments for hardware and software maintenance agreements as well as accrued project income that is billed and reported by reference to the stage of completion of the project.

17 Investments in associated entities and joint ventures

Details on material associated entities can be found in the section below. Further information on all associated entities is provided in note 32. ETH Zurich did not have any joint ventures in the reporting period.

Material associated entities and individually immaterial associated entities

Summarised financial information for each material associated entity and for the individually immaterial entities in aggregate is set out below. For the purposes of equity method accounting, the financial statements and the amounts reported there were adjusted, with some simplifications, to conform to the accounting of ETH Zurich.

CHF million	ETH Zurich Foundation	Student Housing Foundation	Albert Lück Foundation [2]	Individually immaterial associated entities [3]
31.12.2020				
Reporting date used	**31.12.2020**	**31.12.2019**	**31.12.2019**	**31.12.2019**
Current assets	387	6	9	9
Non-current assets	230	111	39	5
Short-term liabilities [1]	38	1	9	0
Long-term liabilities [1]	433	52	23	3
Revenue	49	13	6	0
Tax expense	0	0	0	0
Pre-tax gain or loss attributable to discontinued operations	0	0	0	0
Surplus (+) or deficit (–)	32	3	–2	1
Dividends received from the associated entity	0	0	0	0
31.12.2019				
Reporting date used	**31.12.2019**	**31.12.2018**	**31.12.2018**	**31.12.2018**
Current assets	330	5	1	7
Non-current assets	224	109	51	5
Short-term liabilities [1]	46	1	7	0
Long-term liabilities [1]	396	52	28	3
Revenue	52	13	6	1
Tax expense	0	0	0	0
Pre-tax gain or loss attributable to discontinued operations	0	0	0	0
Surplus (+) or deficit (–)	73	4	1	0
Dividends received from the associated entity	0	0	0	0

1 The short-term and long-term liabilities of the ETH Zurich Foundation comprise capital in the form of dedicated funds and liabilities arising from grants in the amount of CHF 38 million (short-term; previous year: CHF 46 million) and CHF 433 million (long-term; previous year: CHF 396 million). These are already included in ETH Zurich's consolidated equity, where they make up a significant portion of dedicated donation and bequest reserves.
2 The amounts disclosed as of 31 December 2019 include a material transaction in financial year 2020.
3 Individually immaterial associated entities include: Archives of Contemporary History Foundation and Foundation for Contemporary Jewish History.

The "Investments in associated entities and joint ventures" and "Reserves from associated entities" items presented in the consolidated balance sheet rose from CHF 168 million to CHF 202 million. The change primarily reflects the share of surplus of associated entities in the amount of CHF 33 million in the reporting period (previous year: CHF 75 million), most notably a legacy for the ETH Zurich Foundation.

Unrecognised share of losses of associated entities

There was no unrecognised share of losses of associated entities, either for the reporting period or cumulatively.

18 Property, plant and equipment and intangible assets

CHF million	Machinery, equipment, furnishings, vehicles	Information and communication	Advance payments, movable assets under construction	**Total movable assets**	Property, buildings [1]	Assets under construction	**Total immovable assets**	**Total property, plant and equipment**	**Total intangible assets [2]**
2020									
Purchase value									
As of 1.1.2020	**893**	**240**	**13**	**1,145**	**286**	**117**	**404**	**1,549**	**11**
Additions	53	26	7	86	11	92	104	190	1
Reclassifications	10	0	–10	0	32	–32	0	0	0
Disposals	–12	–12	0	–23	–7	0	–7	–30	0
As of 31.12.2020	**944**	**255**	**9**	**1,208**	**322**	**178**	**500**	**1,708**	**13**
Accumulated depreciation									
As of 1.1.2020	**753**	**208**	**0**	**961**	**112**	**0**	**112**	1,072	8
Depreciation	48	19	0	67	25	0	25	92	1
Impairments	0	0	0	0	0	0	0	0	0
Reversed impairments	0	0	0	0	0	0	0	0	0
Reclassifications	0	0	0	0	0	0	0	0	0
Disposals value adjustments	–11	–12	0	–22	–6	0	–6	–28	0
As of 31.12.2020	**791**	**215**	**0**	**1,005**	**130**	**0**	**130**	**1,136**	**9**
Balance sheet value as of 31.12.2020	**153**	**40**	**9**	**203**	**192**	**178**	**370**	**572**	**3**
thereof leased assets					14		14	14	
2019									
Purchase value									
As of 1.1.2019	**857**	**231**	**12**	**1,099**	**271**	**62**	**333**	**1,433**	**11**
Additions	48	17	4	69	7	68	75	144	1
Reclassifications	3	0	–3	0	13	–13	0	0	0
Disposals	–15	–8	0	–23	–5	0	–5	–27	0
As of 31.12.2019	**893**	**240**	**13**	**1,145**	**286**	**117**	**404**	**1,549**	**11**
Accumulated depreciation									
As of 1.1.2019	**718**	**183**	**0**	**901**	**91**	**0**	**91**	**992**	**6**
Depreciation	50	32	0	82	24	0	24	106	1
Impairments	0	0	0	0	0	0	0	0	0
Reversed impairments	0	0	0	0	0	0	0	0	0
Reclassifications	0	0	0	0	0	0	0	0	0
Disposals value adjustments	–15	–8	0	–22	–4	0	–4	–26	0
As of 31.12.2019	**753**	**208**	**0**	**961**	**112**	**0**	**112**	**1,072**	**8**
Balance sheet value as of 31.12.2019	**140**	**32**	**13**	**185**	**175**	**117**	**292**	**477**	**4**
thereof leased assets					15		15	15	

1 The Rübel Geobotanical Research Institution Foundation, an entity controlled by ETH Zurich, holds an investment property. It is not disclosed separately on materiality grounds.

2 Intangible assets comprise software and intangible assets in the implementation phase.

Movable items of property, plant and equipment consist mainly of technical/scientific equipment and information and communications technology (ICT) equipment.

ETH Zurich's immovable property, plant and equipment consists of five properties (CHF 18 million), one property under a finance lease (CHF 14 million) and leasehold improvements (CHF 161 million excluding assets under construction of CHF 178 million). Leasehold improvements are user-specific structural adjustments to buildings taken by ETH Zurich. There was a year-on-year rise in both the volume of leasehold improvements capitalised and assets under construction (additions) due mainly to an increase in construction activity.

