2018
THE ETH DOMAIN IN BRIEF
Mission Statement

The ETH Domain strives to strengthen the competitiveness of Switzerland in the long term and contribute to the development of society through excellence in research, teaching and the knowledge and technology transfer. It endeavours to serve as a beacon by assuming its share of global responsibility for the management of urgent social challenges, the enhancement of the quality of life, and the long-term maintenance of our natural resources.

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Foreword

Dear readers,

Switzerland is among the world’s more innovative and most competitive countries. This is borne out by various rankings year on year. One survey from the USA even puts Switzerland as the best country in the world. A decisive portion of that success is attributable to clever minds from Switzerland and abroad, as well as to high private and state investments in research and development. It is worthwhile investing in training our young people, in research and in the high quality of our universities and research institutes. Our prosperity depends on this to a large degree.

A current study now reveals specific figures for the ETH Domain. This means that every franc invested in the ETH Domain generates more than five times its value in Switzerland, and every job results in around four further jobs. Thus, the ETH Domain stimulates CHF 13bn of added value and 100,000 jobs. It also provides training for professionals who are in great demand, conducts research on socially relevant themes such as health, the environment or safety, and liaises closely with SMEs, industry and the authorities. All told, the ETH Domain makes a central contribution towards the competitiveness of Switzerland and towards the quality of life in our country.

Zurich / Bern, March 2018

Dr Fritz Schiesser
President of the ETH Board
ETH Domain in brief

2,530.8 m
Total federal contribution

31,293 students and doctoral students

21,490 employees, of whom 474 trainees *

850 professors *

260 patents and 297 licences

48 spin-offs

As of 31 December 2017
* Employment contracts

ETH Zurich

4th in the THE Europe ranking
10th in the THE World ranking
10th in the QS World ranking
5th in the QS Europe ranking

EPFL

1st in the THE “Young University” ranking
10th in the THE Europe ranking
12th in the QS World ranking
6th in the QS Europe ranking
The ETH Domain

Teaching and research as well as knowledge and technology transfer at the very highest level worldwide: this is the mandate given by the Federal Council to the six institutions of the ETH Domain. This comprises

- the Swiss Federal Institute of Technology Zurich (ETH Zurich),
- the Swiss Federal Institute of Technology Lausanne (EPFL),
- the Paul Scherrer Institute (PSI),
- the Swiss Federal Institute for Forest, Snow and Landscape Research (WSL),
- the Swiss Federal Laboratories for Materials Testing and Research (Empa), as well as
- the Swiss Federal Institute of Aquatic Science and Technology (Eawag).

In addition, the ETH Board, as a strategic management and supervisory body, and the Internal Appeals Commission, as an independent appeals body, also belong to the ETH Domain.

<table>
<thead>
<tr>
<th>Federal Institutes of Technology</th>
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<tbody>
<tr>
<td>ETH Zurich</td>
<td>ETH Zurich</td>
</tr>
<tr>
<td>Over 20,000 students and doctoral students</td>
<td>11,445 employees *</td>
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<tr>
<td>11,445 employees *</td>
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<tr>
<td>EPFL</td>
<td>EPFL</td>
</tr>
<tr>
<td>Over 10,600 students and doctoral students</td>
<td>5,989 employees *</td>
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<tr>
<td>5,989 employees *</td>
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<table>
<thead>
<tr>
<th>Research institutes</th>
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<tbody>
<tr>
<td>PSI</td>
<td>PSI</td>
</tr>
<tr>
<td>2,059 employees *</td>
<td>2,059 employees *</td>
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<tr>
<td>WSL</td>
<td>WSL</td>
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<tr>
<td>488 employees *</td>
<td>488 employees *</td>
</tr>
<tr>
<td>Empa</td>
<td>Empa</td>
</tr>
<tr>
<td>966 employees *</td>
<td>966 employees *</td>
</tr>
<tr>
<td>Empa</td>
<td>Empa</td>
</tr>
<tr>
<td>Eawag</td>
<td>Eawag</td>
</tr>
<tr>
<td>492 employees *</td>
<td>492 employees *</td>
</tr>
</tbody>
</table>

*Employment contracts, as of 31 December 2017
Tasks and anchoring

The two Federal Institutes of Technology and the four research institutes are seeking

– to educate students and specialists in scientific and technical fields and to ensure permanent continuous training,
– to expand scientific knowledge through research,
– to foster upcoming young scientists,
– to render scientific and technical services,
– to perform public relations activities and make practical use of their research findings.

