



## **Focus on Switzerland's innovative power: the ETH Domain's knowledge and technology transfer**

Dear Readers,



Switzerland is one of the world's most innovative countries. An excellent public education and research system, high private investments in research and development, and short distances and pragmatic cooperation between companies, academia and politics ensure that know-how can be put to economic use. The ETH Domain makes significant contributions towards this: it educates young talents, conducts basic research at a global top level, and through efficient knowledge and technology transfer (KTT) contributes to successful, marketable innovations together with partners from trade and industry and with authorities.

However, global research and technology competition has massively increased in the last few years. If Switzerland wants to maintain its top position in innovation and thus its competitiveness,

it must invest in its innovative power. The ETH Domain has therefore set its sights on an intensification of its KTT activities. This brochure reveals the approaches we are already pursuing and the diversity of possible cooperation ventures we offer our KTT partners. Let yourself be inspired and contact our universities and research institutes. Visionary innovations are the product of your experience and our scientific results. Let us make a joint contribution towards the welfare of our society and our country.

Fritz Schiesser  
President of the ETH Board

## The ETH Domain at the service of the Swiss economy

Innovation is a most demanding activity. Above and beyond an initial idea, it involves the conversion of this idea into new products, services or processes and is concluded by a successful launch on the market. One important prerequisite for innovation is broadly based research equipped with sufficient resources. It lays the cornerstones for new, promising technologies and their industrial applications. To make scientific findings usable for the economy and for society, however, a gap must be bridged between universities and enterprises: on the one hand, the more than 2,000 graduates of Master's programmes and the more than 1,000 graduates with doctor's degrees who move from ETH Zurich and EPFL into practical working life, inject their know-how into Swiss trade and industry; on the other hand, the ETH Domain offers special instruments and platforms for knowledge and technology transfer (KTT), which facilitate exchanges with industrial partners and, depending on the

subject and the issue, in a similar way with the public sector, too.

Switzerland is in a leading position in terms of innovative power, as reputable rankings prove: in the Global Innovation Index 2011 of the renowned business school INSEAD (Paris), Switzerland occupies first place, just as it does in the Innovation Union Scoreboard 2011 of the European Commission. Switzerland also occupies a top position with regard to the number of patents granted per capita. These excellent results show that KTT works in Switzerland and contributes towards the country's economic success.

Yet in a globalised and highly competitive world economy, this strong position must continuously be consolidated and – ideally – extended. Permanent innovation is therefore a prerequisite and the central driver of economic growth and prosperity. If this driver weakens, the Swiss system is in danger. The Federal Council and Parliament took this



Unscratchable gold: in cooperation with the watch-making company Hublot, researchers at EPFL have developed gold that is harder than steel. This 18-carat gold is an alloy with boron carbide (Photo: Hublot)



Neutron investigation of turbine blades: owing to research cooperation with PSI, Alstom will in future be able to avoid material fatigue in high-performance turbine blades. (Photo: Scanderbeg Sauer Photography)

into consideration in the performance mandate for the ETH Domain. The promotion of innovative power is stipulated as one of the crucial objectives of the two Federal Institutes of Technology and the four research institutes. Specifically, they are tasked to make even better technological and economic use of the knowledge generated in the ETH Domain and to intensify cooperation with industry.

Through KTT, the ETH Domain makes new technology available to Swiss companies, thus ena-

bling them to reinforce their competitiveness and to position themselves as leaders in the world market. In parallel, KTT consolidates Switzerland's image as a high-tech and innovation nation – which in turn boosts the country's attraction as a business and science location. For big international corporations, the opportunity of research cooperation with the ETH Domain's institutes is a critical factor for them to locate, continue and extend activities in Switzerland.

Dear Readers,

The success of the Swiss science industries – chemicals, pharmaceuticals and biotechnology – and thus of the Swiss economy is based on their globally excellent innovative power. To be able to maintain a top position in international competition, our industry depends on an excellently educated workforce, particularly in jobs involving natural science and technology.

Our industry will continue to invest substantial amounts of its own funds in Swiss research and development.

However, the public sector will also have to make its contribution and to create general conditions that favour innovation. In particular, government must continue to make its above-average investments in universities, research institutes and technology transfer. Only in this manner will it be possible for a working and internationally attractive network between universities and the economy to be maintained.

