Boosting the dynamics of the EPFL campus through PPP

Prof. Francis-Luc Perret, Vice-president
Dr. Michel Bourquin, Dr. Dimitrios Noukakis

WCU-4, Shanghai - November 1, 2011
A coherent layout: 27,000 persons, including 20,000 students

Science & Technology

Social Sciences & Humanities

Sports

2020 Swiss Tech Parc
EPFL today

Campus

8’000 Students, including 1’900 PhD’s
350 Professors
2’500 Scientific and administrative collaborators

Budget (2010)

460 Mio Euros Federal budget 73 %
170 Mio Euros External funds 27 %

EPFL's Schools and Masters

Schools

Architecture, Civil and Environmental Engineering ENAC
Engineering STI
Computer and Communication Sciences IC
Basic Sciences BS
Life Sciences LS

Colleges

Management of Technology CdM
Social Sciences and Humanities CdH

Master Programs

Architecture
Civil Engineering
Environmental Science and Engineering
Mechanical Engineering
Microengineering
Material Sciences
Electrical and Electronics Engineering
Communication Systems
Computer Science
Mathematics and Applied Mathematics
Computational Science and Engineering
Physics
Nuclear Engineering
Chemistry and Chemical Engineering
Life Sciences and Technology
Bioengineering
Management, Technology and Entrepreneurship
Financial Engineering
Energy Management and Sustainability
Transdisciplinary research

Blue Brain Project
Transportation Center
Solar Impulse
Space Center
Swisscube
Hydroptere
Energy Center
Center for Neuroprosthetics

Students’ growth over the last 50 years
A research university

Professors

Total: 226 profs hired (PO, PA, PATT) since 2000

*Assistant Professors without tenure track / Professors with a FNS grant
### Number of ERC Grants 2007-2010

<table>
<thead>
<tr>
<th>Rank</th>
<th>University Name</th>
<th>Country</th>
<th>No. of Grants</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>University of Cambridge</td>
<td>UK</td>
<td>35</td>
</tr>
<tr>
<td>2</td>
<td>EPFL - École Polytechnique Fédérale de Lausanne</td>
<td>CH</td>
<td>34</td>
</tr>
<tr>
<td>3</td>
<td>ETHZ - Eidgenössische Technische Hochschule Zürich</td>
<td>CH</td>
<td>29</td>
</tr>
<tr>
<td>4</td>
<td>University of Oxford</td>
<td>UK</td>
<td>29</td>
</tr>
<tr>
<td>5</td>
<td>Weizmann Institute of Science</td>
<td>ISR</td>
<td>26</td>
</tr>
<tr>
<td>6</td>
<td>Imperial College</td>
<td>UK</td>
<td>24</td>
</tr>
<tr>
<td>7</td>
<td>The Hebrew University of Jerusalem</td>
<td>ISR</td>
<td>21</td>
</tr>
<tr>
<td>8</td>
<td>Technion - Israel Institute of Technology</td>
<td>ISR</td>
<td>15</td>
</tr>
<tr>
<td>9</td>
<td>University College London</td>
<td>UK</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Universität Zürich</td>
<td>CH</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Karolinska Institutet</td>
<td>SE</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Katholieke Universiteit Leuven</td>
<td>BE</td>
<td>13</td>
</tr>
<tr>
<td>13</td>
<td>University of Bristol</td>
<td>UK</td>
<td>12</td>
</tr>
</tbody>
</table>

#### EPFL: ~ EUR 70 Mios

Including interdisciplinary research, excl. social sciences and humanities
No grants / institution (10 grants or more)

