EXCELLENCE IN TEACHING, RESEARCH, INNOVATION

THE ETH DOMAIN IN BRIEF
The ETH Domain is seeking to strengthen the competitiveness of Switzerland in the long term and contribute to the development of society through excellence in research, teaching and knowledge and technology transfer. It endeavours to set an example by assuming its share of responsibility for the management of urgent social challenges, the enhancement of the quality of life, and the long-term maintenance of our natural resources.
Dear readers,

A country’s openness is crucial to how innovative and competitive it is. Switzerland is a prime example of this. No country has a greater proportion of foreign researchers. More than half of them are not Swiss passport holders. At the same time, however, we are also the country with the second highest proportion of scientists who emigrate, at least temporarily. One third of Swiss researchers work abroad.

International cooperation is critical in science. This is particularly evident in the ETH Domain and is one of the reasons why our institutions are among the world leaders. The exchange with partners in Europe is particularly close. However, we also have a presence in Asia and the USA, with studios in New York and Bangalore, the Singapore ETH Centre and the EPFL Middle East campus, among others. The exchange works in both directions. Attracting students and doctoral students from over 120 countries, the two Federal Institutes of Technology are among the universities with the most international profiles. The research institutes of the ETH Domain also attract researchers from all over the world. For example, more than 2,500 people carry out experiments at the PSI’s large-scale research facilities every year.

This openness and movement of bright minds, this exchange of ideas and knowledge – that is what makes our country so successful. Switzerland benefits when it welcomes talented foreigners. Heinrich Nestlé was German, and Nicolas Hayek, the founder of Swatch, came from Lebanon. This is no different in other countries like the USA, for example. Elon Musk, the founder of Tesla, is South African, and Google founder Sergey Brin is Russian. Consequently, the benefits of international cooperation and exchange in education and research are mutual and not just one-way traffic.

Zurich/Bern, March 2020

Prof. Michael O. Hengartner
President of the ETH Board
Higher education, research and innovation of the highest standard: the ETH Domain provides these services with 22,600 employees, more than 33,600 students and doctoral students and a pool of around 850 professors.

The ETH Domain consists of the two Swiss Federal Institutes of Technology, ETH Zurich and EPFL, as well as the four federal research institutes, the PSI, WSL, Empa and Eawag.

The strategic leadership and supervisory body of the ETH Domain is the ETH Board.

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**Total federal contribution**

CHF millions

- Federal financial contribution: 2,373
- Investments credit for ETH Domain constructions: 208
- Total: 2,581

**Expenses**

CHF millions

- Personnel: 65.5%
- Other current expenditure: 20.9%
- Investments: 13.6%
- Total: 3,489
### Employees (employment contracts)

<table>
<thead>
<tr>
<th>ETH Zurich</th>
<th>EPFL</th>
</tr>
</thead>
<tbody>
<tr>
<td>22,599</td>
<td>33,642</td>
</tr>
</tbody>
</table>

Proportion of women: 35.1%, apprentices: 458

### University rankings

<table>
<thead>
<tr>
<th>THE World ranking</th>
<th>THE Europe ranking</th>
<th>QS World ranking</th>
<th>QS Europe ranking</th>
</tr>
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<tbody>
<tr>
<td>13</td>
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<tr>
<td>2</td>
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### Knowledge & technology transfer

<table>
<thead>
<tr>
<th>Spin-offs</th>
<th>Licences</th>
<th>Invention disclosures</th>
<th>Patents</th>
<th>Software notifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>59</td>
<td>324</td>
<td>329</td>
<td>224</td>
<td>40</td>
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</tbody>
</table>

1. Credits taking the budgetary framework into account
2. New appointments in 2019
Tasks and anchoring

TASKS AND ANCHORING

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.

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 results.

In the “strategic objectives”, which are 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-

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ETH Domain

ETH Board

11 members
Staff: 55 employees (staff, Internal Audit, Internal Appeals Commission)

Federal Institutes of Technology

<table>
<thead>
<tr>
<th>ETH Zurich</th>
<th>EPFL</th>
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</thead>
<tbody>
<tr>
<td>22,193 students and doctoral students</td>
<td>11,449 students and doctoral students</td>
</tr>
<tr>
<td>12,280 employees*</td>
<td>6,119 employees*</td>
</tr>
</tbody>
</table>

Research institutes

<table>
<thead>
<tr>
<th>PSI</th>
<th>WSL</th>
<th>Empa</th>
<th>Eawag</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,072 employees*</td>
<td>533 employees*</td>
<td>1,033 employees*</td>
<td>507 employees*</td>
</tr>
</tbody>
</table>

* employment contracts including doctoral students, as of 31 December 2019
The ETH Board and ETH Domain

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 sets out the strategy and key points in its strategic planning for 2017-2020. Priority is given to high quality, research-based teaching. 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, health-care, economic prosperity and social welfare. The ETH Domain is seeking to take on this responsibility.