I am convinced that this is the best prerequisite for successful knowledge and technology transfer and a prosperous Swiss economy. Let's tackle it together!

Christoph Mäder  
Chairman, Scienceindustries

Dear Readers,

Identifying opportunities and turning them to good account: these are essential characteristics of a successful entrepreneur. Cooperation with ETH Zurich, EPFL or the four research institutes of the ETH Domain offers a great many opportunities. I have experienced this very often both as a CEO and as a member of various boards of directors.

The ETH Domain shares in the responsibility for Switzerland's international top position in terms of innovative power. It produces excellent research and development results. Cooperation with the ETH Domain may be a company's decisive step towards a new, innovative product. For medium-sized enterprises, in particular, which are often unable to afford to do actual research themselves, the ETH Domain offers itself as an innovation partner. Unfortunately, SMEs in Switzerland make too little use of this innovative power.

The doors are wide open. Do not hesitate any longer. Make use of this opportunity!

Hans Hess  
President, Swissmem

## From the laboratory to market maturity

The institutions of the ETH Domain – ETH Zurich, EPFL, PSI, WSL, Empa and Eawag – discharge their KTT mission with the help of various instruments such as research cooperation ventures, patents, licence and transfer agreements. An important role is also played by spin-offs, i.e. new companies which are established out of universities and research institutes and with the latter's financial support (cf. box). A further innovation platform is provided by infrastructures that serve cooperation between university researchers and enterprises; EPFL's Quartier de l'Innovation, the large-scale research facilities at PSI and numerous user labs being cases in point. The key KTT figures from 2002 to 2011 illustrate the ETH Domain's significance for

Switzerland's innovative power: ETH Zurich, EPFL and the research institutes generated more than 300 spin-offs in those ten years and concluded far more than 1,400 licence and technology transfer agreements.

How close KTT relations between the ETH Domain and trade and industry are is also exemplified by the following figures: ETH Zurich concluded some 700 research agreements in 2011, more than 200 of them with Swiss SMEs. They amount to a total of just under 150m CHF. EPFL signed approx. 200 agreements with industrial partners, thus increasing the sum of direct resources from industry by 16 % in comparison with 2010.

### ETH Domain supports spin-offs

The ETH Domain produces about 40 spin-offs a year. Often these new companies make use of patents that are based on research results. In many cases, the founders are the researchers themselves, whose step into self-employment is supported by their mother institutions for a certain period of time. The ETH Domain's spin-offs are also most successful: almost 90 % survive the first five years. This is an outstanding result in an international comparison. Examples of successful spin-offs are Glycart Biotechnology, MyClimate, Netbreeze, Sensirion, Supercomputing Systems u-blox, Nextthink, Sensimed, Biocartis, Siri, Dectris, Dartfish und Optotune.



ETH spin-offs with great chances of success: the spin-off Dacuda was accepted among the world's top 100 most innovative companies by the Red Herring Global Award for its scanner mouse. (Photo: Dacuda)

Dear innovators and new entrepreneurs,

An idea or a research result is not yet an innovation; an innovation requires a successful launch on the market. And this is exactly where the crux is: bridging the gap between the divergent standards and values of researchers and entrepreneurs. This is done best when both share the responsibility and work under one single roof, thus learning to understand each other. Technology transfer – through cooperation projects and university spin-offs – is tantamount to a transfer of skills and thus of human capital. Switzerland's technoparks

are geared precisely to developing and offering optimal conditions for this. An ideal mix of competencies, specific services and extensive networks supports the development and establishment of the market of newly founded enterprises. Cooperation with universities – in Zurich, for instance, with ETH Zurich – is possible on the premises. Our success is your success!

Thomas von Waldkirch  
Chairman, Stiftung TECHNOPARK® Zürich



Energy-efficient propulsion technologies: after the successful hydrogen propulsion system for communal vehicles, Bucher Schörfling and Empa jointly developed a hybrid propulsion system within the scope of a CTI project.



Highly sensitive x-ray detectors for synchrotron applications: after successful tests, Dectris and PSI are jointly developing a marketable next detector generation within the scope of a CTI project.

