

University-industry cooperation

ETH Zürich as a reference organization for industry

Prof. Dr. Konrad Osterwalder, Rector and President a.i.



Switzerland

Population	7'500'000 (foreigners 20%)
Area	40'000 km ²
Languages	63.7% German 20.4% French 6.4% Italian 0.5% Romansh 9.0% other
GDP	450'000 million CHF



Swiss University System

Cantonal (regional) Universities

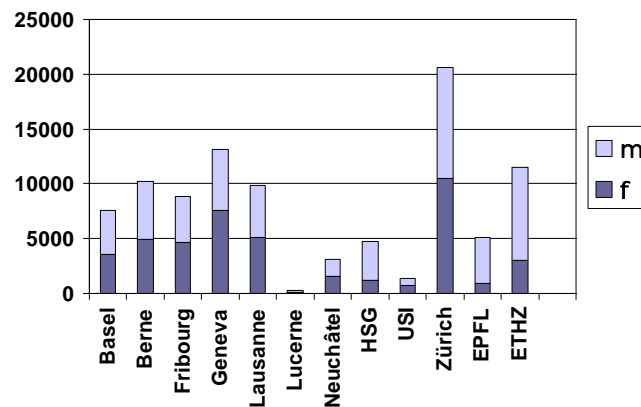
- Geneva
- Lausanne
- Neuchâtel
- Fribourg
- Berne
- Basel
- **Zurich**
- Lucerne
- St. Gallen
- Lugano

Federal Institutions

- EPF Lausanne
- ETH Zurich
- **+ 7 Universities of applied sciences („Fachhochschulen“)**

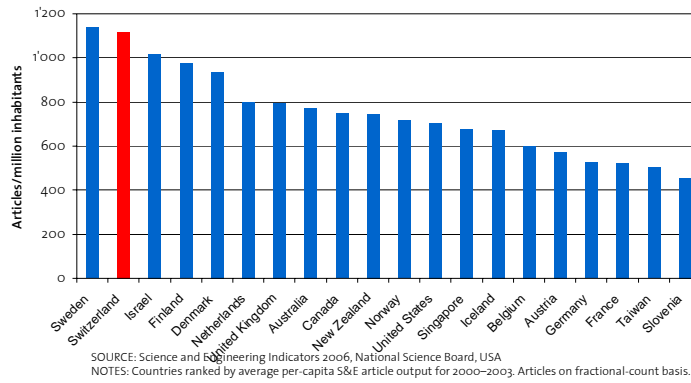
Swiss Universities

Students

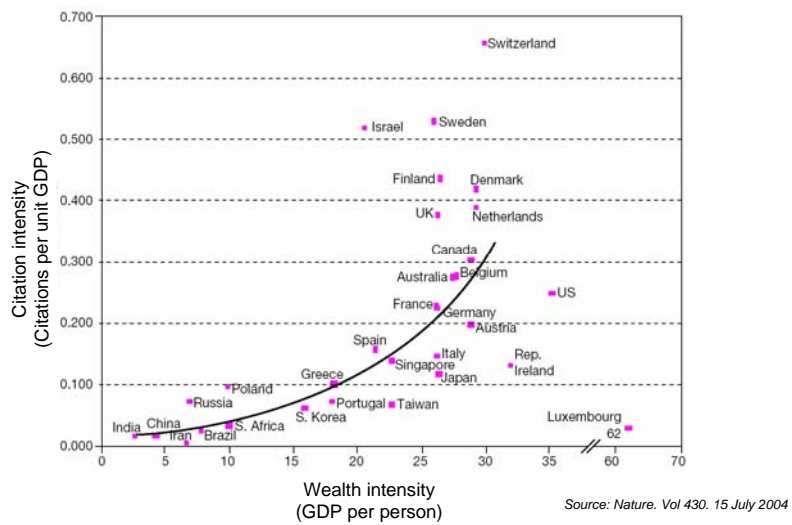


Bundesamt für Statistik 2000

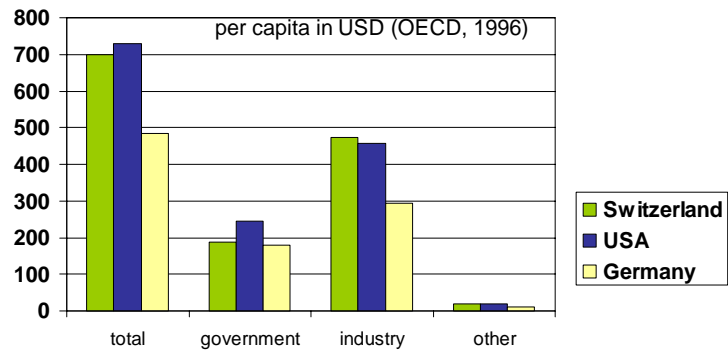
Per Capita Output of S&E Articles by Country (2000-2003)