This is all stated in the ETH Act. In the “strategic objectives”, which are normally valid for four years, the Swiss Federal Council and the Swiss Parliament set out the strategic priorities, the financial and infrastructural goals, as well as personnel-related and pension policy objectives.

Within the framework of the strategic objectives the ETH Board sets forth the strategy and key focus areas of the ETH Domain, presents them to the policy-makers and federal authorities, and regularly reports on the progress made in achieving the objectives. The two Federal Institutes of Technology and the four research institutes are responsible for the operational leadership of the institutions of the ETH Domain.

The ETH Board set out the strategy and key points in its strategic planning for 2017–2020. Priority is given to high quality teaching that is closely linked to research. ETH Zurich and EPFL promote the advancement of the students and invest in optimum supervision, professorships, scientific personnel and modern infrastructure.

Education and research bear much of the responsibility when it comes to confronting the great challenges of our time such as the environment, the use of resources, healthcare, economic prosperity and social welfare. The ETH Domain endeavours to honour this responsibility.
The ETH Board

The ETH Board has comprised the following people from politics, business and society (since 1 January 2018):

- **Dr Fritz Schiesser**  
  President of the ETH Board, former federal State Councillor
- **Beth Krasna**  
  Vice President of the ETH Board, independent board member
- **Prof. Dr Lino Guzzella**  
  President of ETH Zurich
- **Prof. Dr Martin Vetterli**  
  President of EPFL
- **Prof. Dr Joël Mesot**  
  Director of the PSI
- **Kristin Becker van Slooten**  
  Delegate of the University Assemblies of ETH Zurich / EPFL, MER* at EPFL
- **Marc Bürki**  
  CEO of Swissquote Holding AG and Swissquote Bank AG
- **Beatrice Fasana**  
  Managing Director of Sandro Vanini SA
- **Prof. Dr Susan Gasser**  
  Director of the Friedrich Miescher “Institute for Biomedical Research” and Professor of Molecular Biology at the University of Basel
- **Dr Dr h.c. Barbara Haering**  
  President of the Board of Directors of econcept AG
- **Christiane Leister**  
  Owner and CEO of the Leister Group

Management of the institutions
The two Federal Institutes of Technology and the research institutes are managed by:

- **Prof. Dr Lino Guzzella**  
  President of ETH Zurich
- **Prof. Dr Martin Vetterli**  
  President of EPFL
- **Prof. Dr Joël Mesot**  
  Director of the PSI
- **Prof. Dr Konrad Steffen**  
  Director of WSL
- **Prof. Dr Gian-Luca Bona**  
  Director of Empa
- **Prof. Dr Janet Hering**  
  Director of Eawag

* Maître d’enseignement et de recherche (senior scientist)
ETH Zurich is one of the leading technical and scientific universities. It has a reputation for excellent teaching, pioneering fundamental research, and the direct transfer of new findings into practical applications. The ETH Zurich provides an inspiring environment for researchers, and a comprehensive education for students.

Established in 1855, ETH Zurich now has over 20,000 students and doctoral students from 120 countries. More than 500 professors are currently engaged in teaching and research in the fields of natural science, engineering, architecture, mathematics, system-oriented sciences, and in management studies and social sciences.