### Contribution to the special CTI measures

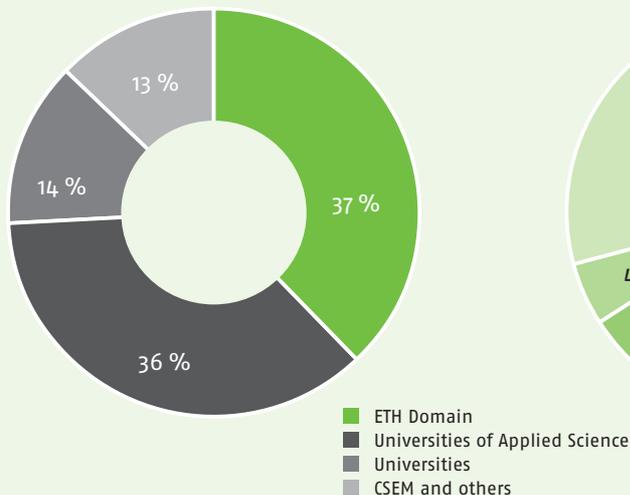
Together with other Swiss research institutions, the ETH Domain has successfully implemented the special measures adopted by the Confederation against the strong Swiss franc. The additional 100m CHF, which the Federal Council awarded in September 2011 to the Commission for Technology and Innovation (CTI) for innovation measures, was completely exhausted. Out of the 246 projects that had been accepted, 83 went to the institutions of the ETH Domain with funds totalling 43m CHF; this is all the more remarkable because ETH Zurich and EPFL, in particular, focus on basic research.

The special CTI measures aimed to support firms operating in the exporting sector in a quick imple-

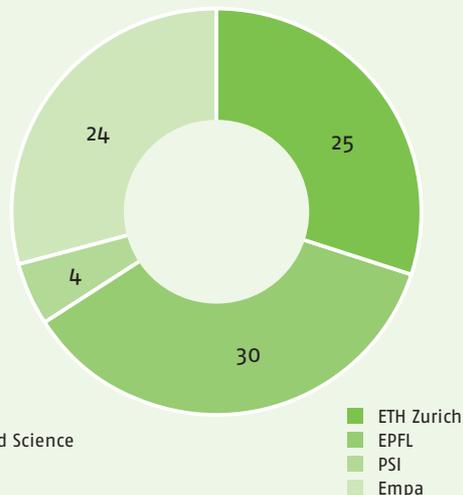
mentation of innovation projects. The CTI only funded those parts of projects which were conducted by recognised research institutions; the companies themselves received no money. A further condition was that innovation projects with a recognised research partner (ETH, EPFL, research institutes, universities, universities of applied science) were already up and running or in the pipeline. The Federal Council and Parliament regarded this as an effective way of increasing the price of export products through additional customer benefit or of cutting production costs and thus compensating for the current strength of the franc.

### Special CTI measures in the ETH Domain in 2011

Federal contributions granted for special CTI measures (total: 113.7m CHF)



Number of projects accepted in the ETH Domain (total: 83 projects)



## ETH Domain: a strong partner for industry



1



2

**1** Programming language Scala: this future-oriented open-source alternative to Java was developed by EPFL Professor Martin Odersky and his team and is already used by Twitter and other important internet actors. (Photo: photos.com)

**2** Expertise from the exploration of snow metamorphosis: WSL examines for Nestlé how the microstructure of ice-cream changes at different temperatures – and how it can be improved.

The ETH Domain strengthens the Swiss economy's innovative power and international competitiveness: with the help of an efficient transfer of knowledge and technology (KTT), the institutions of the ETH Domain make their newly developed technologies, materials and processes available to interested partners. In doing so, they offer industry numerous opportunities to convert these new developments into innovative products and practical applications in cooperation with the institutions of the ETH Domain and thus to enhance industry's international competitiveness.

To ensure optimal cooperation, the institutions of the ETH Domain take their bearings from the specific demands and requirements of their respective partners. The ETH Domain supports SMEs, start-ups and big companies. Similar forms of cooperation also exist with offices in the public sector and with foundations.

### Research cooperation

Jointly run research and development projects with partners from trade and industry are an integral component of cooperation between research and industry. Cooperation agreements stipulate the tasks of individual project partners, as well as the rights of ownership, exploitation and publication concerning research results (inventions, know-how). Such projects are directly funded by the project partners but can also be supported by national and international funds. The following forms of cooperation are available:

- **CTI projects:** the Swiss Commission for Technology and Innovation (CTI) funds application-oriented research and development projects; only the university partner receives funds, whereas the industrial partner profits from them indirectly.
- **EU projects:** the European Union funds application-oriented research projects through its Framework Programmes for Research, Technological Development and Demonstration. Funds may be paid directly to participating firms.



