

Innovation happens between disciplines, technologies and stakeholders

Biotechnology is an interdisciplinary field and will become even more so based on high-value innovation networks that enable exciting industry cross-overs and technology fusion.

Many different technologies blend into biotechnology and may eventually lead to the evolution of novel disciplines. Mastering these technologies requires cooperation to develop the science, and innovative suppliers are needed to support new developments.

For this to happen, there has to be lateral thinking, openness towards other industries and technologies, and the ability to quickly identify areas of mutual benefit and opportunity. This commitment to cooperation at an individual, corporate and international level sits at the very heart of biotechnology in Switzerland.

Cooperation is a vital aspect of prospering in such dynamic environments. Industry has to build on the drive to optimize internal resources and it has to further promote the development or integration of new knowledge and resources into the business. The key to achieving this is to build and support networks, both local and global.

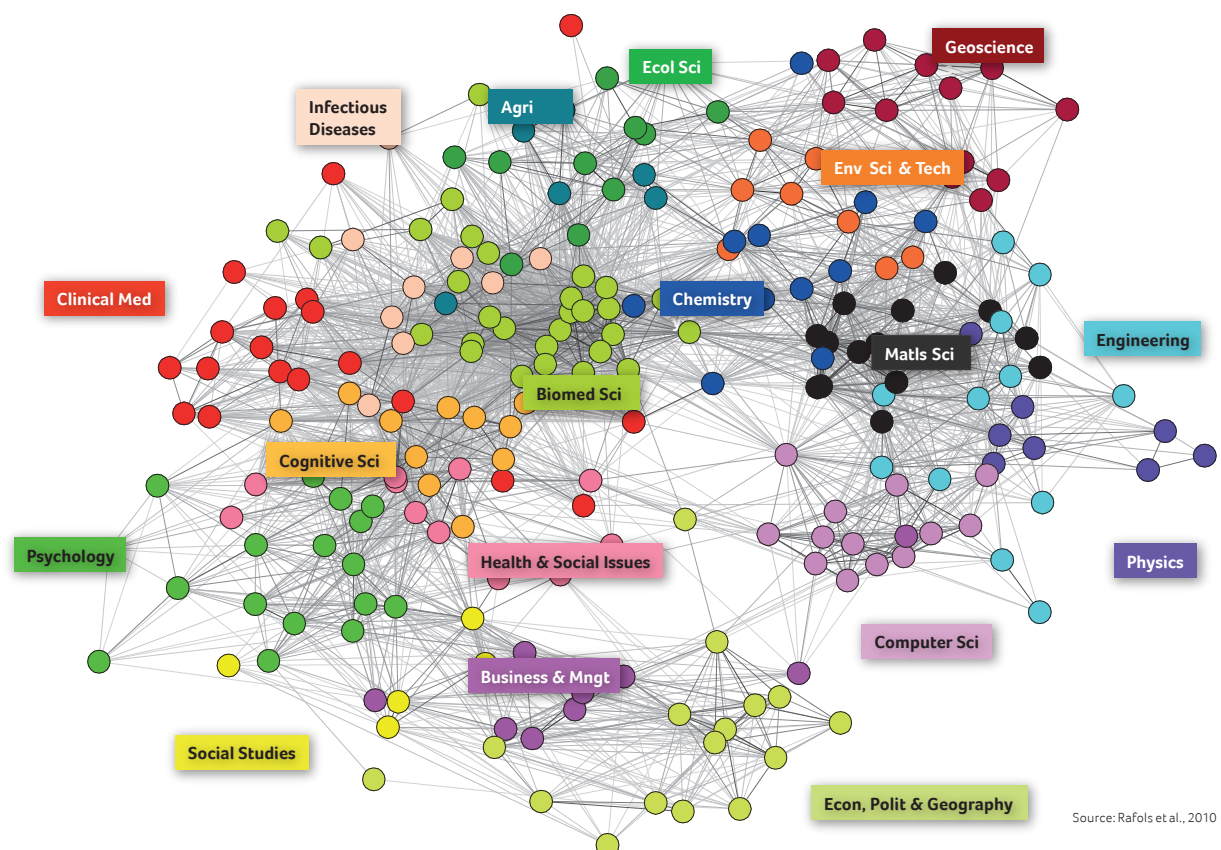
Science and technology

The life sciences industry, as the name implies, relies heavily on scientific input. And it also depends on technology. However the lines between science and technology disciplines are no longer clear cut; and in some cases they are beginning to merge and cross-over. In so doing one can begin to see a new world where the underlying principle of blending along lines of similarity occur.

A similar process can be seen at work in the assimilation and application of technologies: 'technology spill-over', 'technology integration', 'technology convergence' or 'technology fusion' are just some of the terms that describe this phenomenon. It ranges from mere adaptation of technologies to the creation of new science or technology disciplines.

From make to cooperate

We live in turbulent times caused by volatile customer needs and a landscape of international competition with rapid uptake of technical advances. The challenges are considerable. Adoption or diffusion of scientific and technological advances is a prerequisite to enabling innovation, while knowledge related to industrial know-how and practices makes it happen.