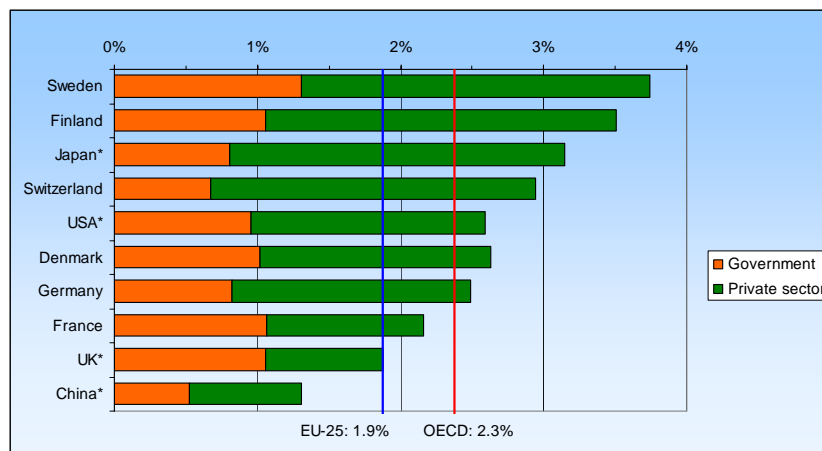
Comparison: Economic vs. Scientific Wealth



Expenditure on R&D



R&D Investment as % of GDP (2004*)



* or most recent data

Source: Eurostat/Swiss Federal Statistical Office, 2006)

Swiss Federal Institute of Technology:

ETH Zürich

Structure: 16 plus 1 Departments

Construction and Geomatics (2)

Architecture; Building, Environment and Geomatics.

Engineering Sciences (5)

Mechanical and Process Engineering; Information Technology and Electrical Engineering; Computer Sciences; Materials; Industrial Management and Manufacturing.

Natural Sciences and Mathematics (4)

Mathematics; Physics; Chemistry; Biology.

System-Oriented Sciences (5)

Earth Sciences; Environmental Sciences; Applied Biosciences; Agricultural and Food Sciences; Forest Sciences.

Humanities, Social and Political Sciences (1)

Humanities, Social and Political Sciences.

Facts and Figures (2005)

Bachelor-, Master- und Diploma students	9672
Foreigners	1264 (13%)
PhD / MAS/MBA students	3033
Foreigners	1585 (52%)
Professors (in FTE)	349
Foreigners	209 (60%)
Administrative and technical personel (FTE)	6009
Total costs	1157 Mio CHF
Third party funding	180 Mio CHF

ETH Zurich:

- Top ranking university in continental Europe

(Shanghai Jiao Tong University: Academic Ranking of World Universities 2005
Times Higher Education Supplements: World University Ranking 2005)



- 21 Nobel Laureates

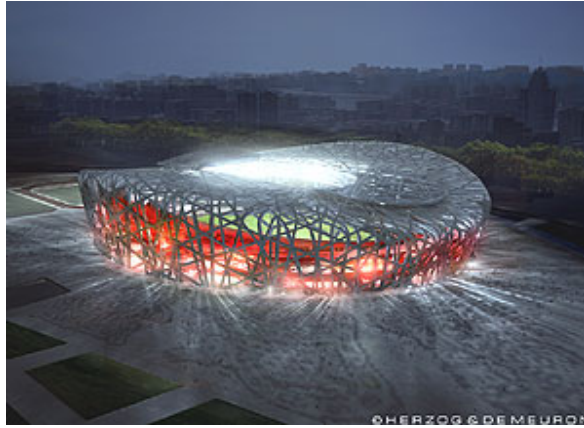
Examples:
Chemistry 1939: Leopold Ruzicka
Physics 1945: Wolfgang Pauli
Chemistry 1975: Vladimir Prelog
Chemistry 1991: Richard Ernst
Chemistry 2002: Kurt Wüthrich



^
Prof. Kurt Wüthrich
<
Prof. Richard Ernst

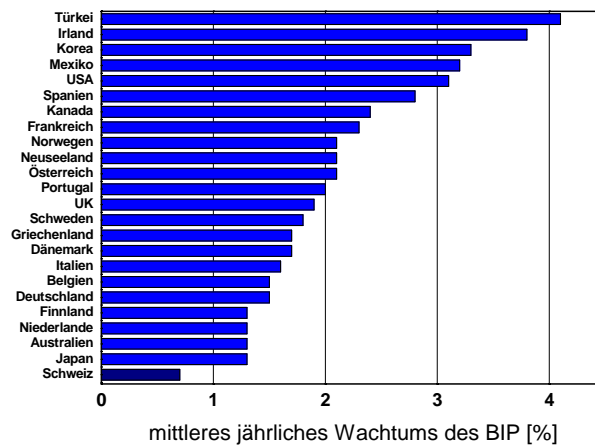
Pritzker Laureates on the Faculty of ETH

Jacques Herzog and Pierre de Meuron, Pritzker Architecture Prize Laureates, 2001. The Pritzker Prize is seen as the Nobel Prize of Architecture



Global Centers of Growth 2020

geschätztes Wachstum des BIP 2006 - 2020, nur OECD



Deutsche Bank Research
9. Februar 2005 - Nr. 313



The world has changed ...