ETH Zurich is regularly identified as one of the world’s best universities, in international rankings. It was once again placed in the top ten worldwide in 2017 (THE and QS World Rankings), and even in first place in continental Europe (THE Europe Ranking). 21 Nobel laureates have studied, taught or done their research at ETH Zurich. The innovations of the university flow into the most forward-looking sectors, from informatics to micro- and nanotechnology, or high-tech medical equipment. 380 spin-off companies since 1996, about 90 patent applications each year, and around 1,500 collaborations with businesses worldwide and in Switzerland all go to show how successful ETH Zurich is in imparting its knowledge to industry and society.

ETH Zurich contributes to the sustainable resolution of global challenges. It is focused on Data Science, specialising in cyber security, health with a new Bachelor’s degree in medicine (since 2017), sustainability with themes such as energy supply or world nutrition, as well as innovative manufacturing technologies.
Skin research Skin is the subject of a major project called SKINTEGRITY, involving a collaboration between ETH Zurich, the University of Zurich and university hospitals. Co-leader, cell biologist Prof. Sabine Werner is working with engineers to investigate the molecular mechanisms of wound healing and its parallels with the development of cancer.

You can find more information about this at: www.ethboard.ch/fascination
Virtual time machine At EPFL, researchers are working together with colleagues from Italy on the construction of a time machine that will allow you to immerse yourself in the Venice of the past. Prof. Frédéric Kaplan, along with his scientific colleague Isabella di Lenardo (right) and the team have already digitised two million documents and images. Specially developed search engines are bringing the digital heritage to life.

You can find more information about this at: www.ethboard.ch/fascination
The Federal Institute of Technology in Lausanne (EPFL) is a young, dynamic university of technology, which is committed to three important tasks: Teaching, research and innovation. The campus in Lausanne on Lake Geneva accommodates over 10,000 students and employs around 5,600 people, including around 340 professors. EPFL is also one of the most international universities in the world with people from over 125 countries every day.

The high quality of its fundamental and applied research is demonstrated particularly by the considerable quantity of ERC grants obtained by EPFL researchers. Or also in the ambitious scientific projects and sustainable innovations such as the transparent-dye solar cells, the solar-powered aircraft Solar Impulse, or the ultra-fast yacht Hydrotère. EPFL is also exploring new routes in education as a pioneer in the provision of MOOCs, which have been accessed by around two million students up to now. It has been running the new Master's degree course in Data Science since September 2017 and is also doing ground-breaking work in terms of “computational thinking” with a foundation course for all first-year students.

Since 1969 when EPFL became a Federal Institution, it has been growing continuously. Various rankings underline the progress made and the high standards. Since 2010, EPFL has risen from 32nd to 12th place on the QS World Ranking, and climbed 58 places on the ARWU World Ranking. It has topped the THE “Young University” Ranking for the past three years.

Partnerships and projects are a further area of competence which ensure its scientific and social impact. The EPFL Innovation Park is likewise located on the campus with around 140 start-ups and research centres of respected companies. 15 spin-offs were founded in 2017, which had acquired total funding of CHF 142m.
The Paul Scherrer Institute (PSI) is the largest research centre for natural sciences and engineering in Switzerland. It carries out top-level research in the fields of matter and materials, energy and the environment, as well as humanity and health. By carrying out fundamental and applied research, the PSI has been working on sustainable solutions for central questions arising within society, the economy and science since 1988.

It operates large-scale research installations that are unique in Switzerland – and in some cases in the world – such as the Swiss Spallation Neutron Source (SINQ), the Swiss Light Source SLS, the Swiss Muon Source SμS and the SwissFEL X-ray Free Electron Laser. Each year, over 2,500 researchers from Switzerland and all over the world come to perform experiments at the PSI. In addition to its research, the PSI operates the only installation in Switzerland for the treatment of specific types of cancer using protons.

Of the 2,000-plus staff members of the PSI, 700 are scientists. The education of young persons is a central concern of the PSI: about one quarter of the staff are postdocs, doctoral students or trainees. Schoolchildren nurture a fascination with natural sciences in the iLab school laboratory, and professionals receive initial and further training at the PSI training centre. The psi forum visitors centre welcomes over 10,000 visitors a year to inform them about research at the PSI.
**Energy System Integration (ESI) platform** “Power-to-Gas” is the name of the concept aimed at connecting the power network to the natural gas network. Researchers hope that to enable solar and wind energy to be stored longer. Photo shows: Marcel Hofer, head of the ESI Realisation project and ESI coordinator (left) and Peter Jansohn, head of ESI at the PSI. Collaborating with industrial partners, they are conducting pilot tests on processes on a platform with containers packed full of high-tech equipment.

