Putting collaboration at the heart of research

For a small country at the centre of Europe, Switzerland’s research and development effort has a broad reach. A conducive culture of shared knowledge fuels collaborations across the world.

“We get so many applications from around the world that we don’t need a special programme to attract international students or post-docs.”

Sandra Ziegler Handschin, communications director, FMI.

IT MIGHT seem optimistic to suggest that a country with a population of fewer than eight million people could compete on the world research stage. But Switzerland is thriving. A strategy of attracting high-quality researchers to the country, supporting links between academia and industry, and funding collaborations with international partners means Switzerland punches above its weight.

Thanos Halazonetis, a molecular biologist at the University of Geneva, believes Switzerland’s success in establishing international connections lies in the country’s central location in western Europe and the “truly international” recruitment policies of its universities and research institutes. Jürg Brunnschweiler, Director of Global Institutional Affairs at ETH Zürich, agrees it is a tradition born of necessity for the country, with its small population, to recruit from abroad. “It’s natural for us to think globally,” he says.

A scientific melting pot
Indeed, more than half of the doctoral students, post-docs and faculty at ETH Zürich are foreign nationals; at the Paul Scherrer Institute (PSI), the largest research centre for natural and engineering sciences in the country, around 44% are not Swiss, and similar figures are replicated at research institutes and universities across the country. Researchers come from far and wide. The Friedrich Miescher Institute for Biomedical Research (FMI) in Basel has around 300 members of staff, representing almost 40 countries of origin.

“We get so many applications from around the world that we don’t need a special programme to attract international students or post-docs,” says Sandra Ziegler Handschin, communications director at the FMI. Many applicants are attracted by the scientific track record of the FMI group leaders but the institute’s lure is enhanced by its close ties with industry. The FMI is affiliated with the Novartis Institutes for BioMedical Research and the University of Basel. “It makes a PhD at our institute different,” says Ziegler. Students are exposed to the industry side of research through FMI’s links to Novartis and around six FMI researchers find employment with the company each year.

Although Novartis is a primary funder of FMI research, the scientists are free to pursue projects of their own interest. Ziegler says the company also understands the potential of funding basic, sometimes daring, research.

Industry attraction
Several other large companies also have bases in Switzerland, drawn by its international environment and attractive lifestyle. Pharmaceutical giant Roche has its headquarters in Basel, and IBM’s continental Europe research laboratory, which focuses on nanotechnology and cloud computing research, is in Zürich.
"IBM came to Switzerland in 1956 precisely because it is in the heart of Europe, and an ideal place to attract international talent," says laboratory director Matthias Kaiserswerth. The Zürich lab is one of 12 IBM research laboratories around the world, but it is the most international, with staff hailing from 45 different countries. The lab networks with groups at ETH Zürich and the Ecole Polytechnique Federale de Lausanne (EPFL), and several IBM employees teach at the two universities.

The Zürich lab also supports other IBM research laboratories with technology and knowledge transfer. "IBM founds labs in new regions specifically to address local problems," says Kaiserswerth, pointing to the company’s research into traffic congestion and water-management strategies in Nairobi, Kenya, as a prime example. The Swiss lab has a particularly strong connection with its Brazilian counterpart, which was founded in 2010.

There is also a comprehensive transfer of knowledge within Swiss borders. The Università della Svizzera italiana in Lugano, for example, offers intensive short courses in biomedicine and biotechnology entrepreneurship through their BioBusiness program, which launched in 2010. "Our course covers the whole process from scientific project to exit from the company," says course organizer Heidrun Flaadt. Staff from start-up companies around Europe and the UK have attended the BioBusiness course, and many companies value the training so highly that they send different people each year.

**Global solutions to global problems**

Innovative projects are evolving from an environment of global collaboration between companies and academics in Switzerland. A new collaboration between IBM and tobacco company Philip Morris International (PMI) – which has around 3000 staff based in Switzerland - aims to develop more transparent and robust processes for analysing complex scientific data. "One of the challenges when developing products that are designed to reduce the risk associated with tobacco is to substantiate the reduction in risk of smoking-related diseases," says Manuel Peitsch, vice president of biological systems research at PMI. This 4dv IMPROVER initiative, which was launched in 2012, uses a crowdsourced approach in which teams of scientists compete to design methods for verifying results of systems-biology studies. The results of the project should go beyond evaluating the health risks of PMI’s own products, benefiting other spheres, from pharmaceuticals to environmental safety.