---

### Quality of the Swiss University System

#### Leiden Ranking 2004-2009

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country</th>
<th>University</th>
<th>Publications</th>
<th>Citations per Publication</th>
<th><em>Cronin Indicator</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CH</td>
<td>EPFL LAUSANNE</td>
<td>8,388</td>
<td>8.32</td>
<td>1.77</td>
</tr>
<tr>
<td>2</td>
<td>CH</td>
<td>ETH ZURICH</td>
<td>15,099</td>
<td>9.41</td>
<td>1.64</td>
</tr>
<tr>
<td>3</td>
<td>UK</td>
<td>UNIV CAMBRIDGE</td>
<td>25,662</td>
<td>9.75</td>
<td>1.58</td>
</tr>
<tr>
<td>4</td>
<td>UK</td>
<td>UNIV OXFORD</td>
<td>26,519</td>
<td>11.25</td>
<td>1.63</td>
</tr>
<tr>
<td>5</td>
<td>CH</td>
<td>UNIV LAUSANNE</td>
<td>6,950</td>
<td>12.43</td>
<td>1.59</td>
</tr>
<tr>
<td>6</td>
<td>UK</td>
<td>UNIV EDINBURGH</td>
<td>13,188</td>
<td>10.25</td>
<td>1.56</td>
</tr>
<tr>
<td>7</td>
<td>DK</td>
<td>TECH UNIV DENMARK</td>
<td>7,713</td>
<td>7.44</td>
<td>1.50</td>
</tr>
<tr>
<td>8</td>
<td>NL</td>
<td>ERASMUS UNIV ROTTERDAM</td>
<td>12,408</td>
<td>11.01</td>
<td>1.49</td>
</tr>
<tr>
<td>9</td>
<td>UK</td>
<td>IMPERIAL COLL LONDON</td>
<td>31,567</td>
<td>10.17</td>
<td>1.49</td>
</tr>
<tr>
<td>10</td>
<td>CH</td>
<td>UNIV GENEVE</td>
<td>9,142</td>
<td>10.90</td>
<td>1.47</td>
</tr>
<tr>
<td>11</td>
<td>CH</td>
<td>UNIV BASEL</td>
<td>8,973</td>
<td>11.01</td>
<td>1.46</td>
</tr>
<tr>
<td>12</td>
<td>UK</td>
<td>UNIV COLL LONDON</td>
<td>26,286</td>
<td>10.85</td>
<td>1.46</td>
</tr>
<tr>
<td>13</td>
<td>UK</td>
<td>UNIV GLASGOW</td>
<td>10,415</td>
<td>9.34</td>
<td>1.45</td>
</tr>
<tr>
<td>14</td>
<td>CH</td>
<td>UNIV ZURICH</td>
<td>12,914</td>
<td>10.16</td>
<td>1.44</td>
</tr>
<tr>
<td>15</td>
<td>NL</td>
<td>VTIE UNIV AMSTERDAM</td>
<td>12,201</td>
<td>9.51</td>
<td>1.40</td>
</tr>
</tbody>
</table>

CPP = nombre de citations par publication
FCSm = Field Citation Score
CR = Competitivity in science

Source: CWTS Leiden

---

**Note:** The Leiden Ranking is a measure of the quality of universities based on their research output. It takes into account the number of publications and citations to assess the impact of a university’s research. The ranking is used to evaluate the competitiveness of universities in various fields of study.
A European comparison

Leading European Universities: FP7 contributions vs ERC grants

- but quality has a cost!

6 Flagship Pilots Projects preselected

FuturICT: Unleashing the Power of Information for a Sustainable Future
Leading house: UCL; co-leading house: ETH Zürich

Graphene-CA: Graphene Science and technology for ICT and beyond
Leading house: Chalmers University

Guardian Angels: for a Smarter Planet
Leading house: EPFL; co-leading house: ETH Zürich

HBP: The Human Brain Project
Leading house: EPFL

ITFoM: Molecular Modeling in Medicine, Aging, and Drug safety
Leading house: Max Planck Institute for Molecular Genetics, Berlin

CA-RoboCom: Robot Companions for Citizens
Leading house: Scuola Superiore Sant’Anna, Pisa (ITA)
Growth of EPFL versus Public Resources