Basic research with a strong practical relevance: with the Industrial Relations Program, ETH Zurich actively encourages visionary research activities between its scientists and industry.



Ongoing accreditation process at FIFA: the floor manufacturer Tisca Tiara and Empa jointly developed an artificial turf whose "blades of grass" stand up again and have a low sliding friction.

- **Direct research cooperation ventures:** research and development projects jointly run by an industrial partner and an institution of the ETH Domain; such projects are directly funded by the project partners.
- **Contract research:** the institutions of the ETH Domain also conduct contract research for companies.

#### **Technology exploitation**

Research-based technologies, processes and methods offer innovative approaches to solutions for companies in numerous industries. Allowing for the institutions' research interests, companies may purchase exploitation rights for research results produced by the institutions of the ETH Domain and thus safeguard their market-oriented development.

#### **Consulting**

The institutions of the ETH Domain provide professional consultancy in their scientific and technical fields and draw up high-quality and sophisticated analyses, reports and expert opinions.

#### **High-tech user labs and services**

Top-level research depends on state-of-the-art infrastructure. The institutions of the ETH Domain have the latest equipment and facilities, which can also be used by industry. And they offer the requisite knowledge of how the appliances and technologies can be used expediently for projects and commissions from industrial partners.

#### **Excellent advanced education and training**

With a wide range of advanced education, training and information events, the institutions of the ETH Domain offer an attractive platform for the transfer of knowledge and a dialogue with experts from academia, trade and industry and other societal areas. No matter whether this is in conventions, conferences or courses, the ETH Domain's scientists communicate practice-oriented knowledge. The subjects they teach also refer to the latest findings in science and research.

#### **Strategic partnerships**

Cooperation ventures with Swiss and international industrial partners are of great importance for the ETH Domain. Within long-term partnerships, existing contacts are further extended into bigger, usually interdisciplinary cooperation ventures between industry and various research groups of the ETH Domain.

## ETH Domain proposals for enterprises



1



2

1 Big companies on the EPFL campus: with the StelLab@EPFL, PSA Peugeot Citroën intensifies cooperation with EPFL researchers – as groups like Logitech, Nokia, Constellium and Nestlé are doing already. (Photo: PSA Peugeot Citroën)

2 The highest mechanical precision: MDC Max Daetwyler AG cooperates with PSI to develop components to ensure that the X-ray free-electron laser SwissFEL can be built to an accuracy of one thousandth of a millimetre. (Photo: Monika Estermann)

Whether big companies or SMEs: the institutions of the ETH Domain have many years' experience in cooperation with enterprises and are able to make them a wide range of offers regarding knowledge and technology transfer (KTT) – right up to the marketable product.

### ETH Zurich

A transfer of its knowledge to trade and industry and society is one of ETH Zurich's main concerns. It does this successfully, as is evidenced by the several hundred cooperation projects between big companies and SMEs and research groups of ETH Zurich. The transfer office ETH transfer accepts requests from the economy and supports researchers in their cooperation with industry. It also supports the increasing number of company founders.

In 2011 alone, ETH Zurich produced 22 spin-offs; there have been around 240 since 1996. To accompany students and researchers on their way towards their own companies at an even earlier stage, it set up the Pioneer Fellowships funding instrument. And new Innovation & Entrepreneurship Laboratories will further accelerate the transfer process.

The most important KTT contribution will continue to be made by ETH graduates: owing to their education and their entrepreneurial way of thinking, they are in great demand on the labour market.

### EPFL

EPFL champions the transfer of technology. Research and development groups from companies such as PSA Peugeot Citroën, Credit Suisse and Cisco Systems have already set up operations in the on-campus Quartier de l'innovation – as has Logitech, EPFL's best-known start-up.

EPFL cooperates with industry: it lets industry share its researchers' research results and expert knowledge. No matter whether it is materials, electronics, medical technology or new energies:



Favourably priced, simple concrete reinforcement: Brugg Seiltechnik Holding AG and Empa developed bi-component fibres from polymers, which can be mixed into concrete to provide it with a high load capacity. (Photo: Brugg Contec AG)



Timber harvesting capacity simple to calculate: WSL's HeProMo software package enables forestry companies, forestries and authorities to calculate how much time and money timber harvesting costs in individual woods.