You can find more information about this at: [www.ethboard.ch/fascination](http://www.ethboard.ch/fascination)
Conservation genetics  How is genetic information used to prove the presence of a rare species of newt in a pond without any sightings of the animal? Researchers at WSL, liaising with Prof. Holderegger, are using genetics as an effective tool in conservation biology, making the new techniques practical for users.

You can find more information about this at:  www.ethboard.ch/fascination
WSL
www.wsl.ch | www.slf.ch

The WSL investigates changes to the terrestrial environment, and the use and protection of natural habitats and cultural landscapes. It monitors the condition and development of forests, landscape, biodiversity, natural hazards and snow and ice, and develops sustainable solutions for socially relevant problems – in collaboration with its partners from academia and society.

Almost half of the 500 or so employees in Birmensdorf, Davos, Lausanne, Cadenazzo and Sion are scientists, and more than 60 are doctoral students. The workforce also includes about 150 technical staff and 50 administrative staff, 15 trainees and interns. About a quarter of the employees work at the WSL Institute for Snow and Avalanche Research SLF in Davos.

WSL is a founding member of the Swiss Polar Institute (SPI). The SPI has coordinated and promoted Swiss research in the Arctic and Antarctic since 2016. And as high mountain ranges constitute the “third pole”, WSL can provide the benefit of its wealth of expertise and experience, such as in the area of snow, permafrost, glaciology or the ecology of tundra-like habitats in climate change.
Empa is the interdisciplinary research institute for materials science and technology in the ETH Domain. It finds solutions for industry and society in the fields of nanostructured materials and surfaces, environmental technologies, energy and sustainable building technologies, as well as in bio and medical technologies.

Working with industry partners and via spin-offs, it transforms its research results into marketable innovations, helping to make the Swiss economy more competitive. Moreover, it creates a scientific basis for the sustainable development of society.

Since 1880, Empa has provided public offices with data resources for their political decisions, and it has also carried out studies on behalf of federal government offices. There are currently about 1,000 staff including 33 professors, as well as some 200 doctoral students and 40 trainees working at Empa. In addition, there are also about 200 Bachelor’s and Master’s degree students and trainees here. Added to this, numerous projects with researchers from industry are always under way, as well as some 300 projects financed by the Swiss National Science Foundation (SNSF), Innosuisse and the EU framework programmes.
Medical technology The mechanical engineers Ameet Aiyangar (left) and Bernhard Weisse are investigating the biomechanical causes of pain in the lumbar region. The forces which put a strain on the back can be identified by combining computer simulations with 3D X-ray videos. The objective is to plan operations more effectively and to develop new implants.

You can find more information about this at: www.ethboard.ch/fascination
Efficient monitoring through digitisation Together with ETH Zurich, Eawag in Fehraltorf has been developing an urban-hydrological field laboratory. Modern sensors continuously transmit data via an innovative low-power wide area network. This enables the scientist Frank Blumensaat (left) and his technical employee Simon Dicht to keep spatial and time records of processes in an urban water catchment area, which generally occur underground.

You can find more information about this at: www.ethboard.ch/fascination
Eawag is one of the world’s leading water research institutes. Its success is based on the combination of research, teaching and continuous education and advice that it has provided for over 80 years. The combination of natural sciences, engineering and social sciences enables comprehensive research of water in relatively untouched rivers and lakes, right through to fully automated waste water management systems.

The research activities are focused on how to strike a balance between humanity’s use of water and the preservation of robust aquatic ecosystems. 27 professors, some 200 scientists and more than 140 doctoral students meet at Eawag in a unique research environment to investigate questions that lead to new scientific findings and solutions for the basic challenges facing society.

