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Swiss Science Diplomacy: Harnessing the Inventiveness and Excellence of the Private and Public Sectors

Flavia Schlegel

IN 1958, Switzerland sent its first science attaché, Urs Hochstrasser, to the United States. His main task was to observe and report back to Bern on the development and potential use of nuclear technology by the United States. Over the past fifty-five years, the Swiss federal government has added eighteen science counselors and six swissnex (a public-private partnership to promote cooperation in science, technology, and innovation) and thus created an extensive Swiss science diplomacy network. If, back in 1958, traditional diplomacy was defined by politics, trade, and economics, today new topics such as art, science, technology, and innovation now belong to the diplomatic toolbox. "Soft power," "public diplomacy," and "citizen diplomacy" have become common terms. Geopolitical shifts, changes in economic power, and a revolution in communication tools have made the world a far different place than the one in which Hochstrasser lived.

Switzerland's well-known neutrality and diverse range of high quality goods and services make the country a credible partner, be it as a host of international organizations in Geneva or as a mediator for situations involving complex governance challenges. Many of these challenges are science-related. Science can serve as an efficient tool for dialogue in times of relative distance or disagreement, and it can also offer platforms for new forms of interaction and resolution over topics that are too politically sensitive to talk about.

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The main theme of the 2014 World Economic Forum in Davos, “The Reshaping of the World: Consequences for Society, Politics and Business,” reflects the contemporary globalized and interdependent world, which is underpinned by rapidly evolving technologies, the consequences of globalization, and appropriate means of governance and coordination of transnational efforts to reduce negative consequences. Any major issue—be it energy consumption, climate change, health, or poverty reduction—is both a national and a global affair and is related to science in some ways. And science, if perceived as a global public good and not as a national treasure, plays an important role in defining common action in regard to the Sustainable Development Goals.¹ Science is both a crosscutting parameter for successful achievement of these goals and a potential beneficiary. Additionally the terms and characteristics of North-to-South cooperation have changed dramatically, and the North sees growing scientific and economic competition from South-to-South alliances, particularly driven by the emerging economies of China, India, and Brazil.

Swiss science diplomacy, jointly led by the State Secretariat for Education, Research and Innovation and the Federal Department of Foreign Affairs, is therefore arguably more important than ever in supporting Switzerland’s economic and technological leadership. Swiss bilateral activities in the United States and China serve as examples of its approach.

Swiss Science Enterprise, an Internationalized Affair

Switzerland’s success as a world leader in economic competitiveness and innovation capacity is the result of an advanced and knowledge-based economy and close proximity between academic (fundamental) research and private-sector research and development (R&D). Though blessed with beautiful mountains, lush meadows, and crystalline lakes, Switzerland has no other natural resources to speak of. Therefore, the country’s wellbeing depends mainly on its brainpower, which is a very internationalized power indeed. Being a small country of eight million people (roughly the population of New York City), Switzerland nurtures very close ties with first-class networks of knowledge around the world, with a particular focus on emerging economies.

Switzerland, together with Finland, produces the highest number of scientific papers per one thousand inhabitants (3.2); its citation index ranks second just behind the United States (116), and 70 percent of Swiss institutions and researchers participate in international networks. At Swiss universities, about 45 percent of professors and 30 percent of students as well as more than 50 percent of PhD students come from abroad.²

Swiss policies in general are characterized by stability and continuity. The country’s main objectives for science are to ensure participation of Swiss institutions and researchers in global networks of excellence and international funding schemes.³ Swiss science profits from high and constant public investment for

competitive, peer-reviewed fundamental research mainly at tier-one universities, and the strong role of the private sector (and universities of applied sciences), which covers around 70 percent of R&D expenditures (in total about 2.9 percent of Swiss GDP). This closely knit web of basic and applied research and development is financed by the public (Swiss National Science Foundation, Commission for Technology and Innovation) and the private sector, either separately or jointly.