The majority of the properties used by ETH Zurich are owned by the Federal Government and are reported in the balance sheet of the Federal Government rather than that of ETH Zurich.

19 Financial assets and loans

CHF million	31.12.2020	31.12.2019	Change absolute
Securities, fixed deposits and investment funds	323	268	55
Positive replacement values	0	0	0
Other financial assets	0	795	–795
Loans	1	0	0
Total current financial assets and loans	**323**	**1,063**	**–740**
Securities, fixed deposits and investment funds	0	0	0
Other financial assets	5	4	1
Loans	1	1	0
Total non-current financial assets and loans	**6**	**5**	**1**

Current financial assets are obtained in particular by investing funds collected from third parties that will not be used immediately. Based on the applicable treasury agreement and the investment guidelines stipulated by the ETH Board, these funds are placed in the market or with the Federal Government. The third-party funds placed in the market are managed by Swiss banks under asset management mandates.

The rise in securities, fixed deposits and investment funds was the result of augmenting the existing asset management mandates and the positive performance from those mandates (CHF + 55 million).

The decline in other current financial assets mainly reflects the transfer of CHF 745 million of financial assets placed with the Federal Government from a custody account with a notice period of six months (current financial assets) to a custody account with no notice period (short-term deposits) in order to increase financial flexibility. Further information on short-term deposits can be found in note 13.

Other non-current financial assets include investments held by ETH Zurich in spin-offs where it has an interest of less than 20 percent.

Loan funding granted to students and doctoral candidates on preferential terms amounted to CHF 0.8 million (of which CHF 0.6 million comprised current loans). Loans to students and doctoral candidates are repayable within twelve months (current) or in instalments over a period of six years from the individual completing their studies (non-current). There were no material loans past due or impairment losses on loans as of 31 December 2020.

20 Co-financing

CHF million	2020	2019	Change absolute
Purchase value			
As of 1.1.	**62**	**62**	0
Additions	0	0	0
Disposals	0	0	0
As of 31.12.	**62**	**62**	**0**
Accumulated depreciation			
As of 1.1.	**16**	**14**	**2**
Depreciation	2	2	0
Disposals	0	0	0
As of 31.12.	**17**	**16**	**2**
Balance sheet value as of 31.12.	**45**	**47**	**–2**

21 Current liabilities

CHF million	31.12.2020	31.12.2019	Change absolute
Trade payables	36	7	29
Liabilities to social insurance institutions	19	19	0
Other current liabilities	58	42	16
Total current liabilities	**113**	**68**	**45**

The rise in current liabilities is attributable to higher trade payables (CHF +29 million), which reflect the variability of accounts payable turnover, and an increase in other current liabilities (CHF +16 million), which consist mainly of a withholding tax liability to the cantonal tax office.

22 Financial liabilities

Current and non-current financial liabilities

As in the previous year, non-current financial liabilities amounted to CHF 19 million and consisted primarily of liabilities under the finance lease (CHF 16 million). The slight reduction here was primarily the result of a reclassification into current financial liabilities and was a non-cash change.

As at the previous year-end, current financial liabilities were small in amount at the end of 2020. The change here due to repayments was a cash change.

Finance lease disclosures

CHF million	Future minimum leasing payments 2020	Future financial expenses 2020	Present value of future minimum leasing payments 2020
Due dates			
Due within 1 year	1	1	0
Due within 1 to 5 years	6	4	1
Due after more than 5 years	27	13	15
Total as of 31.12.	**34**	**18**	**16**

	2020
Leasing expenses	
Lease payments expensed in period	0
Additional details	
Future revenue from sublease (from non-cancellable contracts)	0

The only finance lease is for a property on the Hönggerberg campus.

23 Accrued expenses and deferred income

CHF million	31.12.2020	31.12.2019	Change absolute
Interest	0	0	0
Deferred income	70	57	13
Other accrued expenses and deferred income	16	17	–1
Total accrued expenses and deferred income	**86**	**74**	**12**

This item consists mainly of deferred income from exchange transactions and accrued expenses for central procurement, operations and construction projects.

24 Provisions

CHF million	Provisions for untaken leave and overtime	Other long-term employee benefits (IPSAS 39)	Other provisions	**Total provisions**
2020				
As of 1.1.2020	**48**	**31**	**0**	**78**
Creation (incl. increase)	0	0	1	1
Reversal	0	0	0	0
Appropriation	0	–4	0	–4
Reclassifications	0	0	0	0
Increase in present value	0	0	0	0
As of 31.12.2020	**48**	**27**	**1**	**76**
of which short-term	48		1	49
of which long-term		27		27
2019				
As of 1.1.2019	**48**	**28**	**1**	**77**
Creation (incl. increase)	0	6	0	6
Reversal	–1	0	0	–1
Appropriation	0	–3	0	–3
Reclassifications	0	0	0	0
Increase in present value	0	0	0	0
As of 31.12.2019	**48**	**31**	**0**	**78**
of which short-term	48		0	48
of which long-term		31		31

Provisions for untaken leave and overtime (CHF 48 million) were unchanged year on year. Provisions for other long-term employee benefits in accordance with IPSAS 39 decreased by the amount appropriated (CHF –4 million).

25 Net defined benefit liabilities

Most ETH Zurich employees and pensioners are insured under the pension scheme the ETH Domain maintains at the collective institution "Swiss Federal Pension Fund PUBLICA" (PUBLICA). There are no other pension schemes at the controlled entities, which is why the further statements in the text refer to the pension scheme the ETH Domain maintains at PUBLICA.

Legal framework and responsibilities

Legal requirements

Swiss pension plans must be run through a legally separate, trustee-administered pension institution. The law prescribes minimum benefits.

Organisation of the pension scheme

PUBLICA is an independent, state-run institution under public law.

The Board of Directors (*Kassenkommission*) is PUBLICA's most senior governing body. In addition to management, it is also responsible for the oversight and supervision of PUBLICA's Executive Board. The Board of Directors has 16 members, 8 representing the insured members and 8 representing the employers from among all the affiliated pension plans. This means that PUBLICA's most senior governing body is made up of an equal number of employer and employee representatives.

Each pension scheme has its own governing body made up of equal numbers of representatives. Among other things, it is involved in concluding the affiliation contract and decides on the appropriation of any surpluses. Each governing body is made up of nine employer representatives and nine employee representatives from the entities.