— Prof. Dr Michael O. Hengartner, President of the ETH Board
— Beth Krasna, Vice President of the ETH Board, independent board member
— Prof. Dr Joël Mesot, President of ETH Zurich
— Prof. Dr Martin Vetterli, President of EPFL
— Prof. Dr Gian-Luca Bona, Director of Empa
— Dr 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, Professor of Molecular Biology at the University of Basel
— Prof. Dr Barbara Haering, CEO of econcept AG
— Christiane Leister, Owner and CEO of the Leister Group

* Maître d'enseignement et de recherche (Senior Scientist)

The ETH Board

The ETH Board has comprised the following people from politics, business and society (since 01 February 2020):

— Prof. Dr Michael O. Hengartner, President of the ETH Board
— Beth Krasna, Vice President of the ETH Board, independent board member
— Prof. Dr Joël Mesot, President of ETH Zurich
— Prof. Dr Martin Vetterli, President of EPFL
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— Prof. Dr Barbara Haering, CEO of econcept AG
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Management of the institutions

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

— Prof. Dr Joël Mesot, President of ETH Zurich
— Prof. Dr Martin Vetterli, President of EPFL
— Dr Thierry Strässle, Acting Director of the PSI
— Prof. Dr Christian Rüegg, Director of the PSI (from April 2020)
— Prof. Dr Konrad Steffen, Director of WSL
— Prof. Dr Gian-Luca Bona, Director of Empa
— Prof. Dr Janet Hering, Director of Eawag
DIGITISATION AND CLIMATE CHANGE

- World leader in drone technology
- SwissFEL, SLS, SINQ, SµS – large-scale research facilities that are unique worldwide
- CSCS with the Piz Daint supercomputer with 8.8 petabytes
- Four spin-offs among the top 50 Super-Scale Ups in Europe
- EnviDat: Environmental research data is always at hand
- Master’s in Cyber Security
- SDSC: Facilitating the multidisciplinary exchange of academic data and knowledge with AI and ML
Digitisation and climate change are two of the great challenges of our time. Therefore, the ETH Domain is setting priorities in teaching, research and knowledge and technology transfer in these areas.

The ETH Domain and its institutions have defined the initiatives and actions for the coming years with which they intend to master the current challenges facing society and the economy. Particular emphasis is placed on digitisation and climate change. The two universities ETH Zurich and EPFL are planning additional professorships in information technology and computer science. In addition, information technology and programming skills are to be taught more intensively in foundation courses and in all subject areas.

The strategic priorities defined by the ETH Board together with the two Federal Institutes of Technology and the four research institutes are closely linked to digitisation: Personalized Health, Advanced Manufacturing, Data Sciences, as well as Environment and Energy. Personalized Health will make therapies more effective and cost-efficient thanks to patient-specific approaches. The objectives are a more successful healing process, a better quality of life and new possibilities for managing diseases that are difficult to treat. In Advanced Manufacturing, the ETH Domain is establishing a national network of regional technology transfer centres. Together with industry, it is seeking to develop state-of-the-art production processes that boost Switzerland’s innovation and hone its competitive edge.

Data sciences are becoming increasingly important for basic research. Expanding this field should enable vast amounts of data to be used and, at the same time, be handled securely. A close working relationship with industry and science is particularly important in these strategic priorities.

More than half of EPFL’s 370 laboratories are working on the UN’s Sustainable Development Goals. With its competence centres on nutrition, climate change and urban development, ETH Zurich is a world leader in teaching and research on sustainable development. The research institutions of the ETH Domain are making significant contributions towards the sustainable restructuring of the Swiss energy system. They play a central role in practical research and knowledge transfer in the area of the environment. The ETH Board wants to focus research in the ETH Domain even more specifically on the impact of climate change. Scientific competence, cooperation within and outside the ETH Domain and the rapid transfer of knowledge are to be further strengthened. The ETH Domain wants to make a contribution towards finding solutions to the diverse challenges facing our society.
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 22,000 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 the social sciences.