Looking ahead, Switzerland has to remain at the top and anticipate new emerging sectors where the country has a comparative advantage. The high dependency on private-sector research, high salaries, and a strong Swiss franc (mainly against the euro; payments from the European Union to Switzerland, including EUR 1.8 billion for the Framework Programme 7, are in euros) also put some pressure on the system. Another current issue is Switzerland's relationship with the EU.

Switzerland is firmly situated in the European Research Area. Hosting major international projects and infrastructures such as the Human Brain Project at EPFL (École Polytechnique Fédérale de Lausanne) or CERN, as the European Organization for Nuclear Research is known, in Geneva, its strong international role is widely recognized. As an associate state since 2004, Switzerland has so far fully participated in the European Framework Programmes and their funding mechanisms, though this relationship is at risk with regard to Horizon 2020, the current framework program, and other initiatives of academic cooperation.⁴

Swiss Government Commitment to International Science, Science for Development, and Science Diplomacy

The Swiss government is active in science, policies, and diplomacy through the internationalization of almost all technical departments, its support for developing and emerging countries, and a formal science diplomacy network.⁵

Based on the assumption that we live in a globalized and interdependent world, and that all major domestic issues are of a transnational nature and are related to science in some way, all technical departments within the Swiss government have their own scientifically trained and internationally active staff. They perform or outsource their own research and participate in international bilateral or multilateral negotiations and networks pertinent to their specific domains, such as health, energy, water management, and other topics.

In addition, Switzerland is strongly committed to North–South research cooperation for development. As the main governmental actor, the Swiss Agency for Development and Cooperation aims at empowerment, local capacity building, and solution-oriented research projects. Together with the Swiss National Science Foundation it finances the Swiss Programme for Research on Global Issues for Development,⁶ only one example of a long-term initiative in this domain. The Swiss Commission for Research Partnerships with Developing Countries is looking into fair and equal partnership arrangements for such research initiatives and provides

advice to funding agencies, policy makers, and development organizations (e.g., “A Guide for Transboundary Research Partnership”⁷). These specific programs relate primarily to the Swiss development agenda and aim to achieve humanitarian goals through excellent research and promotion of education, research, and innovation as integral parts of the global development agenda.

Finally, Switzerland maintains a science diplomacy network for bilateral science, technology, and innovation cooperation in twenty-five locations in nineteen countries. Switzerland has formal representation in the areas of education, research, and innovation, comprising nineteen science counselors working in capitals of hosting countries and six swissnex consular annexes located in global science and innovation hot spots. Each science counselor or swissnex is affiliated with a Swiss embassy or consulate. Within the diplomatic representation they cooperate with trade offices (Switzerland Global Enterprise), Pro Helvetia (the Swiss Arts Council), and other in-country partners.

Swiss Science Diplomacy Network

All activities of the Swiss science diplomacy network are based on specific policy goals, set by the Swiss government for a four-year legislative period. For the current period, from 2013 to 2016, the policy goals are documented in the “Education, Research and Innovation policy guidelines and objectives.”⁸ These objectives are reflected in a four-year service agreement and annual plans of specific activities for each location.

The mandate for the network can be summarized as follows:

- to promote Switzerland as an excellent partner for cooperation in science, technology, and innovation;
- to connect academia, government, private sector, and civil society and to create and maintain an extensive network at home and in the host country;
- to facilitate academic programs, global innovation strategies, and knowledge exchange;
- to support internationalization efforts of Swiss academic institutions, and R&D-based spin-offs and start-ups;
- to inform on developments in science, technology, education, and innovation policies;
- to build trust, confidence, and relations—bottom-up and top-down at the same time; and
- to create an open-minded, innovative space for critical thinking and collaborative networking.

This mandate reflects considerations of scientific, economic, and political natures. All activities should lead toward a growing pool of well-trained scientists

and managers of science, technology, and innovation who feel familiar with the Swiss culture and working environment as well as that of the host country.