- New awareness: research results have an economic value!
- The US have done it for a long time – the Bay-Dole Act
- General assumption: the universities cost a lot of tax payer money and sit on valuable know-how
- Conflict with industry: industrial partners are ever less interested in „published knowledge and know-how“– universities on the other hand should and must publish. Since confidentiality is difficult at the universities intellectual property has to be protected.

The Trend is clear ...

„München, 1. Juli 2003 -- Die starke Nachfrage nach europäischen Patenten hält weiter an: Das Europäische Patentamt registrierte 2002 mit **165'100 Patentanmeldungen** einen neuen Höchststand. Mit 47'400 erteilten Patenten übertraf das Amt die Vorjahresmarke um 37 % und erreichte ebenfalls einen Höchstwert. Insgesamt führte das EPA mehr Recherche- und Sachprüfungsverfahren durch als 2001 und steigerte die Produktion in allen Bereichen gegenüber dem Vorjahr um 5,8 % . „

EPA - Pressemitteilungen

... and the legislator has reacted :

Technology Transfer has become an Obligation

Bundesgesetz über die Eidgenössischen Technischen Hochschulen
(ETH-Gesetz) **21. März 2003**

**Die Bundesversammlung der Schweizerischen Eidgenossenschaft ...
beschliesst:**

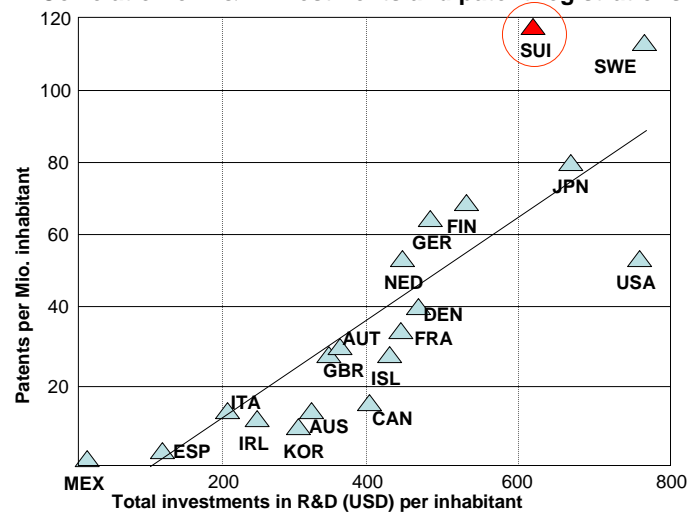
...

Art. 2 **Zweck**

1. Die ETH und die Forschungsanstalten sollen:
 - a) Studierende und Fachkräfte auf wissenschaftlichem und technischem Gebiet ausbilden und die permanente Weiterbildung sichern;
 - b) durch Forschung die wissenschaftlichen Erkenntnisse erweitern;
 - c) den wissenschaftlichen Nachwuchs fördern;
 - d) wissenschaftliche und technische Dienstleistungen erbringen.
 - e) **Öffentlichkeitsarbeit leisten;**
 - f) **ihre Forschungsergebnisse verwerten.**

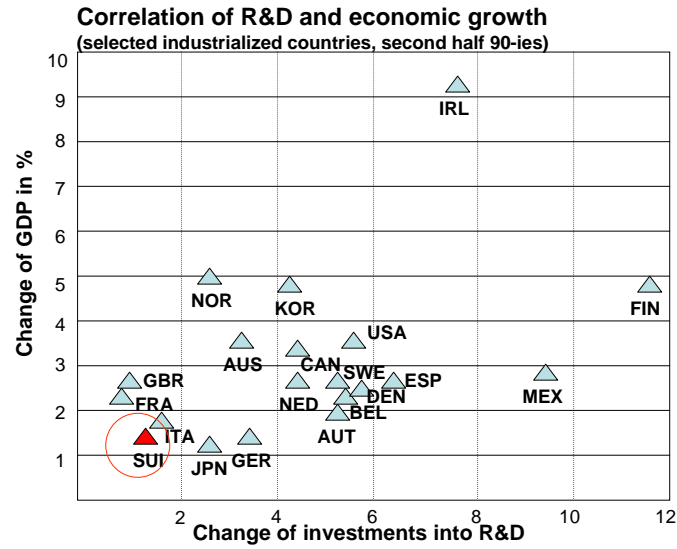
Switzerland is a champion in transferring R&D into patents