1990 = 100%

Students
Professors
Collaborators
State Budget

Evolution of external funding

Dépenses (Mio EUR)

170
127.5
85
42.5

Public & private mandates
European projects
CTI
FNRS
Industry

EPFL FLP November 2011
26 sponsored chairs

- Advanced production technologies
  *Micro- & nanotechnologies, robotic, sustainable production, micro sensors with zero energy consumption*

- Sustainable technologies for energy
  *CO₂ life cycle optimization, increase in energy efficiency, smart grids,*

- Engineering for life science
  *Program SystemsX, Blue Brain project, « From Genes to Health » program, biomedical engineering, cancer research, …*

- Systems and ecosystems
  *Understanding climate change, architecture and sustainable construction, transportation system, pollution,*

- High performance computing
  *HPC technologies, spectroscopy and image processing, …*

- Neuroprosthetics

- Financial engineering

---

Ongoing Projets 2011

**PPP versus public**

<table>
<thead>
<tr>
<th>Public investments</th>
<th>[EUR Mio]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neuroprosthetics</td>
<td>55</td>
</tr>
<tr>
<td>Nanotechnology</td>
<td>12</td>
</tr>
<tr>
<td>Physics + Chemistry</td>
<td>8</td>
</tr>
<tr>
<td>Roofs rehabilitation</td>
<td>10</td>
</tr>
<tr>
<td><strong>TOTAL Public</strong></td>
<td><strong>85</strong></td>
</tr>
<tr>
<td></td>
<td>17%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Private Public Partnership</th>
<th>[EUR Mio]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovation Quarter</td>
<td>125</td>
</tr>
<tr>
<td>Swiss Tech Conference Center</td>
<td>185</td>
</tr>
<tr>
<td>Photovoltaic Production plant</td>
<td>15</td>
</tr>
<tr>
<td>Microtechnology Neuchâtel</td>
<td>65</td>
</tr>
<tr>
<td>Sport Center</td>
<td>10</td>
</tr>
<tr>
<td><strong>TOTAL PPP</strong></td>
<td><strong>400</strong></td>
</tr>
<tr>
<td></td>
<td>83%</td>
</tr>
</tbody>
</table>
Public Private Partnership

Example of legal structure

- Swiss Confederation (Ground Owner)
- EBSA (UBS-FM) (Investor)
- Naef (Real Estate Company)
- EPFL (Management contract)
- EPFL (Sublease agreement)
- HRS (Total Contractor)
- EPFL (Companies/ Subtenants)

Factors mitigating the financial and juridical risks of the PPP

- Quality of the investor (AAA rating)
- Risk share between partners
- Options of contract modification according to economic conditions
- Fiscal advantages through the company legal structure
- Contract rules
- Length of the lease
- Flows of potential revenues and charges
- Project’s due diligence
Formalization of the payback period
Innovation Square (IS) and Congress Center (CC)

Examples of major PPP on campus
PPP’s linking the campus with the Science, the City and the Economy

The largest solar power plant in Switzerland

- A partnership with an electricity provider
- 20'000 m² photovoltaic cells, 15 Mio EUR, 2 Mio kWh/an
- 2'000 m² experimental Graetzel cells
The EPFL Swiss Tech Conference Center
185 millions EUR PPP
Profit & Loss statement

Operating results

Cumulated yearly results

Break Even

2013 & 2014
2015
2016
2017
2018
2019
0
1'000'000
2'000'000
3'000'000
4'000'000
-1'000'000
-2'000'000
-3'000'000
-4'000'000
-5'000'000
The Innovation Square

« Le Garage »
Early stage start-up (rent 1 – 2 years)

PSE
Science Parc
Start-up

Research Centers
for large companies, including partnerships and collaboration with EPFL

Numbers of start ups born @ EPFL

- Others
- Energy - environment
- Sensors
- Electrical - electronics
- Micro - nanotech
- Mechanical
- Medtech
- Biotech
- IT

Number of start up created at EPFL

Start-ups de l’EPFL