EPFL's 380 laboratories do not only develop tomorrow's solutions; rather, researchers are also linked in with companies in numerous different kinds of partnerships.

The EPFL's Technology Transfer Office builds bridges between universities and industry. At present, it supervises over 340 patent families and 380 active licences and technology transfer agreements. EPFL supports prospective start-ups with a successful programme: about 15 new companies are set up by staff and students of EPFL every year.

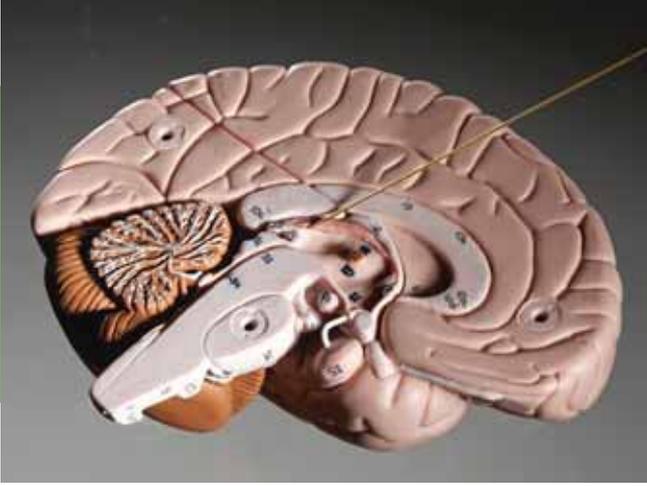
**PSI**

PSI's credo runs: "We create knowledge – today for tomorrow." This knowledge is created by the PSI's staff. The PSI Transfer Office supports the bridge-building process between itself and trade and industry for the purpose of generating innovations: thus it promotes cooperation and services between industry and PSI's laboratories and large-scale research facilities. It involves companies in the realisation of projects at an early stage and supports the establishment of spin-offs and the transfer of results into industry. Furthermore, technology-intensive companies which want to actively profit from PSI's know-how and unique research infrastructures are encouraged to settle in the planned high-tech zone. The Transfer Office helps safeguard the business potential of results relevant to the economy by means of industrial property rights, establishes contacts with industry and intensifies them. In this way, KTT creates new jobs in the economy and helps secure them in the long term.

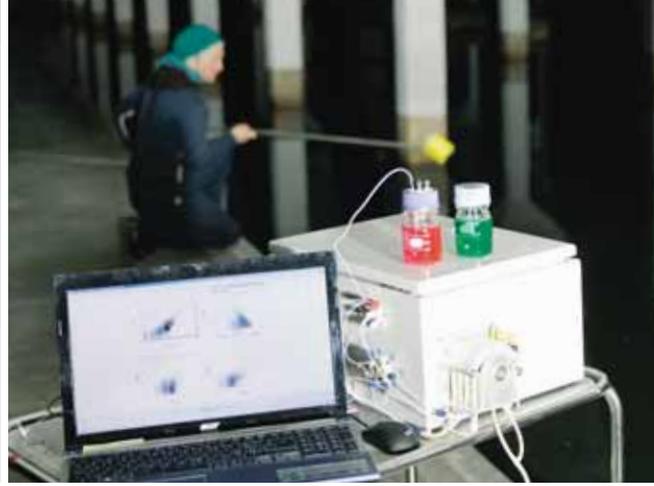
**WSL**

WSL's research primarily concentrates on public goods such as forests, natural hazards and biodiversity. Its KTT focus is therefore on cooperation with authorities and offices, for instance in the training of avalanche security officers and in the provision of exact data about Switzerland's forests to enable foresters to plan the management of their woods.

Some methods and expertise are also interesting for industrial partners. Thus highly specialised research appliances are used for problems arising in industry (an example of this is a microcomputer tomograph in a cold laboratory). In addition, WSL develops software for the computation of avalanches, mudslides and other natural hazards, which is used by planning offices worldwide. And everyone who is in direct or indirect contact with snow (e.g. hydro power, snow sports, road safety) is able to profit from the competence of the WSL Institute for Snow and Avalanche Research.