Source: Rafols et al., 2010

Global Map of Science

This global base map of science illustrates the many interdisciplinary relationships. The nodes represent web of science categories. Gray links represent degree of cognitive similarity. The darker the link, the more cognitive similarity. Colors represent similar categories.

In a complex innovation ecosystem – one which includes suppliers and customers, technology peers and sometimes even competitors along the full value chain – the categories of innovator, early adopter, lead user and sophisticated user are blurred and the need for greater cooperation is clearly demonstrated. The current pace of developments, within and between disciplines and technologies, means that no single organization is able to fully integrate all of the internationally available and required know-how and technologies, to complete the job.

High-value innovation networks

The complex value chain in life sciences requires an appropriate (hygienic) infrastructure. Key elements include high-tech lab and production equipment, high-quality raw materials, consumables and specialty chemicals. There is a need for skilled service providers who provide good practice in research (GLP and GCP) and manufacture (GMP), as well as a fundamental knowledge base in intellectual property and the regulatory environment. Being a supplier or consultant to life sciences will require in itself a highly innovative mind-set and even more challenging, the ability to operate effectively in a world where today's competitor can become tomorrow's cooperation partner.

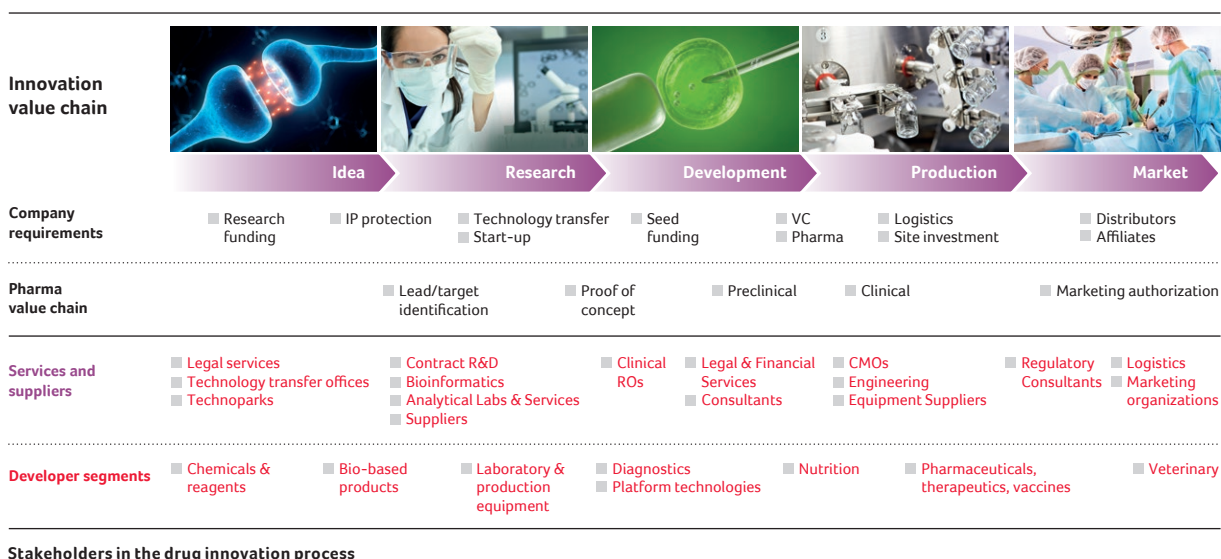
Academia start-ups tend to be the owners of state-of-the-art technologies and their business model relies on several different options: they can be vertically integrated with a large international player (brain drain); serve as 'technology broker' or they can be an external R&D partner to a variety of key play-

ers in different industries and applications (maintaining the national technology base).

In most of the key stakeholder sectors within life sciences – chemicals, mechanical engineering, informatics – Switzerland is home to excellent science and to highly innovative companies, ranging from hidden champions in the SME sector to global leaders. And because academia and these companies often serve different industry segments, innovation within one industry segment or market can spill over into other applications.

That is why it is so important that the players in the innovation ecosystem or network are not 'locked-in' their region but that they are internationally competitive and source competence on a global scale. Networks of any kind are required to manage information and knowledge flow within innovation systems or to enable working cooperation.

In this report, our network gatekeepers from academia, government and industry provide insights into the way in which biotechnology is becoming more interdisciplinary, how technologies are fusing to deliver new solutions, and how cooperation is enabling innovation. Switzerland is open for innovation and cooperation. It provides a high value innovation network that makes it possible for innovators and early adaptors to feed into the biotechnology sector, enabling real innovation now and on into the future.



Academia and industry interact to boost innovation



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The National Thematic Networks (NTN) help to form contacts and projects between companies and public research institutes. Each NTN deals with a different area of innovation which is of importance to the Swiss economy.