ETH Zurich is regularly rated as one of the world’s best universities, in international rankings. Ranked 6th in the QS World Ranking and 13th in the THE World Ranking; it even comes out second in 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 computer science to micro- and nanotechnology, even high-tech medical equipment. A total of 437 spin-off companies since 1996, up to 200 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.

A seismometer flies to Mars
"We will do everything in the Mars Seismological Service exactly as we do on Earth." Professor Domenico Giardini from ETH Zurich is relying on tried and tested infrastructure, existing knowledge and an institution with a reputation for being a stable research environment.

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22,000 students and doctoral students

12,000 employees\(^{1/2}\)

30 spin-offs

102 patents and 62 licences

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1. Key figures rounded
2. Employment contracts including doctoral students
Institutions of the ETH Domain

EPFL

www.epfl.ch

EPFL is a young, world leading technical university, which is committed to three important tasks: teaching, research and innovation. Around 11,500 students and doctoral students from 120 countries and more than 370 laboratories conduct leading research in areas such as renewable energy, medical technology, materials science and information technology at the campus in Lausanne, on the banks of Lake Geneva.

The high quality of its fundamental and applied research is demonstrated particularly by the considerable quantity of ERC grants obtained by EPFL researchers. And also by ambitious scientific projects and sustainable innovations such as the transparent-dye solar cells, the solar-powered aircraft Solar Impulse, or the ultra-fast yacht Hydroptère. 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.

EPFL has been growing continuously since it was founded in 1969. Various rankings underline the progress made and the high standards achieved. Between 2010 and 2019, EPFL had gained 14 places in the QS World Ranking and more than 10 places in the THE World Ranking. EPFL has moved up into the top ten in the THE Europe ranking.

Another area of expertise is partnerships and projects that ensure its scientific and social impact. EPFL Innovation Park is one of the first innovation parks in Switzerland and is home to around 140 start-ups and research centres. 23 spin-offs were founded in 2019.

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**Key figures rounded**

| 11,500 students and doctoral students | 6,000 employees\(^1/2\) | 23 spin-offs | 98 patents and 50 licences |

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1. Employment contracts including doctoral students

Tribots from the Reconfigurable Robotics Lab Robotics professor Jamie Paik explores the possibilities of "free-form" robotics in her laboratory.

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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 X-ray Free Electron Laser SwissFEL. 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 2,100 or so staff members of the PSI, over 780 are scientists. The education of young people 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, giving them an insight into research at the PSI.

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2,100 employees from around 60 nations\(^1/2\)

2,500 researchers\(^1\) make use of the large-scale research-infrastructure every year

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\(^1\) Key figures rounded

\(^2\) Employment contracts including doctoral students

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Biomedical research at the PSI
Professor Gebhard Schertler and his team use a novel pixel detector at the PSI's SwissFEL to decipher the structures of protein molecules with sophisticated experiments at the frontiers of feasibility.
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.

The SwissForestLab initiated by WSL is a network of researchers from various institutions and their test sites and facilities. Through the intensive use of synergies in Swiss forestry research, it promotes joint research work in order to gain a deeper understanding of the functioning, resilience and adaptability of the woodland ecosystem. It also increases the national and international visibility of Swiss forestry research.

EnviDat environmental data portal
Programme and Project Manager Gian-Kasper Plattner (left), and his colleague and software engineer Ionut Iosifescu from WSL are building a platform to make environmental data more readily accessible and accelerate research.

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500 employees from around 36 nations¹/²

885 publications, 241 of which are geared towards courses of action

¹ Key figures rounded
² Employment contracts including doctoral students
Empa is the interdisciplinary research institute of the “ETH Domain” for materials science and technology. It finds solutions for industry and society in the fields of nanostructured materials and surfaces, energy and sustainable building technologies, as well as 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 innovative and more competitive. Moreover, it creates a scientific basis for the sustainable development of society.

Empa provides public-sector bodies with data resources for their policy-making decisions, and it carries out studies on behalf of federal government agencies. There are currently about 1,000 staff including 37 professors, as well as some 240 doctoral students and 40 apprentices working at Empa. In addition, there are around 150 Bachelor’s and Master’s students and interns, as well as numerous projects with researchers from industry and around 260 projects financed by the Swiss National Science Foundation (SNSF), Innosuisse and the EU Framework Programmes.