Insurance plan

In accordance with IPSAS 39, insurance plans are classified as defined benefit plans.

The pension plan is defined in the terms of the ETH Domain pension scheme applicable to employees and professors. Those terms form part of the affiliation contract with PUBLICA. The pension plan provides benefits in excess of the minimum benefits required by law in the event of disability, death, old age and departure; i.e. it is what is known as an "enveloping" plan (obligatory and extraordinary benefits).

The employer and employee savings contributions are set as a percentage of the insured salary. A risk premium is charged for death and disability insurance. The administrative costs are paid by the employer.

The old-age pension is calculated from the credit balance in the retirement fund at the retirement date multiplied by the conversion rate specified in the terms. Employees have the option of drawing the retirement benefits as a lump sum. There are pension plans for different groups of insured persons. In addition, employees have the option of making additional savings contributions.

The risk benefits are determined depending on the projected savings capital, which attracts interest, and on the conversion rate.

Investment of assets

Investments are made by PUBLICA for all pension schemes (with the same investment profile) collectively.

As PUBLICA's most senior governing body, the Board of Directors bears overall responsibility for asset management. It is responsible for issuing and amending the investment policy and determines the investment strategy. The Investment Committee advises the Board of Directors on investment-related issues and oversees compliance with the investment policy and strategy.

Responsibility for implementing the investment strategy rests with PUBLICA's Asset Management. Asset Management also makes tactical decisions to deviate temporarily from the investment strategy weightings in order to generate added value compared to the existing strategy. Where individual asset classes are built up or reduced over a number of years, a pro rata strategy is calculated so as to enable transactions to be spread over time.

Risks for the employer

The governing body of the ETH Domain's pension scheme made up of equal numbers of representatives can change the funding system (contributions and future benefits) at any time. The governing body may collect restructuring contributions from the employer while the scheme is underfunded within the meaning of pension law (Article 44 Occupational Pension Ordinance (BVV 2)) and if other measures are without success. If these are used to fund benefits in excess of the statutory minimum, the employer must indicate their agreement with this.

The definitive funding ratio in accordance with the Occupational Pensions Act (BVG) was not yet available at the time the annual consolidated financial statements were authorised for issue. The provisional regulatory funding ratio for the ETH Domain's pension scheme at PUBLICA, in accordance with the Occupational Pension Ordinance (BVV 2), was 107.9 percent at the end of the year (2019: 105.6 percent, definitive). The provisional economic funding ratio for the ETH Domain's pension scheme at PUBLICA was 88.9 percent at the end of the year (2019: 87.3 percent, definitive).

Special events

There were no plan amendments, plan curtailments or plan settlements required to be reflected in the current reporting period.

Changes in accounting estimates as of 31 December 2020: Introduction of risk sharing and change in determining the discount rate

In line with the risk sharing between the employer and employees, only the portion of the defined benefit liability assumed to be payable by the employer is now included. This results in a more realistic picture of the pension scheme costs expected to be incurred by ETH Zurich. Risk sharing was not reflected in the actuarial valuation as of 31 December 2019. The estimation technique used to determine the financial assumptions taking risk sharing into account was applied for the first time as of 31 December 2020.

Including risk sharing in the measurement resulted in a CHF 152 million reduction in net defined benefit liabilities as of 31 December 2020. As a change in estimate, this reduction was recognised directly in equity within actuarial gains and losses.

In addition, as of 31 December 2020, the discount rate was for the first time linked to the yield on high-quality fixed-rate corporate bonds. As a change in accounting estimate, this change is also recognised directly in equity.

Net defined benefit liabilities

CHF million	31.12.2020	31.12.2019	Change absolute
Present value of defined benefit obligations	–4,249	–4,704	456
Fair value of plan assets	3,734	3,559	175
Recognised net defined benefit liabilities	**–515**	**–1,145**	**630**

The CHF 630 million decrease in the net defined benefit liability was the result of a reduction in the present value of the defined benefit obligations and an increase in the fair value of the plan assets. The one-time effect of transitioning to risk sharing was recognised directly in equity as of 31 December 2020 and reduced the liability by CHF 152 million. In addition, the increase in the discount rate (31 December 2020: 0.2 percent; 31 December 2019: –0.2 percent) and the change in demographic assumptions reduced the net defined benefit liability by CHF 294 million and CHF 146 million respectively. The plan assets increased by CHF 175 million as a result of the positive return on investments.

Net pension costs

CHF million	2020	2019	Change absolute
Current service cost (employer)	163	140	23
Past service cost	5	6	–1
Gains (–)/losses (+) from plan settlements	0	0	0
Interest expense from defined benefit obligations	–9	13	–22
Interest income from plan assets	7	–10	17
Administrative costs (excl. asset management costs)	2	2	0
Other	0	0	0
Total net pension costs incl. interest expense recognised in statement of financial performance	**168**	**151**	**17**

ETH Zurich's net pension costs amounted to CHF 168 million for the reporting period (CHF +17 million).

The increase in current service cost (CHF +23 million) and the change in both interest expense from defined benefit obligations (CHF –22 million) and interest income from plan assets (CHF +17 million) were due primarily to the changes in actuarial assumptions in the previous year (discount rate as of 1 January 2020: –0.2 percent versus 1 January 2019: 0.3 percent). Due to the negative discount rate, unwinding of the discount on the defined benefit obligations resulted in interest income in financial year 2020. As pension costs are in each case based on prior-year assumptions under IPSAS 39, the inclusion of risk sharing features will not affect the amount of the pension costs until the coming financial year.

Past service cost of CHF 5 million included purchases into the pension plan for professors (CHF –1 million). The ETH Board did not transfer any contributions to the ETH Domain's pension scheme in the reporting period (previous year: CHF 3.5 million).

Employer contributions of CHF 116 million and employee contributions of CHF 64 million are expected for the coming financial year.