The twenty-five locations in nineteen countries of the network were chosen for their political, economic, and scientific importance to Switzerland. Traditionally, there is a strong focus on Europe, as the home base of Switzerland's science enterprise, and on the United States, where there are numerous well established and successful bilateral cooperation initiatives. Over the past decade, Switzerland has systematically broadened its scope and began to include Brazil, China, India, and other emerging and future markets with huge economic and scientific potential. For Asia and the BRIC economies (Brazil, Russia, India, and China) in general, the exciting challenge lies in opening doors to emerging markets and in anticipating future research and innovation hot spots for Swiss universities and R&D-driven small- and medium-sized enterprises.

At the same time, these countries might become more and more independent from traditional North-to-South activities, because they are increasingly active in a growing number of South-to-South cooperation initiatives. Cooperation allows Switzerland to benefit from these new opportunities as well.

The science counselors are usually career diplomats, fully integrated in the embassy. The science section, which they lead, has one or two staff members. About a third of the science counselors work full time. The role of the science counselor is to anticipate and analyze policy developments related to science, technology, and innovation and to search for opportunities for cooperation.

On the other hand, swissnex functions like a small consular enterprise. Its CEOs (in 2013, the title changed from director to CEO to underline swissnex's entrepreneurial spirit), experts in many aspects of science or science management, have diplomatic status, but they are not career diplomats. A typical swissnex will have ten to fifteen part- or full-time staff members, interns, and representatives of partner organizations, for which swissnex provides space for short- or long-term engagements.

As a public-private partnership, according to a four-year service agreement, swissnex gets funding from the Swiss government for essential infrastructure and staff. Partners, donors, and sponsors provide vital financial support for any of the activities. Third-party funding should cover two-thirds of the project budget. The same rules apply to science counselors for their own projects.

The significance of a public-private partnership to the running of a swissnex is justified by the fact that the interests and considerations of Swiss industry play a major role in defining the location and the project portfolio of a swissnex. This reflects once again the close cooperation between Swiss science and the private sector at home.

For swissnex, which is always annexed to a Swiss consulate, location has never meant a capital but always a region that is cross-pollinating excellent research, entrepreneurship, and innovation capacity. The creation of the U.S. swissnex

(Boston, 2000; San Francisco, 2003) and the Singapore swissnex (2004) were based on the initiatives of entrepreneurial individuals who seized the opportunity to build an innovative platform; China (Shanghai, 2008), India (Bangalore, 2011), and now Brazil (Rio de Janeiro, 2013), followed as a result of a formal political process led by the State Secretariat of Education, Research and Innovation in consultation with the Rector's Conference of Swiss Universities.

The science diplomacy network is run by the State Secretariat for Education, Research and Innovation (within the Federal Department of Economic Affairs, Education and Research). The secretariat is responsible for strategy, objectives, and funding, together with the Federal Department of Foreign Affairs, as well as integration of the network in Swiss embassies and consulates in the host country. Together they form a complex but usually well cooperating system. The “two bosses” approach leaves some uncertainties, as one might expect, but at the same time it allows leeway for unorthodox and creative working methods.

The two components of the network require the integration of a public-private entity, swissnex, that promotes entrepreneurial ventures into a diplomatic mission. A swissnex functions like a small public enterprise on diplomatic ground, which according to the Vienna Convention is not intended for any commercial activity. This situation demands quite a bit of flexibility, as well as political tact and instinct, from all partners involved. The science diplomacy network cannot take this type of flexibility for granted by the traditional diplomatic service, but, instead, it has to earn it through trustworthiness and the high quality of the activities of swissnex and science counselors.

In consequence, both science counselors and swissnex representatives wear two hats—one as a diplomat, formally representing Switzerland, and one as a science promoter and broker, defending the interests of the Swiss science enterprise. They should feel comfortable with these two hats and deploy them creatively and efficiently.