Correlation of R&D investments and patent registrations



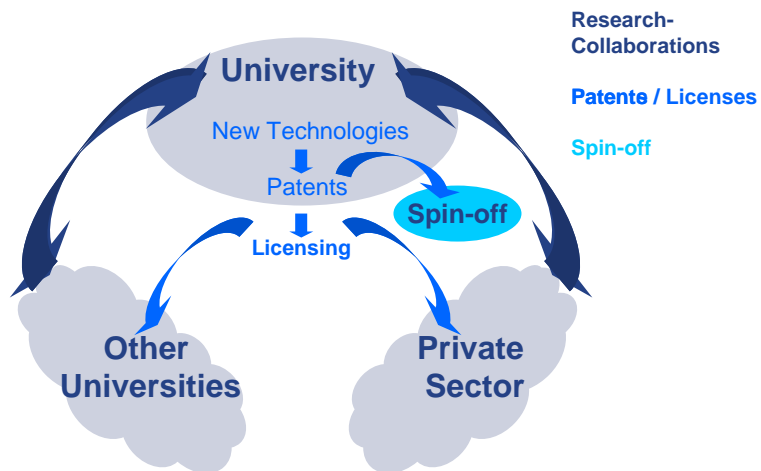
Quelle: OECD, Main Science and Technology Indicators, Berechnungen und Schätzungen des NIW 2003, ausgesuchte Industrieländer, 1997

...but does not sufficiently exploit these as source for economic growth



Quelle: OECD, Main Science and Technology Indicators, Berechnungen und Schätzungen des NIW 2003

The Ways of „New Technology Transfer“



Kinds of Cooperations

- **Collaboration without IP transfer**
 - A third party participates in a project for which the initiative has been taken by ETH Zurich.
 - The intellectual property is owned by ETH Zürich.
- **Collaboration with IP transfer**
 - ETH Zurich performs a project for which the interest is mainly on the side of the third party.
 - Intellectual property is owned by the ordering party.
 - Overhead costs are charged.
- **Commission for Technology and Innovation (CTI)**
- **European research programmes**

Patents and Licenses

- **The Technology Transfer Office supports the researchers with :**
 - Information and advice on patenting and licensing
 - Help in patent searches
 - Contacts to attorneys for document preparation and filing
 - Funds for patenting
 - Contacts to technology brokers
 - Production of brochures/presentations
 - Advice and help in license negotiations
 - Contract preparation, controlling

Inventions at ETH Zurich

- **Owner of the Intellectual Property:**
 - Inventor? ETHZ? Professor? Author? Student?
- **Patent and Publish:**
 - Just be careful to get it in the right order...!
- **Exploitation:**
 - Outlicensing, Sale, Spin-off
- **Revenues:**
 - 1/3 inventors, 1/3 Institut, 1/3 ETHZ

ETH-Zurich Technology Inside!

Jackcontrol -
hydraulic System



Nanopowders



Hightspeed Camera



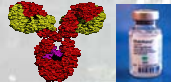
Direct Ceramic Machining



Starch Gels



Glycosylated AB's



OpenTrack
Simulation of
Railway Networks



Food
Technology



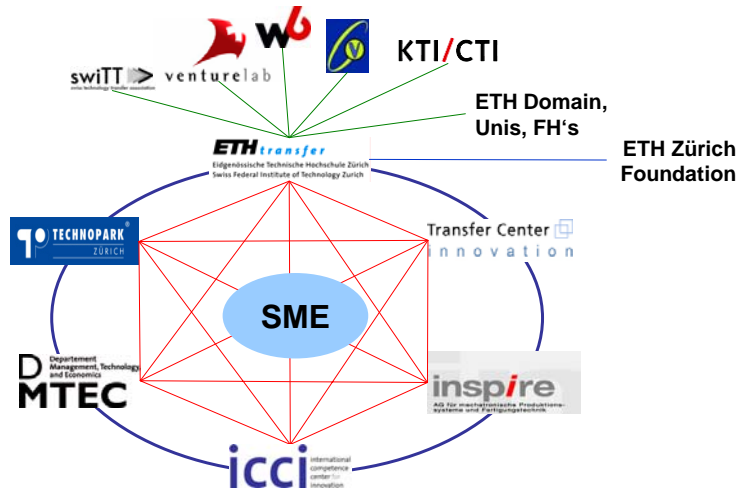
Sensor
Technology



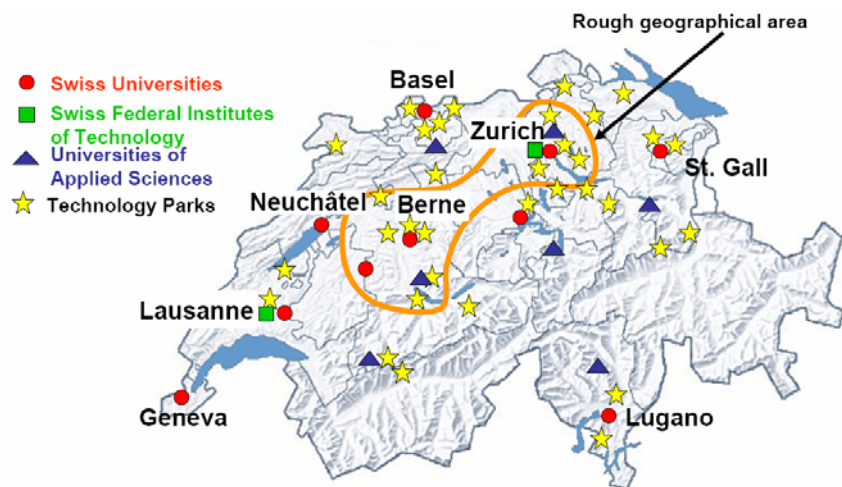
2006

~ 60 new Licenses and Technology Transfers

Innovation Engine ETH Zürich



Geographical Extension

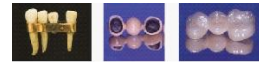


Collaboration and Technology Transfer go well!