Better treatment of Parkinson's disease: Aleva Neurotherapeutics is working on the next generation of microscopically small electrodes, which were developed at EPFL for deep brain stimulation. (Photo: Alain Herzog)



Monitoring bacteria in drinking water online: Eawag, Zurich Water Supply and Wädenswil University of Applied Sciences jointly developed a combination of appliances with a good chance of becoming marketable. (Photo: Gesa Lüchinger)

### **Empa**

Application-oriented research and development conducted as close to industry and to the economy as possible is Empa's trademark. Owing to efficient, individual forms of cooperation and a wide range of services, Empa is capable of offering tailor-made solutions to its partners. No matter whether this is to optimise existing technologies or to solve specific problems: Empa and its more than 500 highly qualified researchers and first-class technical infrastructure is the right address.

Besides the transfer of technologies and know-how into existing enterprises, the encouragement of start-ups is one of Empa's important concerns. For this purpose, it operates the glaTec business incubator in Dübendorf and is involved in the Eastern Swiss Startfeld initiative with the Tebo technology centre.

The Empa Academy's advanced education, training and information events provide a lively platform for the transfer of knowledge and a dialogue with experts from academia and the economy.

### **Eawag**

Water is a public good and should be accessible to everyone, since water is of vital importance for health, welfare and intact ecosystems. The Eawag research centre is a strong partner for authorities, associations and national and international organisations, and thus also for industry and the economy. It actively looks for solution-oriented partnerships with various actors and stakeholders and relies on strategic alliances. As a platform for exchange and part-time further education in the field of water, it has offered the "Practice-Oriented Eawag Courses" since 1993. Additionally, Eawag is engaged in close cooperation with the Swiss Water Association and with the Swiss Society of the Gas and Water Industries.

Eawag and Empa support the KTT in economy and society with a jointly run technology transfer office.

## Your KTT contacts in the ETH Domain

### ETH Zurich

Dr Silvio Bonaccio  
 Head of ETH transfer  
 Phone 044 632 77 42  
[silvio.bonaccio@sl.ethz.ch](mailto:silvio.bonaccio@sl.ethz.ch)  
[www.transfer.ethz.ch](http://www.transfer.ethz.ch)

### EPFL

Gabriel Clerc  
 Head of EPFL-TT0  
 Phone 021 693 70 23  
[tto@epfl.ch](mailto:tto@epfl.ch)  
[tto.epfl.ch](http://tto.epfl.ch)

### PSI

Dr Giorgio Travaglini  
 Head of Technology Transfer  
 Phone 056 310 27 21  
[giorgio.travaglini@psi.ch](mailto:giorgio.travaglini@psi.ch)  
[www.psi.ch/industry](http://www.psi.ch/industry)

### WSL

Dr Christoph Hegg  
 Deputy Director  
 Phone 044 739 24 44  
[christoph.hegg@wsl.ch](mailto:christoph.hegg@wsl.ch)  
[www.wsl.ch](http://www.wsl.ch)

### Empa

Gabriele Dobenecker  
 Head of Marketing, Knowledge  
 and Technology Transfer  
 Phone 058 765 44 21  
[gabriele.dobenecker@empa.ch](mailto:gabriele.dobenecker@empa.ch)  
[www.empa.ch](http://www.empa.ch)

### Eawag

Evelin Vogler  
 Contact Point, Knowledge  
 Transfer  
 Phone 058 765 50 46  
[evelin.vogler@eawag.ch](mailto:evelin.vogler@eawag.ch)  
[www.eawag.ch/beratung](http://www.eawag.ch/beratung)

### Imprint

Publisher: ETH Board  
 Editorship: Communication, ETH Board, Zurich, in cooperation with the institutions of the ETH Domain  
 Translation: Translation Services, ETH Board  
 Layout: Works Design, Zurich  
 Photos: made available by the institutions, or according to source indicated  
 Printer: Merkur Druck AG, Langenthal  
 © ETH Board, 2012

This publication is also available as an eBook: [www.ethboard.ch/en/ktt](http://www.ethboard.ch/en/ktt)

Cover picture:

Trail-blazing public-private partnership: IBM Research Zurich and ETH Zurich intensify their cooperation with the Binnig and Rohrer Nanotechnology Center. This infrastructure, such as the clean room, can also be used by third parties.



**ETH Board**

Haldeliweg 15  
CH-8092 Zurich  
Phone +41 (0)44 632 23 67  
Fax +41 (0)44 632 11 90  
[www.ethboard.ch](http://www.ethboard.ch)