Difference in the Roles and Tasks of the Washington-Based Science Counselor and the Shanghai-Based swissnex

Science Counselor in Washington, DC, 2002–2004

The Swiss embassy in the United States represents almost all departments of the Swiss government because of very diverse and complex relations between Switzerland and the United States, and it has hosted a science counselor since 1958. The science section focuses on understanding the latest U.S. science policy developments and building relationships with U.S. organizations that are active in science policy and international cooperation, such as the American Association for the Advancement of Science (publisher of *Science & Diplomacy*), the National Academy of Sciences, the National Science Foundation, science counselors of other countries, and staff of members of the House and the Senate. It is mainly a

network of politics and policies. Academic contacts usually are limited to the local universities and research institutions.

From 2002 to 2004, reflecting the immediate aftermath of 9/11 and the anthrax events, the science policy issues of concern included challenges to scientific freedom and scientific mobility. Another topic at the time—while less controversial, equally important for the future of the United States as a global science leader—was the growing research capacity of emerging economies such as Brazil, China, and India. The science counselor had to explain why and how these politics offered challenges and chances: whether mobility of Swiss scientists was going to be limited as well (no); whether Switzerland should invest in scientific cooperation with BRIC countries (yes).

While the science section at the embassy concentrated on national politics and policies, both swissnex San Francisco and Boston covered the local academic and economic hot spots and neighboring areas with their activities to promote and facilitate U.S.-Swiss cooperation with a particular focus on innovation and start-ups. At the time, the science section and the swissnex hubs were only loosely connected to each other. They informed each other about their activities and coordinated efforts whenever necessary (such as preparing for the visit of an official delegation or co-organizing large projects), but there was no formalized process of cooperation in place.

For both the science section and the swissnex hubs in the United States, the primary support for Swiss stakeholders at home was anticipating and creating opportunities to cooperate with American partners. The Swiss universities and companies were already familiar with the United States, its science, and its competitive working culture, and there was less of a need to explain how to cooperate than where and with whom. This was a completely different situation in China in 2008, when a new swissnex was opened in Shanghai.

swissnex China in Shanghai, 2008–2012

Switzerland has historically had very friendly ties with China, based on being one of the first nations to officially recognize the People's Republic of China in 1950. This dialogue has continued ever since and has created a certain measure of trust and reliability. As Switzerland sought to dramatically strengthen its science relations with China, it started its China program in 2008 on three levels: Switzerland posted a science counselor at its embassy in Beijing; it launched the first call for abstracts under a new bilateral research program, the Sino-Swiss Science and Technology Cooperation Programme (SSSTC), financed jointly by the Swiss and Chinese governments; and swissnex China, a platform for Sino-Swiss cooperation in science, technology, and innovation, was established in Shanghai.

This was 2008, at the peak of the global economic crisis. China had risen as a new global power, but it was still mostly uncharted territory for many Swiss academic institutions and future partners of swissnex China, which was to open

the doors to this emerging market and future research and innovation area for Swiss academia and R&D-driven small companies. Moreover, the newly created swissnex had to establish itself in competition with the initiatives of other countries—France, Germany, the United Kingdom, and the United States, among others—that had far more resources at hand.

While the Chinese science and research “hardware” seemed familiar, having been built closely after the U.S. model, the human- and process-oriented “software” and the overall culture were totally different. The Chinese working environment could not be compared with that of the EU or the United States, and it had its own set of rules. The Chinese scientific enterprise was to a large extent a very national affair, managed in a predominantly top-down style, and was short-term oriented in its outlook. The Chinese government was (and still is) trying to foster initiative and creativity among students and to implement independent evaluation and quality control. In addition, many efforts were made to improve protection of intellectual property rights.