Revaluation recognised in equity

CHF million	31.12.2020	31.12.2019	Change absolute
Actuarial gains (–)/losses (+)	–510	348	–858
from change in financial assumptions	–423	313	–735
from change in demographic assumptions	–146	0	–146
from experience adjustments	59	36	23
Return on plan assets (excl. interest income), (gains [–]/losses [+])	–172	–298	126
Other	0	0	0
Revaluation recognised in equity	**–682**	**50**	**–732**
Cumulative amount of revaluation recognised in equity (gain [–]/loss [+])	**19**	**702**	**–682**

A revaluation gain of CHF 682 million was recognised in equity in the reporting period (2019: revaluation loss of CHF 50 million). This resulted in a cumulative loss of CHF 19 million as of 31 December 2020 (2019: CHF 702 million). The actuarial gains attributable to the change in financial assumptions were the result of the increase in the discount rate (CHF 294 million) and the introduction of risk sharing (CHF 152 million). They were diminished slightly by the higher return on retirement savings and the reduction in the expected rate of salary increase (actuarial loss of CHF 24 million). The change in demographic assumptions (in particular, probable employee turnover and disability rates) resulted in actuarial gains of CHF 146 million (previous year: zero). The return on plan assets recognised in equity was due to the higher earned return on investments of over 4.2 percent compared with the expected return on plan assets (which equates to a discount rate of –0.2 percent).

Change in the present value of defined benefit obligations

CHF million	2020	2019	Change absolute
Present value of defined benefit obligations as of 1.1.	**4,704**	**4,318**	**386**
Current service cost (employer)	163	140	23
Interest expense from defined benefit obligations	–9	13	–22
Employee contributions	64	61	3
Benefits paid in (+) and paid out (–)	–168	–181	13
Past service cost	5	6	–1
Gains (–)/losses (+) from plan settlements	0	0	0
Actuarial gains (–)/losses (+)	–510	348	–858
Other	0	0	0
Present value of defined benefit obligations as of 31.12.	**4,249**	**4,704**	**–456**

The weighted average duration of the defined benefit obligations was 14.0 years as of 31 December 2020 (previous year: 15.5 years).

Change in the fair value of plan assets

CHF million	2020	2019	Change absolute
Fair value of plan assets as of 1.1.	**3,559**	**3,262**	**297**
Interest income from plan assets	–7	10	–17
Employer contributions	116	112	4
Employee contributions	64	61	3
Benefits paid in (+) and paid out (–)	–168	–181	13
Gains (+)/losses (–) from plan settlements	0	0	0
Administrative costs (excl. asset management costs)	–2	–2	0
Return on plan assets (excl. interest income), (gains [+]/losses [–])	172	298	–126
Other	0	0	0
Fair value of plan assets as of 31.12.	**3,734**	**3,559**	**175**

Reconciliation of net defined benefit liabilities

CHF million	2020	2019	Change absolute
Net defined benefit liabilities per 1.1.	**–1,145**	**–1,056**	**–89**
Net pension costs incl. interest expense recognised in statement of financial performance	–168	–151	–17
Revaluation recognised in equity	682	–50	732
Employer contributions	116	112	4
Obligations paid directly by the entity	0	0	0
Other	0	0	0
Net defined benefit liabilities per 31.12.	**–515**	**–1,145**	**630**

Major categories of plan assets

In %	31.12.2020	Listed	Not listed	31.12.2019	Listed	Not listed
Liquidity	3	3	0	4	4	0
Bonds (in CHF) Confederation	6	6	0	5	5	0
Bonds (in CHF) excl. Confederation	10	10	0	10	10	0
Government bonds (in foreign currencies)	25	25	0	26	26	0
Corporate bonds (in foreign currencies)	10	10	0	11	11	0
Mortgages	1	1	0	0	0	0
Shares	26	26	0	27	27	0
Real estate	10	4	6	9	3	6
Commodities	2	2	0	3	3	0
Other	7	0	7	5	0	5
Total plan assets	**100**	**87**	**13**	**100**	**89**	**11**

PUBLICA bears the actuarial and investment risks itself. The investment strategy is defined in such a way that benefits under the policy can be provided at maturity.

There is no known pension plan property used by the employer.

Principal actuarial assumptions used as at the reporting date

In %	2020	2019	Change absolute
Discount rate per 1.1.	–0.20	0.30	–0.50
Discount rate per 31.12.	0.20	–0.20	0.40
Expected salary development	0.40	0.50	–0.10
Expected pension development	0.00	0.00	0.00
Interest on retirement savings	0.30	0.00	0.30
Share of employee contribution to funding gap	36.00	n.a.	n.a.
Life expectancy at age 65 – women (no. of years)	24.76	24.65	0.11
Life expectancy at age 65 – men (no. of years)	22.72	22.61	0.11

As of 31 December 2020, the discount rate was linked to the yield on high-quality fixed-rate corporate bonds (previously on the spot interest rates for federal bonds published by the Swiss National Bank on a monthly basis) and (as before) on the expected cash flows of the ETH Domain's pension scheme at PUBLICA in accordance with existing prior-year data. The expected future rate of salary increase is based on reference economic variables. The rate of pension increase is the rate of pension increase expected for the average remaining term based on the financial position of the pension plan. The employee share of the shortfall in funding is based on the current sliding scale of savings contributions under the terms of the scheme. The generation tables in BVG 2015 are applied for assumptions about life expectancy.

Sensitivity analysis (effect on present value of defined benefit obligations)

CHF million	Increase in assumption 2020	Decrease in assumption 2020	Increase in assumption 2019	Decrease in assumption 2019
Discount rate (change +/– 0.25 %)	–111	118	–176	189
Expected salary development (change +/– 0.25 %)	11	–11	20	–19
Expected pension development (change +/– 0.25 %)	92	n.a.	145	n.a.
Share of employee contribution to funding gap (change +/– 10%)	–45	45	n.a.	n.a.
Interest on retirement savings (change +/– 0.25 %)	20	–20	29	n.a.
Life expectancy (change +/– 1 year)	118	–120	177	–178

The sensitivity analysis determined the change in the defined benefit obligations in the event of a change in actuarial assumptions. In each case, only one of the assumptions was adjusted, while the other inputs remained unchanged.

The discount rate, the assumptions about salary trends and the return on retirement savings, and the employee share of the shortfall in funding were increased or reduced by fixed percentage points. The assumptions about pension trends were increased, not reduced, for the reporting period, as it is not possible to curtail pension benefits (previous year: assumptions about pension trends and the return on retirement savings). The sensitivity to life expectancy was calculated by reducing or increasing life expectancy by a flat rate, as a result of which the life expectancy of most age categories was increased or reduced by about one year.