International collaboration by Swiss universities means more opportunities for scientists to broaden their horizons. The University of Freiburg, for instance, has built faculty links with universities in more than 30 countries. The same is true for the E.biozentrum, an interdisciplinary institute at the University of Basel, which offers an International PhD program. Others have taken this further. The Singapore-ETH Centre, based in Singapore, is a joint venture between ETH Zürich and Singapore’s National Research Foundation. More than 140 ETH faculty, researchers and students are working on its first endeavor, the Future Cities Laboratory, which focuses on sustainable urban systems, from building design to food security. "Today, these questions are best addressed in a place like Singapore," says Gerhard Schmidt, the centre’s director. "These are big challenges, and the cities must be planned and simulated on-site where urban growth is most intense."

At EPFL, a group of researchers have come together to form EcoCloud, a consortium that aims to find better ways to process and store ever-increasing data. They are developing energy-efficient technologies to enable scalable and cost-effective IT. "Transistors just aren’t getting more efficient," says Babak Falsafi, the centre’s director, "so we’re working on technologies to try to address this problem." The centre is collaborating with international companies such as Intel, HP and Microsoft, and local partners Credit Suisse and Swisscom.

**Supporting the links**

Industry is not the only source of research money. Even though Switzerland is not part of the European Union, it is integrated in ways that allow researchers to take part in large EU projects. This year, the European Commission announced funding of 1.19 billion Euros ($1.6 billion) for the 10-year Human Brain Project, a global collaboration led by Switzerland, which seeks to model the human brain in intricate detail. And the burgeoning neuroscience landscape in Switzerland is proving a big draw for international students, says Patrik Vuilleumier, of Geneva Neurosciences, an interdisciplinary network gathering brain researchers at the University of Geneva.

Others are attracted by access to research funding for which competition in Switzerland is not quite as tough as in other places. So says Friso van der Ven, head of the Department for Synchrotron Radiation and Nanotechnology at the Paul Scherrer Institute. "If you have a good idea, sooner or later you’ll get funded."

The Swiss government specifically facilitates international connections with several funding schemes, including the Sinergia grants from the Swiss National Science Foundation (SNSF), which are awarded to teams of three to four research groups of which one is allowed to be based outside the country. The SNSF also funds the SCOPES programme that supports scientists from partner countries in Eastern Europe and states of the former Soviet Union.

The search for some scientific answers requires big infrastructure, and Switzerland boasts many large-scale research facilities. Of course, there’s CERN, the international organisation that operates the world’s largest particle-physics laboratory, based in Geneva. But Switzerland also has the Paul Scherrer Institute (PSI), a national laboratory that incorporates the Swiss Light Source (SLS) photon source, the…

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In 2011, the Swiss National Science Foundation funded nearly 3,900 collaborative projects. The ten countries collaborated with most frequently.

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of collaborations</th>
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<tbody>
<tr>
<td>Germany</td>
<td>746</td>
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<tr>
<td>US</td>
<td>672</td>
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<tr>
<td>France</td>
<td>414</td>
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<td>UK</td>
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<td>Italy</td>
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<td>Austria</td>
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<td>Canada</td>
<td>111</td>
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<td>Belgium</td>
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<td>Sweden</td>
<td>85</td>
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Source: Swiss National Science Foundation
Inside the experimental hall of the Swiss Light Source (SLS) at the Paul Scherrer Institute. The synchrotron is free for use by scientists from anywhere in world.

SINQ neutron source and the SPS muon source. "Switzerland has a tradition of very good vocational training programmes," says van der Veen, "the engineering, logistics and infrastructure people here are excellent, so the capability to build these facilities is right here." PSI's facilities all have an 'open access' policy, under which synchrotron beamtime is provided at no cost to scientists from anywhere in the world whose projects are approved by an international review committee. Around 10% of the beamtime capacity at the SLS is sold to industry, mainly pharmaceutical companies based in nearby Basel, including Roche and Novartis, who use the facility to assess the effects of drugs on their biological targets.

Large-scale facilities require significant investment, but not all collaborative efforts need be expensive. Martin Gander, a mathematician at the University of Geneva, points to a particularly productive interaction between his group and that of Yao-Lin Jiang, a mathematician at Xi'an Jiaotong University in China. The relationship started when Gander taught a course at the university. Soon after, an exchange student and a post-doc came to Geneva, and another post-doc followed, funded through the Swiss Excellence Scholarships for Foreign Scholars and Artists, a federal government scheme that awards one-year doctoral or postdoctoral fellowships to researchers from any discipline and any country to study in Switzerland. "It has a tremendous impact for not much money," says Gander of the programme.