Jackcontrol -
hydraulische Fuge



Direct Ceramic Machining



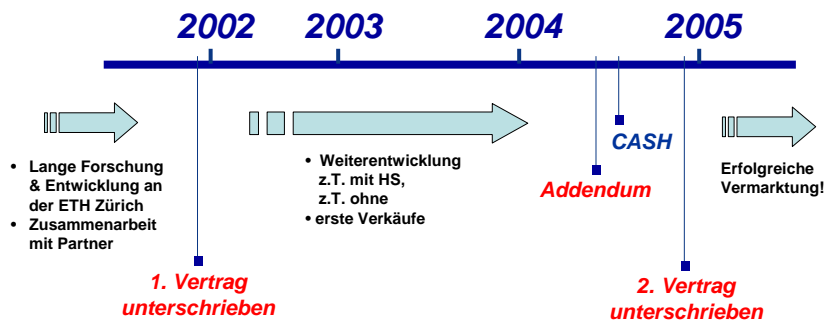
Gruppe Prof. Gauckler /
Filser et al.



It still can take a long time from
basic science to products (5 - 40 yrs)



Example: HighSpeedCamera



USP:

- Small, only (71 x 71 x 97 mm)
- 1280 x 1024 true pixels full resolution, up to 32000 frames / sec



What have we learnt during the past few years?



- Confidentiality is important
- SMEs are under time pressure
- SMEs need access to latest technology
- Know-how transfer und Support are crucial



- Universities must publish
- Projects/Planing takes time
- Protection of IP is important and doesn't harm
- Cost should not be underestimated. People and time



Openness, Willingness to discuss
Mutual understanding
Trust
Shared pursuit for success



Hochschulen als Out-Sourcing Partner

- Industrie lagert einen immer grösseren Teil ihrer F&E aus
- Meist Kooperationen mit anderen Firmen, ein wichtiger Teil sind Kooperationen mit Hochschulen
- 18% der gesamten F&E-Aufwendungen der CH-Wirtschaft im Jahre 2000 an externe Partner
- Im Sektor Pharma/Chemie betrug der Anteil 27%
- Prognose: Weltweites Volumen der ausgelagerten F&E-Aufwendungen steigt von 9.3 Mia. \$ im Jahre 2001 auf rund 36 Mia. \$ im Jahre 2010

Chance für Hochschulen

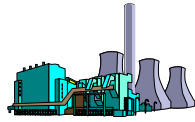
Absicht der Hochschulen

- Erbringen eines volkswirtschaftlichen Nutzens durch Nutzbarmachung des Wissens und des Know-hows der ETH Zürich für Wirtschaftspartner
- Wirtschaftliche Umsetzung von Forschungsergebnissen zum Nutzen der Gesellschaft
- „Recruit, retain and reward faculty“
- Partnerschaftliche Beziehungen mit Wirtschaftspartnern zum Nutzen in Lehre und Forschung
- Erwirtschaften von finanziellen Erträgen (Drittmittel)

Motivation of ETH Zürich

- Benefit to society – resulting from innovative products that offer new opportunities to the wider public.
- Benefit to researchers – resulting from know-how expansion and external contacts.
- Benefit to Swiss research – resulting from confrontation with new problem aspects.
- Benefit to ETHZ – resulting from positive image and income from business generated.

Excellent Business Partners



- Obtain new / advanced technology with competitive edge
- Develop products
- Commercialize results



- Open up Scientific Horizons
- Publish results (reputation)
- Participate in economic success

Fair Deal

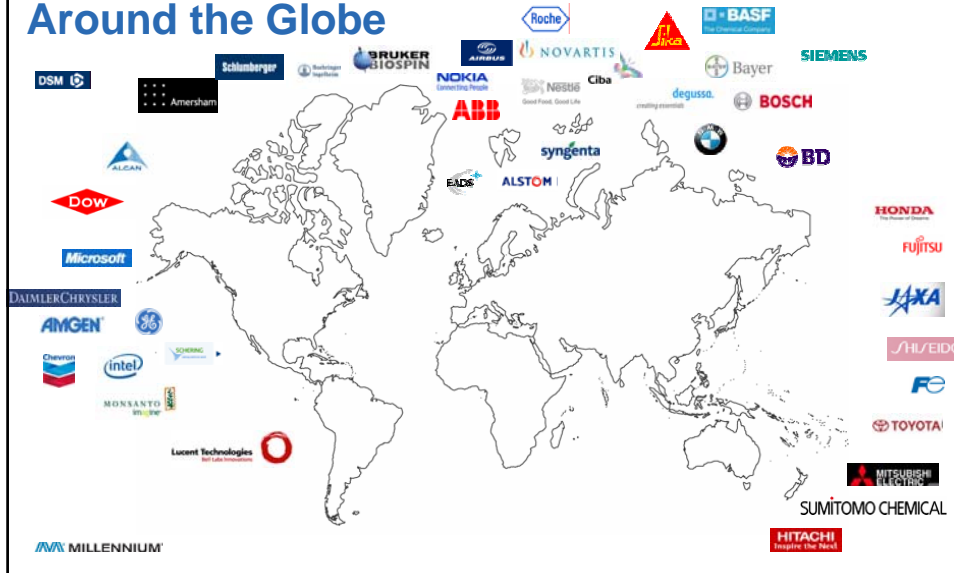
*Intellectual Property Rights
Publishing Rights
Payments*