26 Dedicated third-party funds

CHF million	31.12.2020	31.12.2019	Change absolute
Swiss National Science Foundation (SNSF)	353	327	25
Swiss Innovation Agency (Innosuisse)	28	27	1
EU Framework Programmes for Research and Innovation (FP)	249	223	26
Special federal funding of applied research	24	26	– 1
Industry-oriented research (private sector)	30	33	– 3
Other project-oriented third-party funding	26	31	– 5
Donations and bequests	106	110	– 4
Total dedicated third-party funds	**815**	**776**	**39**

An increase in dedicated third-party funds was recorded mainly on EU projects (CHF + 26 million), primarily as a result of Future Emerging Technologies (FET), and on SNSF projects (CHF + 25 million) due to the growth in project volumes.

The main item on a downward trajectory, on the other hand, was other project-oriented third-party funding (CHF – 5 million, of which CHF + 3 million was attributable to controlled entities). There was also a fall in donations and bequests (CHF – 4 million) and research contributions for industry-oriented research projects (CHF – 3 million). The reduction related mostly to the stage of completion of existing projects.

27 Financial risk management and additional information about financial instruments

General

Financial risk management is embedded in ETH Zurich's general risk management, in respect of which annual reports are made to the ETH Board (see the Governance and Sustainability section).

Financial risk management primarily addresses credit and default risk, liquidity risk and market risk (interest rate, foreign currency and other price risk).

The focus of risk management remains on credit risk. There are guidelines governing the investment of financial resources in order to reduce credit and market risk. The counterparties to a large proportion of the receivables and claims arising from financial assets are of high credit standing and solvency. Risk concentrations only exist in respect of those counterparties, which is why credit risk is regarded as low.

Furthermore, there are receivables and financial assets in foreign currencies which are hedged according to prevailing circumstances.

Compliance with and the effectiveness of the guidelines are ensured by the internal control system (ICS) (see the Governance and Sustainability section).

Credit and default risk

Maximum exposure to credit risk, breakdown by counterparty

CHF million	**Total**	Federal Government	European Commission FP [1]	SNSF, Innosuisse, OASI social service, Suva	SNB and banks with government guarantee	PostFinance and other banks	Other counterparties
31.12.2020							
Cash and cash equivalents	**914**	846	0	0	26	42	0
Receivables from non-exchange transactions	**954**	37	190	261	0	0	466
Receivables from exchange transactions	**34**	5	0	0	0	0	29
Financial assets and loans	**329**	0	0	0	0	10	319
Prepaid expenses and accrued income	**13**	0	0	0	0	0	13
Total	**2,244**	**888**	**190**	**261**	**26**	**52**	**828**
Total prior period	**2,176**	**947**	**182**	**250**	**15**	**62**	**720**

1 The remaining receivables due from the Federal Government (State Secretariat for Education, Research and Innovation [SERI]) under the Horizon 2020 bridge financing programme and the receivables from European universities arising from EU Framework Programmes for Research and Innovation are shown in the column "European Commission FP".

The maximum exposure to credit risk corresponds to the carrying amounts in the balance sheet. The actual risk is low due to the fact that the counterparties to a large proportion of the financial assets are the Federal Government and other public-sector institutions.

Liquidity risk

ETH Zurich has processes and principles in place which guarantee that adequate liquidity is available to settle current and future obligations. These include systematic liquidity planning, monitoring and optimisation as well as maintaining an adequate reserve of liquidity and tradable securities.

The following table shows the contractual maturities of the financial liabilities:

CHF million	**Total carrying amount**	**Total contract value**	Up to 1 year	1–5 years	More than 5 years
31.12.2020					
Non-derivative financial liabilities					
Current liabilities	113	113	113	0	0
Leasing liabilities	16	34	1	6	27
Financial liabilities	3	3	0	1	2
Accrued expenses and deferred income	16	16	16	0	0
Derivative financial liabilities	**0**	**0**	**0**	**0**	**0**
Total	**148**	**166**	**131**	**7**	**29**
Total prior period	**104**	**124**	**86**	**6**	**32**

Financial liabilities arise, most notably, from current operating liabilities. Under normal circumstances, expenses and investments are financed with self-generated funds. In some cases, investments are financed through lease agreements.

All financial liabilities are covered by liquidity and by short-term deposits with the Federal Government. Liquidity risk is low.

Market risk

Interest rate and price risk

Interest rate risk is not hedged. A one percentage point increase or decrease in the interest rate would increase or reduce surplus or deficit by around CHF 9 million.

The bonds under the asset management mandates are also taken into account in analysing interest rate risk. The other trading positions (excluding bonds) largely consist of equity funds holding both international and Swiss equities. A 10-percent decrease in price would have a negative impact on surplus or deficit of CHF 31 million.

All trading positions exposed to price risk are held under asset management mandates with Swiss banks. There is a model in place for selecting the optimal portfolio for the investment strategy of the asset management mandates. The value-at-risk approach is used to determine risk tolerance. The investment strategy and the amount of assets invested must be chosen such that there is sufficient risk capital available, or sufficient risk capital can be built up, to cover the value at risk calculated.

Foreign currency risk
Most foreign currency receivables are in euros and US dollars; they are hedged using derivative financial instruments according to prevailing circumstances. Most foreign currency risks in asset management mandates are hedged. Net of hedges, a fluctuation in the exchange rate of the currencies of +/– 10 percent would impact on the statement of financial performance as follows:

CHF million	**Total**	CHF	EUR	USD	Other
31.12.2020					
Net currency balance	**1,882**	**1,844**	**8**	**3**	**27**
Sensitivity affecting financial performance +/–10 %			1	0	3
Closing rate			1.0817	0.8840	
31.12.2019					
Net currency balance	**1,866**	**1,828**	**6**	**4**	**28**
Sensitivity affecting financial performance +/–10 %			1	0	3
Closing rate			1.0866	0.9676	

The net currency balance for the EUR and USD categories related primarily to receivables from exchange transactions. The net currency balance for other currencies was CHF 27 million and related primarily to asset management mandates and the entity in Singapore controlled and consolidated by ETH Zurich.

Capital management

Managed capital is defined as equity excluding valuation reserves. ETH Zurich seeks to create a solid equity base. This base will enable the implementation of the strategic objectives to be guaranteed. Legal regulations prohibit ETH Zurich from raising funds on the capital market.

The entities controlled by ETH Zurich may raise funds on the capital market.

Estimation of fair value

Because of their short-term maturity, the carrying amount of cash and cash equivalents and the carrying amounts of current loans, fixed deposits, receivables and current liabilities are a reasonable approximation of fair value.