A major effort of swissnex was promoting Switzerland as an excellent partner for scientific cooperation. Among Chinese people—and this is true not only for the layman but also for the university professor—the Swiss image of sweet chocolate and pristine, snowcapped mountains still prevails. Heidi and Roger Federer are both more famous in China than Swiss innovation capacity and economic competitiveness, which leads in many international scoreboards and rankings. In this regard, the World Expo 2010 in Shanghai was a unique chance to promote the excellence of Swiss science, technology, and innovation and to prove the quality of swissnex services to Swiss and Chinese partners. The Swiss Pavilion offered a perfect stage for diverse activities ranging from inflating an oversized red plastic house⁹ (the result of a Sino-Swiss artistic cooperation), to a high-level scientific conference on “Future Cities,”¹⁰ which was backed by both Swiss and Chinese ministries of science.

Cultural and art events have the great potential to improve knowledge of science and technology and to create mutual understanding. This was also true for a Swiss exhibition about Albert Einstein’s life and achievements¹¹ that traveled through China, visiting Beijing, Guangzhou, Hong Kong, and Wuhan. Einstein, who is hugely admired by Chinese people, was an ideal character to connect with local academics, business professionals, experts, and members of the general public. The exhibit also allowed for the debate of rather sensitive political topics such as humanism, equality of opportunity, fostering creativity, and independence of thought during the question-and-answer session after a Swiss Nobel laureate’s presentation and during a local radio talk show. Cultural activities can help bridge the gap between very different cultures, while keeping strong separate identities—in this case, a Swiss identity.

In promoting Swiss partnerships, swissnex took advantage of events such as the World Expo and the Einstein exhibition and the existence of SSSTC and other

mechanisms. However, swissnex was not usually involved in formal political activities. It was the domain of the science counselor to focus on the political activities, coordinating negotiations with the Chinese Ministry of Science and Technology, nurturing contacts with the central government, and providing analysis of Chinese politics. This distribution of tasks allowed the embassy science section and swissnex to efficiently combine bottom-up and top-down efforts and to develop both the political and academic networks. The relationship between the embassy and swissnex was a much closer and more tightly coordinated effort than was the case in the United States ten years earlier.

“Promote, connect, facilitate” was the slogan of swissnex China, and, in addition, swissnex provided an important analytical service. As China had become an important market and started to draw everybody’s attention, mainly because of its role during the financial crisis of 2008, Swiss stakeholders in science, technology, and innovation had to ask themselves whether to invest there or not. Each answer, yes or no, had to be based on better knowledge about the opportunities and risks of cooperation with China. This demand continues to create a constantly growing number of inquiries for an organization of science brokers and matchmakers such as swissnex China. Together with Swiss trade offices, swissnex provides answers to all types of questions ranging from fundamental research cooperation to market opportunities for young, science-driven start-ups.

One Model for Small Countries with Advanced Economies

Being a small country, Switzerland invests a lot in the internationalization of its science, technology, and innovation networks in order to stay connected and remain competitive with the best players and infrastructures worldwide. Defending the best international rankings for innovation capacity and economic competitiveness calls for close cooperation between academic research and private-sector R&D domestically. This requires stable politics with little uncertainty for companies and markets, high private-sector investment for R&D, and, at the same time, generous and continuous public funding for fundamental research without any political strings attached.

Science, innovation, and economic growth form a continuum, interdependent with each other and mutually supportive of each other. Switzerland therefore must remain alert and anticipate the importance of emerging technologies and new markets. The Swiss government has to consider and coordinate politics of interior, foreign, economic, and scientific natures to define the goals for the science diplomacy network. As resources are limited, priorities must be set among health, energy, food safety, and other competing issues. Topics of common concern have to be negotiated with the host country to create win-win situations and higher potential for successful cooperation such as SSSTC. Swiss stakeholders need to find synergies among their own economic, political, and scientific interests at

home and match them with the demand of potential partners in host countries in a manner that can compete with opportunities from other countries that have more resources at hand.