Its interdisciplinary nature and knowledge transfer with authorities and interest groups from business and society play an important role in this. The 4,000-plus teaching hours at Swiss universities and the supervision of 175 Bachelor’s and Master’s degree theses every year are contributing towards the education of young professionals in the Swiss water sector.

Decentralised treatment of dirty grey water so that it can be used not only for flushing the toilet but also for showering is the aim of the new grey water treatment plant in the “Water Hub” of the NEST research building. To this end, the grey water is collected and is fed through a diaphragm in the first step, filtering out dirt and pathogens. After that, the grey water flows through a filter with activated carbon, which binds the other pollutants which are left.
Digitisation will lead to far-reaching changes to the economy and society in the years ahead. It also represents a great opportunity for Switzerland. The necessary preconditions have to be created to cope with this successfully.

The issue of the risks and security arising within the virtual environment, i.e. dealing with cyber risks and cyber security, has gained in significance. The institutions of the ETH Domain have laid great store by research and teaching in the area of cyber security for years and are central figures and partners for public agencies with responsibility for this. This also applies to collaboration with private sector organisations. For example, four professorships and 12 associated professorships and their research groups are collaborating closely in an Open Lab with various industrial partners (including IBM, Google, Credit Suisse or NEC) at the Zurich Information Security & Privacy Center (ZISC), which was founded in 2003. The Security and Cryptography Laboratory (LASEC), among others, does this at EPFL. Last but not least, cyber security is also a key focus activity at EPFL Innovation Park Lausanne. In this regard, EPFL is planning to open a Center for Digital Trust in association with industrial partners in 2018.

Digitisation – a central theme of the four strategic focus areas of the ETH Domain

“Energy” is not only geared towards issues of energy efficiency, renewable energy, impact research or the use of chemical processes for energy generation and storage, but also the integration of the individual systems which requires a high degree of digitisation. The research platforms implemented include the “Energy System Integration” (ESI) platform on the PSI site or the ehub research platform at Empa.
“Personalized Health and Related Technologies“ (PHRT) is seeking to link the growing body of available health–related data to more targeted care. For instance, technology platforms are being developed to process the large volumes of personalised data. They must meet common standards so that they can aid clinical decision–making directly.

“Data science“ is pivotal to digitisation and contributes towards a better understanding and targeted use of huge volumes of data for scientific purposes, but also towards the secure handling of that data. Numerous research areas with the ETH Domain draw upon findings from data science. This prompted EPFL and ETH Zurich to build the Swiss Data Science Center (SDSC), which brings together data scientists and researchers from the various areas of application. The SDSC complements and uses the Swiss National Supercomputing Centre CSCS at ETH Zurich with the Piz Daint supercomputer, which at 25 petaflops is one of the most powerful computers in the world. In addition, ETH Zurich and EPFL developed a Master's degree in Data Science, which was successfully launched in autumn 2017.

With its focus on advanced manufacturing, the ETH Board has reaffirmed the ETH Domain’s central role in the area of advanced manufacturing technologies for Swiss industry and SMEs. The focus area now supports seven projects which all have great potential for practical applications and which are being implemented with an emphasis on industrial usability. They include the three original key focus areas, i.e. high–precision free–form production of small parts, printable electronics, and sustainable use of digital production processes.
## Key figures for the ETH Domain in 2017

### Students and doctoral students

<table>
<thead>
<tr>
<th></th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total number of students and doctoral students</strong></td>
<td>30,351</td>
<td>31,293</td>
</tr>
<tr>
<td>Students at ETH Zurich</td>
<td>15,805</td>
<td>16,515</td>
</tr>
<tr>
<td>Students at EPFL</td>
<td>8,412</td>
<td>8,544</td>
</tr>
<tr>
<td><strong>Total number of students</strong></td>
<td>24,217</td>
<td>25,059</td>
</tr>
<tr>
<td>Percentage women</td>
<td>29.7 %</td>
<td>30.6 %</td>
</tr>
<tr>
<td><strong>Total number of doctoral students</strong></td>
<td>6,134</td>
<td>6,234</td>
</tr>
<tr>
<td>Percentage women</td>
<td>31.0 %</td>
<td>30.8 %</td>
</tr>
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</table>