Industry Collaborations Around the Globe – Selected Partners

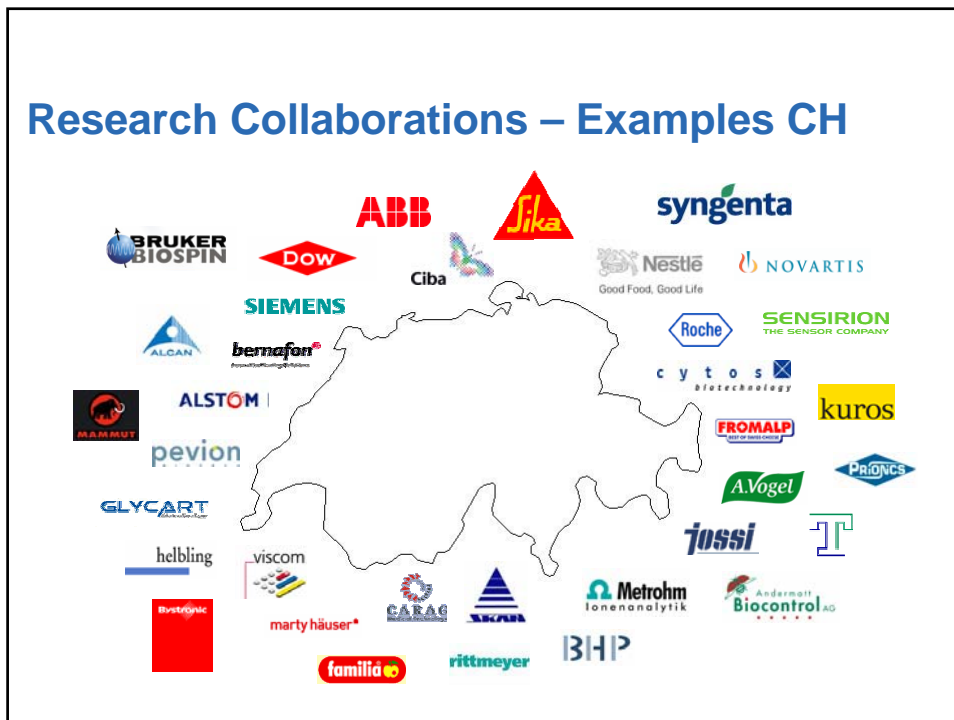
Selection of Existing Research Collaborations:

ABB	DaimlerChrysler	Microsoft Research
Airbus	Degussa	Millenium Pharmaceutical
Alcan	Dow Europe	Mitsubishi Heavy Industries
Alstom	DSM	Monsanto
Amersham	EADS	Nestlé
Amgen	Hoffmann-La Roche	Nokia
BASF	Fuji Electric Corporate R&E	Novartis
Bayer	Fujitsu Laboratories of Europe	Osaka University
Becton Dickinson	GE	Schering
BMW	Hitachi	Shiseido Co
Boehringer Ingelheim	Honda Research Institute	Siemens
Bruker BioSpin	Intel	Starlabo Corporation
Bosch	JAXA JP Aerospace Expl. Agency	Sumika Fine Chemicals
ChevronTexaco	Lucent	Syngenta
Schlumberger	MELCO Mitsubishi Electric Corp.	Toyota
Ciba	MERL Mitsubishi Electric Res. Lab.	The Commun. Res. Lab. of JP