In that science diplomacy by definition consists partly of science and partly of diplomacy, recognition of and familiarity with science diplomacy should be fostered among diplomats and scientists who are interested, willing, and talented. Science diplomacy should grow within the Federal Department of Foreign Affairs as a main pillar of diplomatic activities. Science issues should be framed for diplomats in such a way that they can easily pick them up and include them in their daily work. Interaction between the science community (members who have an interest in and an understanding for diplomats) and career diplomats will help the scientists realize that diplomacy can serve their research purposes and vice versa. The position does not currently exist in Switzerland, but a “science and diplomacy advisor” could facilitate these types of activities.

The Swiss science diplomacy network today reflects in its spirit and activities the openness, inventiveness, and excellence of its science and innovation home base. It must enjoy as much freedom as possible for any type of unusual event or partnership and should not be limited to traditional political and diplomatic formats.

Looking ahead, Switzerland should continue and possibly intensify its engagement with networks of other countries in a bilateral or multilateral manner to further contribute to the governance of science- and technology-related issues of global importance or even help initiate a cross-sector global forum for governance of science.

The Swiss approach to science diplomacy might be considered a model for other small countries with similarly advanced and innovation-driven economies, given the prerequisites, principles, and good or potentially risky practices described above when engaging in science diplomacy. As Heinrich Rohrer, the recipient of the 1986 Nobel Prize in Physics and one of the fathers of nanotechnology, said during a presentation in China in 2010, “Novelty is what others thought to be impossible, did not dare to do, could not do, did not think of, found uninteresting. Never let you [*sic*] get discouraged.” **SD**

Endnotes

1. “Sustainable Development Knowledge Platform,” United Nations, accessed March 11, 2014, <http://sustainabledevelopment.un.org/index.html>.
2. *Bibliometrische Untersuchung zur Forschung in der Schweiz 1981-2009* (Bern: Swiss State Secretariat for Education, Research and Innovation, 2011), <http://www.sbf.admin.ch/dokumentation/00335/01740>.
3. “Promotion of education, research and innovation for 2013–2016,” Swiss State Secretariat for Education, Research and Innovation, accessed March 11, 2014, <http://www.sbf.admin.ch/org/01645/index.html?lang=en>.

4. As of the writing of this article, the European Union has suspended the negotiations for Horizon 2020 and Erasmus+, a student exchange program, (among others) as a consequence of a successful February 9, 2014, Swiss referendum on unilateral limitations to free movement for citizens from EU member states to be introduced within three years. The next few months will be crucial for Switzerland's future participation in the European Research Area and science diplomacy within Europe.
5. To avoid possible confusion, it is helpful to clarify some of the terminology while admitting the risk of oversimplifying the complexity of the issues at hand. Generally speaking, all of international science cooperation aims at advancing competitive research and improving data available for and knowledge about any given topic, usually without any political strings attached. Science diplomacy, on the other hand, is explicitly based on specific political goals to improve relations between countries for or through scientific cooperation. Most helpful is the definition set by the Royal Academy and the American Association for the Advancement of Science in 2010, which differentiates among science in diplomacy, science for diplomacy, and diplomacy for science. *New Frontiers in Science Diplomacy* (London: Royal Society and the American Association for the Advancement of Science, 2010), <http://royalsociety.org/policy/publications/2010/new-frontiers-science-diplomacy>.
6. The Swiss Agency for Development and Cooperation contributes SF 72 million and the Swiss National Science Foundation contributes SF 25.6 million to the total budget of SF 97.6 million (around US\$111 million) for the period from 2012 to 2022.
7. "KFPE's New Guide for Transboundary Research Partnerships," KFPE—Commission for Research Partnerships with Developing Countries, <http://www.kfpe.ch/11-Principles>.
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The opinions and characterizations in this article are those of the author and do not necessarily represent official positions of the Swiss government. The mid- and long-term positions of Switzerland within the European Research Area are currently under negotiation and might change by the publication date.