### Employees (employment contracts)

<table>
<thead>
<tr>
<th></th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total staff</strong></td>
<td>21,054</td>
<td>21,490</td>
</tr>
<tr>
<td>ETH Zurich *</td>
<td>11,157</td>
<td>11,445</td>
</tr>
<tr>
<td>EPFL *</td>
<td>5,870</td>
<td>5,989</td>
</tr>
<tr>
<td>PSI</td>
<td>2,049</td>
<td>2,059</td>
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<tr>
<td>WSL</td>
<td>495</td>
<td>488</td>
</tr>
<tr>
<td>Empa</td>
<td>936</td>
<td>966</td>
</tr>
<tr>
<td>Eawag</td>
<td>497</td>
<td>492</td>
</tr>
<tr>
<td>Professors</td>
<td>829</td>
<td>850</td>
</tr>
<tr>
<td>Percentage women</td>
<td>13.9 %</td>
<td>14.9 %</td>
</tr>
<tr>
<td>Scientific personnel</td>
<td>12,765</td>
<td>12,970</td>
</tr>
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<td>Technical / administrative staff</td>
<td>6,996</td>
<td>7,196</td>
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<tr>
<td>Apprentices</td>
<td>464</td>
<td>474</td>
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### Knowledge and technology transfer (KTT)

<table>
<thead>
<tr>
<th></th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invention disclosure reports</td>
<td>–</td>
<td>343</td>
</tr>
<tr>
<td>Software notifications</td>
<td>–</td>
<td>26</td>
</tr>
<tr>
<td>Patents</td>
<td>230</td>
<td>206</td>
</tr>
<tr>
<td>Licences</td>
<td>353</td>
<td>297</td>
</tr>
<tr>
<td>Spin-offs</td>
<td>50</td>
<td>48</td>
</tr>
</tbody>
</table>

The invention disclosure reports and software notifications have been collected as additional KTT indicators since 2017.

* including doctoral students
### Financial key figures (in CHF millions)

<table>
<thead>
<tr>
<th></th>
<th>2016</th>
<th>2017</th>
<th>Δ in %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating revenue</td>
<td>3,598</td>
<td>3,698</td>
<td>2.8%</td>
</tr>
<tr>
<td>Proportion of primary funds (total federal contribution)</td>
<td>71.3%</td>
<td>71.8%</td>
<td>0.5%</td>
</tr>
<tr>
<td>Proportion of research contributions, mandates and scientific services</td>
<td>21.5%</td>
<td>20.1%</td>
<td>-1.4%</td>
</tr>
<tr>
<td>Proportion of other revenue</td>
<td>7.2%</td>
<td>8.1%</td>
<td>0.9%</td>
</tr>
<tr>
<td>Operating expenses</td>
<td>3,314</td>
<td>3,515</td>
<td>6.1%</td>
</tr>
<tr>
<td>Proportion of personnel expenses</td>
<td>63.4%</td>
<td>65.5%</td>
<td>2.1%</td>
</tr>
</tbody>
</table>

### ETH Domain real estate portfolio

<table>
<thead>
<tr>
<th></th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value (purchase value in CHF millions)</td>
<td>7,600</td>
<td>7,750</td>
</tr>
<tr>
<td>Number of buildings</td>
<td>395</td>
<td>391</td>
</tr>
<tr>
<td>Number of facilities</td>
<td>70</td>
<td>69</td>
</tr>
<tr>
<td>Number of plots of land</td>
<td>125</td>
<td>130</td>
</tr>
</tbody>
</table>
Cover page: At the World Economic Forum 2017, ETH Zurich made it possible to experience the latest research results, such as the magic cube “Cubli”, that can balance on a corner, jump up or control its fall. (Andreas Eggenberger / ETH Zurich)