Collaboration ETH Zürich – Industry Around the Globe



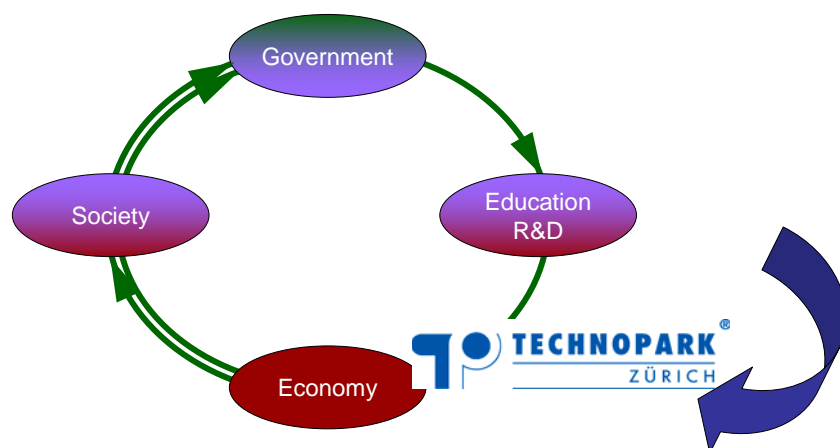
Research Collaborations – Examples CH



**ETH all by itself cannot do the
job:**

Technopark

**Closing the economic cycle: Creating new jobs
through the transfer of technologies**

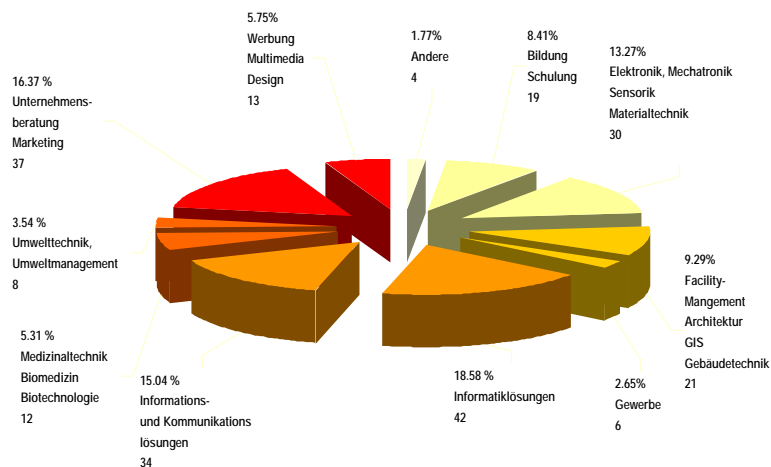


Switzerland's largest technology transfer center

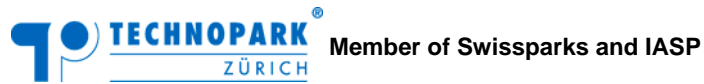
- Founded 1993; 44'000 sqm
- **Over 230 companies; 60 high-tech start-ups < 8 years**
- 1'700 entrepreneurs
- **Broad spectrum of industries**
- Dynamic – approx. 100 office changes p.a.
- CHF 40 Mio. tax substrates generated p.a.
- **3 technology donors: ETHZ, CSEM, HTZ**
- Close cooperation with the governmental promotion agencies, industry and the financial community
- **Fully privately financed**

No „cluster“ strategy – market environment forms company mix

Technopark companies according to industries



TECHNOPARK® Alliance –decentralized growth
(licencing)



Key success factors for building high-tech start-ups –
focus of our coaching efforts

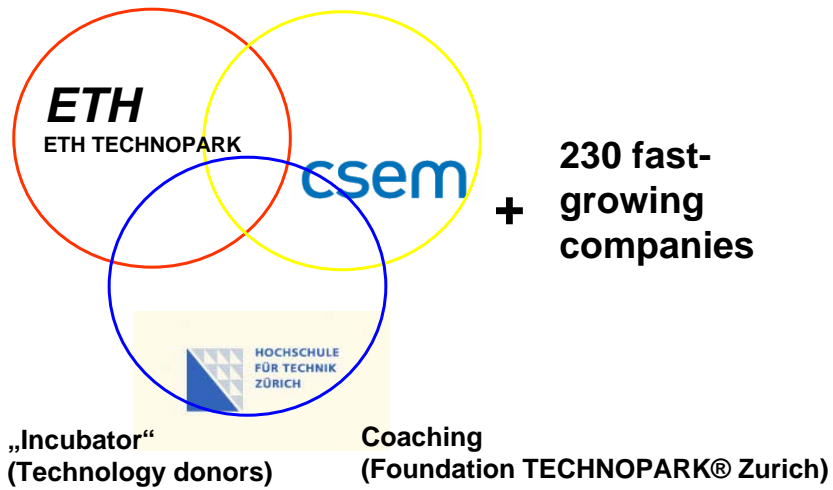
Time-to-Market → From inventions to innovations

Power-Teams → Balance of scientific and marketing know-how

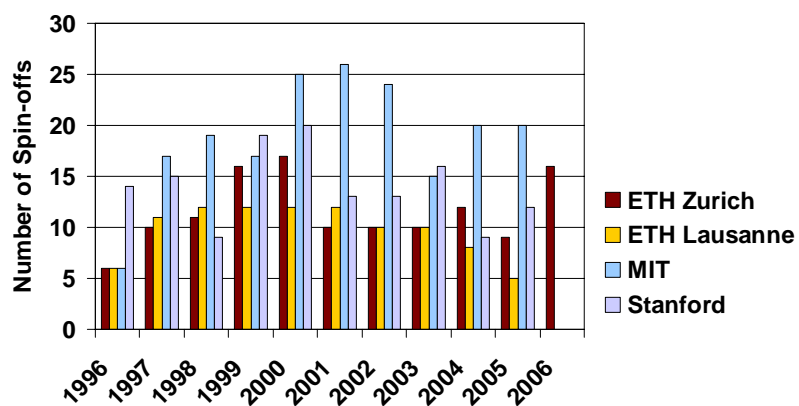
Market orientation → Visionary goals coupled with pragmatic approach