1,000 employees from around 50 nations\(^1/2\)

600 current cooperation agreements \(^1\)

\(^1\) Key figures rounded

\(^2\) Employment contracts including doctoral students

**Sustainable mobility with Power-to-X**

Head of the Empa Automotive Powertrain Technologies laboratory, Christian Bach and his team are looking for ways to convert road traffic from currently being based almost entirely on fossil fuels to renewable energy in the future.
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 wastewater 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. 32 professors, some 200 scientists and more than 130 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 4,500-plus teaching hours at Swiss universities and the supervision of 160 Bachelor’s and Master’s degree theses every year are contributing towards the education of young specialists in the Swiss water sector.

Teaching at Eawag goes beyond the ETH Domain and is based on research conducted in-house. It covers special topic areas and considers various uses of water and their impact on ecosystems. In addition to academic teaching, Eawag is committed to the continuing education of practitioners and vocational training.

Excellent alternatives for animal trials
Professor Kristin Schirmer (right) and her colleague Melanie Fischer were presented with the 3RCC’s 3Rs Award in 2019 in recognition of their exceptional research work. They developed a toxicity test using cultured fish gill cells.

aquatox-solutions.ch

<table>
<thead>
<tr>
<th>500 employees from around 40 nations</th>
<th>1/2</th>
</tr>
</thead>
<tbody>
<tr>
<td>43 joint projects with universities of applied science</td>
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</tr>
<tr>
<td>32 professors</td>
<td></td>
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1 Key figures rounded
2 Employment contracts including doctoral students
Employees (employment contracts)

<table>
<thead>
<tr>
<th></th>
<th>2018</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total personnel</strong></td>
<td>22,349</td>
<td>22,599</td>
</tr>
<tr>
<td>ETH Zurich*</td>
<td>12,151</td>
<td>12,280</td>
</tr>
<tr>
<td>EPFL*</td>
<td>6,053</td>
<td>6,119</td>
</tr>
<tr>
<td>PSI*</td>
<td>2,080</td>
<td>2,072</td>
</tr>
<tr>
<td>WSL*</td>
<td>508</td>
<td>533</td>
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<tr>
<td>Empa*</td>
<td>994</td>
<td>1,033</td>
</tr>
<tr>
<td>Eawag*</td>
<td>510</td>
<td>507</td>
</tr>
<tr>
<td>Professors</td>
<td>851</td>
<td>862</td>
</tr>
<tr>
<td>of which, women</td>
<td>132</td>
<td>148</td>
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<tr>
<td><strong>Scientific personnel</strong></td>
<td>13,656</td>
<td>13,617</td>
</tr>
<tr>
<td><strong>Technical/administrative staff</strong></td>
<td>7,380</td>
<td>7,662</td>
</tr>
<tr>
<td>Apprentices</td>
<td>462</td>
<td>458</td>
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* incl. doctoral students

Students and doctoral students

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<thead>
<tr>
<th></th>
<th>2018</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total number of students and doctoral students</strong></td>
<td>32,531</td>
<td>33,642</td>
</tr>
<tr>
<td>of which, at ETH Zurich</td>
<td>21,397</td>
<td>22,193</td>
</tr>
<tr>
<td>of which, at EPFL</td>
<td>11,134</td>
<td>11,449</td>
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<tr>
<td><strong>Total number of students</strong></td>
<td>26,140</td>
<td>27,275</td>
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<tr>
<td>Percentage who are women</td>
<td>31.2</td>
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<tr>
<td>Percentage who are foreign nationals</td>
<td>39.3</td>
<td>40.7</td>
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<tr>
<td><strong>Total number of doctoral students</strong></td>
<td>6,391</td>
<td>6,367</td>
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<tr>
<td>Percentage who are women</td>
<td>31.4</td>
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<tr>
<td>Percentage who are foreign nationals</td>
<td>76.3</td>
<td>76.9</td>
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### Knowledge and technology transfer (KTT)

<table>
<thead>
<tr>
<th></th>
<th>2018</th>
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<tbody>
<tr>
<td>Invention disclosures</td>
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<td>Licences</td>
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<tr>
<td>Spin-offs</td>
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<td>59</td>
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</table>

1 Open Source Software not included

### 2019/2020 university rankings

<table>
<thead>
<tr>
<th>Rank</th>
<th>THE World</th>
<th>THE Europe</th>
<th>QS World</th>
<th>QS Europe</th>
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</tbody>
</table>

- ETH Zurich
- EPFL

Rankings of ETH Zurich (blue) and EPFL (red) according to THE, QS, ARWU and CWTS Leiden Rankings 2019/2020
Start your Day with the brightest Minds. Discover the brilliance of the institutions of the ETH Domain on the sciena.ch news platform – Swiss Science Today.