In mathematics, says Gander, the real momentum for establishing collaborations comes not from the desire to generate big projects or obtain big grants, but to exchange new and complementary knowledge. For others of course – such as large-scale particle physics projects, or materials research, exchanges come from the need to share expertise and facilities. "Collaboration is becoming more important because the problems are becoming more complex," says Jean-Marc Triscone, also at the University of Geneva. But whether it's small exchanges or large-scale collaborations, Switzerland knows the benefits. Building on decades of experience in attracting researchers and industry, the country is now reaping the rewards of exchanging knowledge, technology and international experience.

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Application deadline: June 30, 2013.

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**Professor of Circuits and Systems Neuroinformatics**

The Department of Information Technology and Electrical Engineering (www.ee.ethz.ch) at ETH Zurich and the Faculty of Science (www.mnf.uzh.ch) of the University of Zurich invite applications for the above-mentioned position in the Institute of Neuroinformatics (INI) to complement and extend its vigorous research activities.

The research of the candidate should be directed towards the theory and practice of computation in neural systems and behavior, with a strong interest in theory driven experimental neuroscience and information processing by neural circuits. The successful candidate will combine cutting-edge theories and experiments in neural information processing and computation to explore the causal links between neuronal circuits and behavior in animals. An ability to develop requisite neurotechnologies will be an asset. The successful candidate will contribute to a highly collaborative multidisciplinary environment. We encourage internationally recognized candidates with strong research records to apply. We seek to fill a full professorship position, but tenure track appointments will be considered as well. The new professor will be expected to teach undergraduate level courses (German or English) and graduate level courses (English).

The INI is a joint institute of the Faculty of Science of the University of Zurich and the Department of Information Technology and Electrical Engineering of ETH Zurich. The INI fosters research at the interface between neuroscience, computing and engineering through its research, teaching and graduate training, and specialist international workshop programs. Its members conduct a coordinated research program by means of multidisciplinary teams composed of about 70 biologists, physicists, psychologists, engineers and computer scientists. Through many levels of experiment and theory INI scientists explore how the circuits of the brain process information to generate intelligent behavior. They exploit new developments in silicon technology and computers as a means of developing models and hardware implementations of information processing and storage in the brain. In order to strengthen interdisciplinary research, the new professor should have a strong overlap with existing interests in the INI, and also forge links with other institutes of the University of Zurich and the ETH Zurich (for example: Biology, Brain Research, Pharmacology, Computer Science, Information Technology and Electrical Engineering, Mathematics, and Physics).

Applications should include a curriculum vitae, a list of publications and statements of future research and teaching activities.

The letter of application should be addressed to the President of ETH Zurich, Prof. Dr. Ralph Eichler. The closing date for applications is 15 June 2013. ETH Zurich is an equal opportunity and affirmative action employer. In order to increase the number of women in leading academic positions, we specifically encourage women to apply. ETH Zurich is further responsive to the needs of dual career couples and qualifies as a family friendly employer. Please apply online at www.facultyaffairs.ethz.ch.

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Requirements: Applicants are expected to have a degree in veterinary medicine, medicine, biology or another closely related field in the life sciences and, in addition, a PhD or habilitation or equivalent. Applicants should demonstrate a strong and promising research program in pharmacology (preferably in molecular pharmacology) and a proven record in successful acquisition of extramural funding.

Experience in teaching undergraduate and graduate students is required; teaching will be coordinated with the Professor in Toxicology and the Division of Veterinary Pharmacology and Toxicology of the Vetsuisse Faculty University of Berne. Prior mentoring of graduate students is desirable. The successful candidate is expected to contribute to the service work offered by the Institute of Pharmacology and Toxicology.

More detailed information can be obtained from the Dean’s office of the Vetsuisse Faculty University of Zurich.

Ideally, applicants should be fluent in English and German, although knowledge in German can also be acquired within a reasonable time period.

Younger applicants are particularly encouraged to apply. The University of Zurich strives to increase the percentage of women in leading positions and therefore strongly encourages qualified female researchers to apply.

Application process: Applicants are kindly invited to respond no later than May 30, 2013, by sending the following information as a complete package in English: cover letter outlining concepts for research, teaching and service work, curriculum vitae incl. structured list of publications and extramural funding; copies of relevant examinations.

Please supply a hardcopy and one comprehensive PDF-file on CD-ROM or USB key (please, no online applications) to: University of Zurich, Vetsuisse Faculty, Dean’s Office, Ms. Silvia Kaufmann, Winterthurerstrasse 204, CH-8057 Zürich, Switzerland e-mail: dekanat@vetadm.uzh.ch
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We wish all of you good luck in your future research endeavours.

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