Early stage financing → „Gamble money“ for seed phase, 1st/2nd rounds of financing comparable to int' standards

3 top-liga „technology donors“ and over 230 growth companies „under one roof“



Significant amount of deal-flow from ETH Zurich

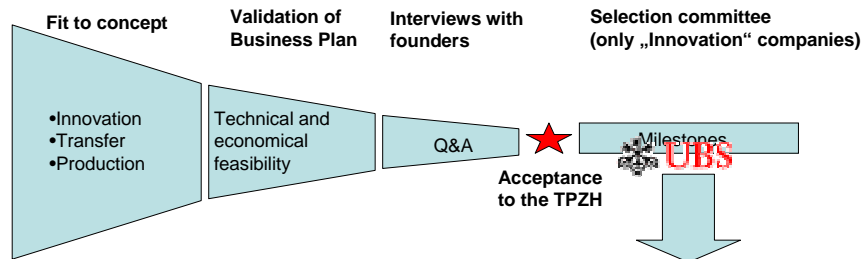


➔ Approx. 60% of ETH Zurich spin-off dealflow locate @ TECHNO PARK® Zurich (“Incubator section”)

Source: ETH Zurich Technology Transfer Office, Feb. 07

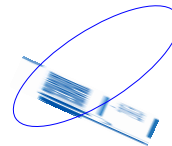
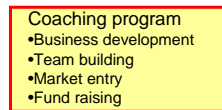
Tight selection process – Quality label

TECHNOPARK®



Selection committee

- Renowned group of experts in the fields of technology, HR, marketing and financing
- Quarterly meetings, 10-12 companies/ year
- Milestone setting and kick-off for targeted coaching measures
- **Very high success rate of 90%**



Project People for team-building – key success factor

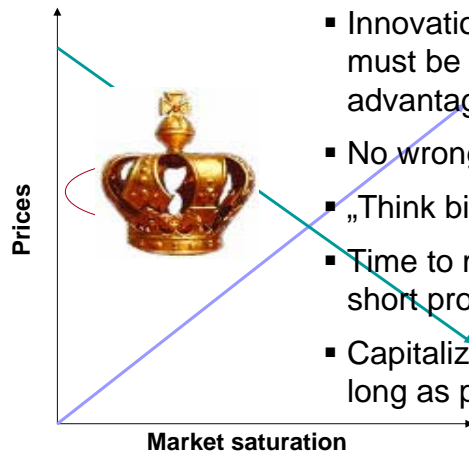


Project partner:

Mercuri Urval

- Team as main success factor
- Most difficult component to objectively access and measure
- Structured and transparent team building project
 1. Qualification and social competencies of core team and candidates
 2. Strategic objectives of company
- Targeted team completion

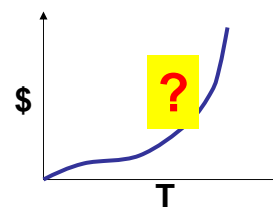
First mover = Premium pricing



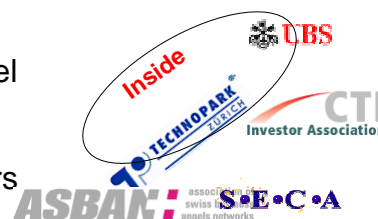
- Innovation window of opportunity must be translated into a first mover advantage
- No wrong „perfectionism“
- „Think big“
- Time to market is essential due to short product cycles
- Capitalize on „premium“ pricing as long as possible

Active support in the fund raising process

- Coaching for business planning: Structure, plausibilization, prioritization
- Team Building
- Preparation for investor presentations: „Killer questions“ and negotiation support
- TECHNOPARK® = Quality label
- Bridge grants for start-ups
- Established network to investors



Advisory Board



Key components of best practices @ TECHNOPARK® Zurich

- **„Technology donors“ and „technology takers“ under one roof:** ETHZ, CSEM and HTZ + 230 high-growth companies united for co-operation projects and spin-offs
- **Tight selection process:** Strong filter used for applicants
- **Portfolio management approach:** For targeted coaching provided in cooperation with selected strategic partners
- **Encompassing coaching program:** Milestones and thematic emphasis on (1) business development, (2) team-building, (3) fund raising, (4) Peer-to-peer learning
- **TECHNOPARK® = Quality label: Best-in-class partner for investors due to selection, active involvement + “time due diligence”**

Conclusions

- Industry and University have come together much closer in recent years.
- Technopark as professionalized promotor of spinoffs
- Main focus of ETH remains Basic Research and Education (Independent Research is the foundation for genuine innovation).
- However, awareness for economic value of research and results thereof is increasing at the University.
- It's important to understand each others point of view to cut a fair deal.