The fair value of non-current receivables from non-exchange transactions and non-current loans is calculated based on the payments falling due in the future, which are discounted at market interest rates.

The fair value of available-for-sale financial assets is based on actual values, provided they can be determined reliably, or reflects their cost.

The fair value of fixed-rate financial liabilities which are not traded publicly is estimated on the basis of payments falling due in the future, which are discounted at market interest rates.

The fair value of publicly traded fixed-rate financial assets and liabilities is based on quoted prices at the reporting date.

The fair value of finance lease liabilities is calculated on the basis of payments falling due in the future, which are discounted at market interest rates.

Classes and categories of financial instruments, by carrying amount and fair value

CHF million	**Total fair value**	**Total carrying amount**	Loans and receivables	At fair value through surplus or deficit	Available for sale	Financial liabilities measured at amortised cost
31.12.2020						
Cash and cash equivalents	914	914	914			
Receivables from non-exchange transactions	954	954	954			
Receivables from exchange transactions	34	34	34			
Financial assets and loans	329	329	2	323	5	
Prepaid expenses and accrued income	13	13	13			
Financial liabilities [1]	148	148		0		148
31.12.2019						
Financial assets (in a broader sense) [2]	2,176	2,176	1,904	268	4	
Financial liabilities [1]	104	104		0		104

1 Current liabilities, leasing liabilities, financial liabilities, accrued expenses and deferred income (see the table in the section "Liquidity risk").
2 Cash and cash equivalents, receivables from non-exchange transactions, receivables from exchange transactions, financial assets and loans, prepaid expenses and accrued income.

ETH Zurich does not hold any held-to-maturity financial assets.

Fair value hierarchy

Financial instruments measured at fair value are required to be disclosed within a three-level valuation hierarchy:

- Level 1: quoted prices in an active market for identical assets or liabilities;
- Level 2: valuation techniques where all significant inputs are based on observable market data;
- Level 3: valuation techniques where significant inputs are not based on observable market data.

CHF million	**Carrying amount/ fair value**	Level 1	Level 2	Level 3
31.12.2020				
Financial assets	328	323	0	5
Financial liabilities	0	0	0	0
31.12.2019				
Financial assets	272	268	0	4
Financial liabilities	0	0	0	0

Net surplus or deficit by category

CHF million	Loans and receivables	At fair value through surplus or deficit	Available for sale	Financial liabilities
2020				
Interest income (+)/interest expense (–)	5	0		– 1
Income from investments		4	0	
Change in fair value		16		
Currency translation differences, net	– 4	0		0
Impairments	0		0	
Reversal of impairment	0			
Gains and losses reclassified from equity to the statement of financial performance			0	
Net surplus or deficit recorded in the statement of financial performance	**1**	**21**	**0**	**– 1**
Net surplus or deficit recognised in equity			**1**	
Total net surplus or deficit by category	**1**	**21**	**1**	**– 1**
2019				
Total net surplus or deficit by category	**2**	**32**	**3**	**– 1**

Fair value changes (CHF 16 million) had the biggest impact on net surplus or deficit (see note 12).

28 Contingent liabilities and contingent assets

Contingent liabilities

At the end of 2020, there was a contingent liability of CHF 1 million (previous year: zero) related to expenses incurred by contracting parties which may have to be reimbursed to those parties.

In addition, there were contingent liabilities in the low single-digit millions which cannot be measured reliably. These are attributable to a potential legal dispute and the associated costs.

Contingent assets

As in the previous year, there were no quantifiable contingent assets at the end of 2020.

Aside from that, ETH Zurich receives research funds and grants from third parties where, although they meet the significant characteristics of an asset, ETH Zurich's share of the future cash inflow could not be quantified reliably in the reporting period. These comprise the donation from Hansjörg Wyss for the Wyss Translational Center Zurich and the remaining inheritance from Dr Branco Weiss for the Society in Science programme (The Branco Weiss Fellowship) to support young researchers.

29 Financial commitments

CHF million	31.12.2020	31.12.2019	Change absolute
Financial commitments up to 1 year	4	13	– 9
Financial commitments from 1 to 5 years	10	0	10
Financial commitments > 5 years	0	0	0
No due date / indefinite	0	0	0
Total financial commitments	**13**	**13**	**1**

At the end of 2020, there were financial commitments amounting to CHF 13 million, mainly from the ETH library for access to digital publications.

30 Operating leases

CHF million	2020	2019	Change absolute
Due dates			
Due within 1 year	33	32	2
Due within 1 to 5 years	91	89	3
Due after more than 5 years	88	95	–7
Future minimum payments for non-cancellable operating lease as of 31.12.	**212**	**215**	**–2**
Leasing expenses			
Minimum lease payments	31	25	6
Payments from subleasing	1	1	0
Leasing payments of current period	**32**	**26**	**6**
Additional details			
Future revenue from sublease (from non-cancellable contracts)	2	2	–1

Operating leases relate mainly to rental agreements and to a lesser extent to IT licences.

31 Remuneration of key management personnel

The key management personnel of ETH Zurich are the seven members of the Executive Board (previous year: five; of which a new Vice President for Leadership and Personnel Development as of 1 November 2020 and a new Vice President for Knowledge Transfer and Corporate Relations as of 1 January 2021). The remuneration is disclosed in the section Governance and Sustainability.

32 Relationships with controlled and associated entities

Controlled entities

The entities listed below were consolidated.

	Legal form	Nature of collaboration/ business activity	Domicile	Currency	Jurisdiction	Proportion of voting rights and participating share (in %) [2]		Reporting date used
						31.12.2020		
ETH Singapore SEC Ltd.	Ltd.	Strengthening the global position of Switzerland and Singapore in the field of environmental sustainability and engaging in appropriate research collaborations.	Singapore	SGD	Singapore	100	100	31.03.2020
Rübel Geobotanical Research Institute Foundation [1]	Foundation	Promoting geobotanical science (plant sociology, plant ecology, plant distribution, vegetation history).	Zurich	CHF	Switzerland	57	100	31.12.2019

1 The remaining 43 percent of the voting rights in the Foundation are held by people determined by the founder. However, ETH Zurich has a 100-percent equity interest in the Foundation.

2 As in the previous year.

Summarised financial information on the two controlled entities is set out in the table below:

CHF million	31.12.2020	of which ETH Singapore SEC Ltd.	of which Rübel Geobotanical Research Institute Foundation	31.12.2019
Current assets	16	12	4	12
Non-current assets	3	1	3	3
Short-term liabilities	1	1	0	1
Long-term liabilities	14	11	3	11
Revenue	12	12	0	16
Surplus (+) or deficit (–)	0	0	0	0

Associated entities

All the associated entities listed were accounted for using the equity method.

	Legal form	Nature of collaboration/ business activity	Domicile	Currency	Jurisdiction	Proportion of voting rights and participating share (in %) [2]	
						31.12.2020	
Material associated entities							
ETH Zurich Foundation [1]	Foundation	Promoting teaching and research at the Swiss Federal Institute of Technology Zurich.	Zurich	CHF	Switzerland	15	100
Student Housing Foundation	Foundation	Providing and operating low-cost housing for students in Zurich.	Zurich	CHF	Switzerland	22	50
Albert Lück Foundation	Foundation	Promoting teaching, research and study in the field of building and construction at ETH Zurich, initially in the current Department of Civil, Environmental and Geomatic Engineering and in its successor unit.	Zurich	CHF	Switzerland	20	100
Individually immaterial associated entities							
Archives of Contemporary History Foundation	Foundation	Promoting, safeguarding the long-term existence of and extending ETH Zurich's Archives of Contemporary History as a documentation and research centre for general and Swiss contemporary history.	Zurich	CHF	Switzerland	43	100
Foundation for Contemporary Jewish History	Foundation	Setting up and promoting a documentation centre for contemporary Jewish history within ETH Zurich's Archives of Contemporary History.	Zurich	CHF	Switzerland	25	100

1 Even though ETH Zurich has less than 20 percent of the voting rights in the ETH Zurich Foundation, it can still exercise significant influence over the Foundation and is also the sole beneficiary. It is therefore required to be classified as an associated entity.

2 As in the previous year, except in the case of the Foundation for Contemporary Jewish History (previous year: 20 percent of voting rights).

Restrictions

At the controlled and associated entities listed above, ETH Zurich does not have any rights of access to the assets. Therefore, it cannot initiate a transfer of liquid funds or otherwise access the entities' funds.

Entities below the thresholds defined in the OFA

The Ordinance on the Finance and Accounting of the ETH Domain (OFA) contains more detailed guidance on consolidation. It also defines thresholds for inclusion in the annual consolidated financial statements. In accordance with Appendix 2 to this Ordinance, entities that meet the criteria for consolidation or equity method accounting, but fall below those thresholds must be disclosed as follows and are not included in the annual consolidated financial statements of ETH Zurich:

	31.12.2020	31.12.2019
Controlled entities		
Quantity	5	5
Total assets (CHF million)	14	13
Associated entities		
Quantity	5	5
Total assets (CHF million)	14	14

33 Events after the reporting date

ETH Zurich's financial statements were authorised for issue by ETH Zurich's President and Vice President of Finance and Controlling on 22 February 2021. No significant events occurred prior to that date that would require disclosure in or an adjustment to ETH Zurich's financial statements for the period ended 31 December 2020.

EIDGENÖSSISCHE FINANZKONTROLLE
CONTRÔLE FÉDÉRAL DES FINANCES
CONTROLLO FEDERALE DELLE FINANZE
SWISS FEDERAL AUDIT OFFICE

Reg. Nr. 1.20307.934.00120.003

Report of the statutory auditor

to the President of the Swiss Federal Institute of Technology, Zurich

Report on the audit of the consolidated financial statements

Opinion

We have audited the consolidated financial statements of the Swiss Federal Institute of Technology of Zurich (ETH Zurich), which comprise the consolidated statement of financial performance 2020, the consolidated balance sheet as of 31 December 2020, the consolidated statement of changes in equity and the consolidated cash flow statement for the year then ended, and notes to the consolidated financial statements, including a summary of significant accounting policies.

In our opinion the consolidated financial statements (pages 77 to 115) present fairly, in all material respects, the consolidated financial position of the ETH Zurich as of 31 December 2020, and its consolidated financial performance and its consolidated cash flows for the year then ended in accordance with the International Public Sector Accounting Standards (IPSAS) and legal requirements and the Accounting Manual for the ETH Domain.

Basis for Opinion

We conducted our audit in accordance with Swiss Law, International Standards on Auditing (ISAs), Swiss Auditing Standards and article 35a^{ter} of the Federal Act on the Federal Institutes of Technology (SR 414.110). Our responsibilities under those standards are further described in the Auditor's responsibilities for the audit of the consolidated financial statements section of our report. We are independent based on the Federal Audit Office Act (SR 614.0) and the requirements of the audit profession and we have fulfilled our other ethical responsibilities in accordance with these requirements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Other information in the Annual Report

The Executive Board of the ETH Zurich is responsible for the other information in the annual report. The other information comprises all information included in the annual report, but does not include the consolidated financial statements and our auditor's report thereon.

Our opinion on the consolidated financial statements does not cover the other information in the annual report and we do not express any form of assurance conclusion thereon.

In connection with our audit of the consolidated financial statements, our responsibility is to read the other information in the annual report and, in doing so, consider whether the other information is materially inconsistent with the consolidated financial statements or our knowledge obtained in the audit, or otherwise appears to be materially misstated. If, based on the work we have performed, we conclude that there is a material misstatement of this other information, we are required to report that fact. In this context, please refer to the section Report on other legal and regulatory requirements at the end of this report.

Responsibilities of the Executive Board of the ETH Zurich for the consolidated financial statements

The Executive Board of the ETH Zurich is responsible for the preparation and fair presentation of the consolidated financial statements in accordance with the International Public Sector Accounting Standards (IPSAS) and the legal requirements (Ordinance on the ETH Domain, SR 414.110.3; Ordinance on the Finance and Accounting of the ETH Domain, SR 414.123; Accounting Manual for the ETH Domain), and for such internal control as the Executive Board determines is necessary to enable the preparation of consolidated financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the consolidated financial statements, the Executive Board of the ETH Zurich is responsible for assessing the ETH Zurich's ability to continue as a going concern, disclosing, as applicable, matters related to going concern.

Auditor's responsibilities for the audit of the consolidated financial statements

Our objectives are to obtain reasonable assurance about whether the consolidated financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with Swiss law, ISAs and Swiss Auditing Standards will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these consolidated financial statements.

As part of an audit in accordance with Swiss law, ISA's and Swiss Auditing Standards, we exercise professional judgment and maintain professional scepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the consolidated financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the ETH Zurich's internal control.
- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made.
- Conclude on the appropriateness of the Executive Board of the ETH Zurich's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the ETH Zurich's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the notes to the consolidated financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the ETH Zurich to cease to continue as a going concern.
- Evaluate the overall presentation, structure and content of the consolidated financial statements, including the disclosures, and whether the consolidated financial statements represent the underlying transactions and events in a manner that achieves fair presentation.
- Obtain sufficient appropriate audit evidence regarding the financial information of the entities or business activities within the ETH Zurich to express an opinion on the consolidated financial statements. We are responsible for the direction, supervision and performance of the audit of the consolidated financial statements. We remain solely responsible for our audit opinion.

We communicate with the Executive Board of the ETH Zürich and the Audit Committee of the ETH Board regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

Report on other legal and regulatory requirements

In accordance with the Federal Audit Office Act and Swiss Auditing Standard 890, we confirm that an internal control system exists, which has been designed for the preparation of the consolidated financial statements according to the instructions of the ETH Board.

In accordance with Art. 21 par. 2 of the Ordinance on the Finance and Accounting of the ETH Domain, we confirm that no contradictions exist between the personnel reporting in the annual report (management report) and the consolidated financial statements. Likewise, we confirm that no contradictions exist between the financial figures in the annual report (management report) and the consolidated financial statements.

Furthermore, in accordance with Art. 21 par. 2 of the Ordinance on the Finance and Accounting of the ETH Domain, we confirm that risk management has been appropriately conducted according to the instructions of the ETH Board.

We recommend that the consolidated financial statements submitted to you be approved.

Berne, 22 February 2021 SWISS FEDERAL AUDIT OFFICE

Martin Köhli
Licensed audit expert

Patrik Lüthi
Licensed audit expert

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Many companies, foundations, private individuals and alumni are keen to support education and research in partnership with ETH Zurich. In doing so, they make an important contribution to Switzerland's status in science and business and to its international competitiveness. On behalf of our researchers and students, ETH Zurich would like to thank all our donors and supporters for their generous contributions, and for the trust they place in us.

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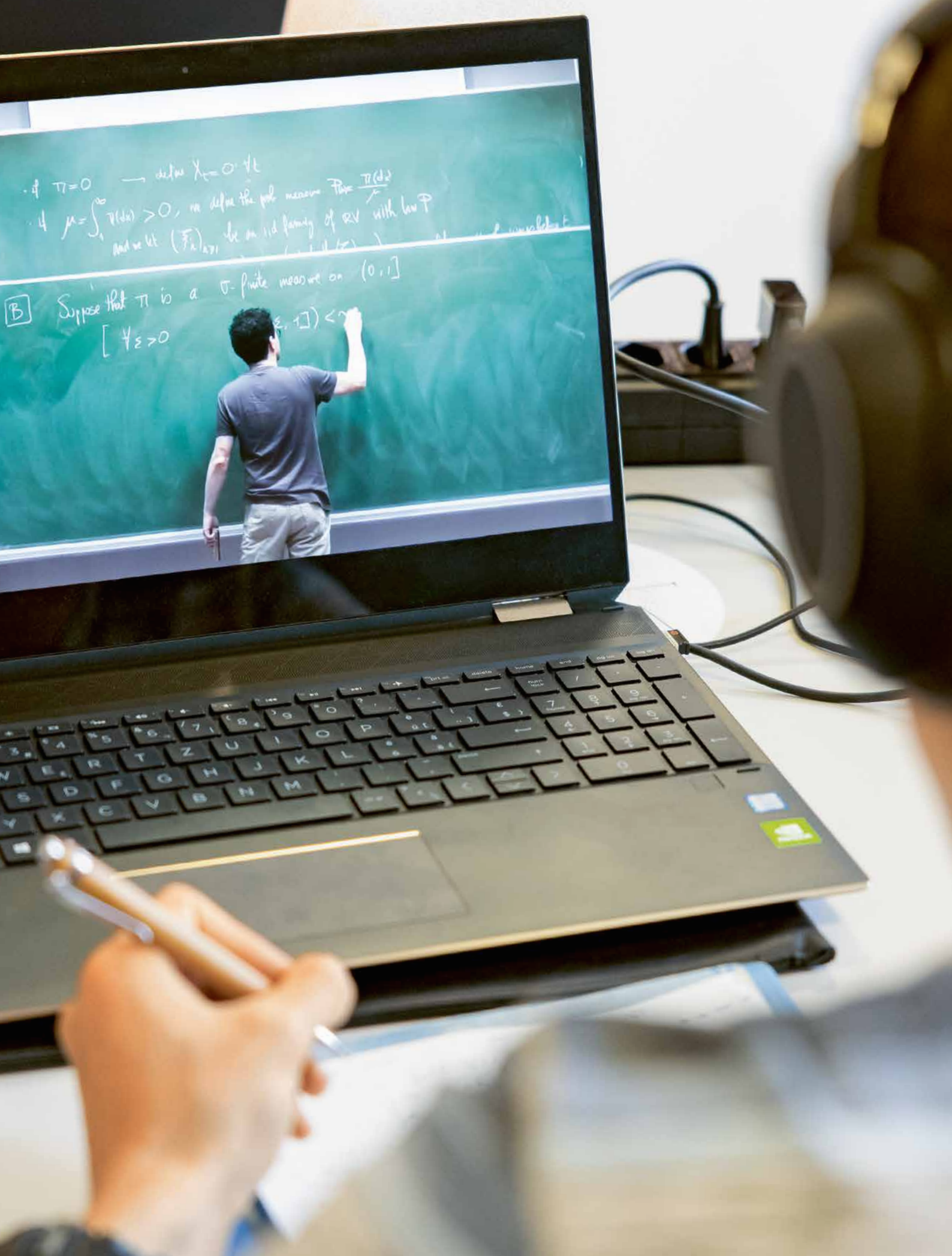
if $\pi = 0$ → define $X_t = 0$ $\forall t$
if $\mu = \int_1^\infty \nu(dx) > 0$, we define the prob measure $\frac{\pi(dx)}{\mu}$
B Suppose that π is a σ-finite measure on $(0,1]$
$\forall \varepsilon > 0$