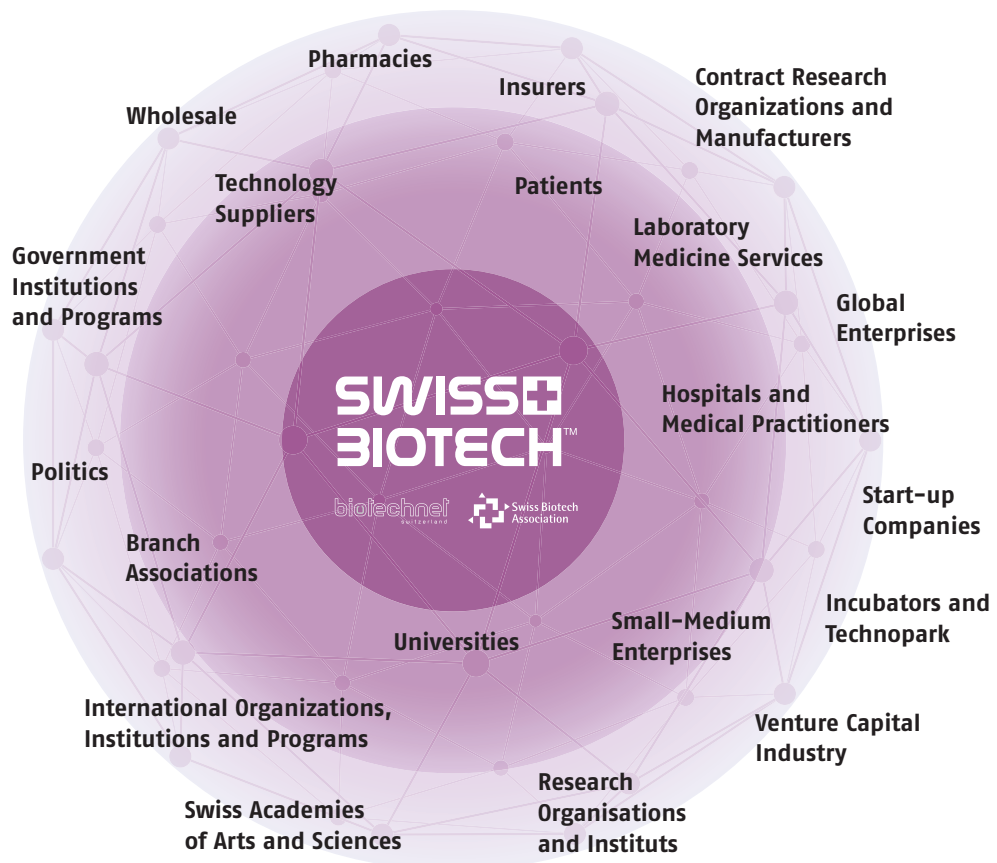
Switzerland's Commission for Technology and Innovation (CTI) recognised eight NTN: Carbon Composites Switzerland, Inartis, Innovative Surfaces, Swiss Biotech™, Swiss Food Research, Swiss Wood Innovation Network, Swissphotonics, and Logistics Network Association. These networks started up in January 2013 and are now moving into their fourth year of operation.

Many stakeholders participate in the Swiss biotech ecosystem which supports close ties between academy and industry. All over Switzerland, there are hotspots for biotechnology. The main clusters are to be found in the cantons of Geneva, Vaud, Basel and Zurich. Swiss Biotech operates as 1Cluster1Nation.

The NTN puts a number of measures in place to foster the competitiveness of companies. These include networking events such as the NTN Swiss Biotech Innovation Day and the NTN Swiss Biotech Research Day, tailored workshops and company visits. To enhance value to members, the NTN Swiss Biotech™ makes a point of concentrating knowledge and technology around defined thematic platforms.

Round up 2014–15

There were many successful projects between industry and academia that were powered by resources from the NTN Swiss Biotech™ and CTI. A selection of stories, originally featured in CHIMIA, a journal aimed primarily but not exclusively at a scientific audience, are presented below. Scientific writer, E. Heinzelmann, wrote Swiss biotech case studies on behalf of the NTN Swiss Biotech™.



The Swiss Biotech structure of relationship for the pharmaceutical-diagnostic industry and health care

Recovering valuable phosphates

Researchers from the HES-SO Valais/Wallis have demonstrated how to extract phosphate from sewage sludge on a laboratory scale, using renewable energy sources from a microbial fuel cell. The mobilized phosphate barely contains heavy metals and can be used to produce fertilizer of marketable quality. The necessary energy comes from a sewage treatment plant and causes no additional costs.

Roche invests in customized training

In response to current needs, Roche is offering its employees an intensive course in biotechnology under the auspices of biotechnet Switzerland. Lecturers from the Zurich University of Applied Sciences (ZHAW) in Wädenswil give participants the benefit of their expertise in theory and laboratory practice. One valuable spin-off is that this extra-mural course allows participants to create a permanent network.

Applied research for innovators

The Institute of Life Technologies at the HES-SO Valais/Wallis in Sion focuses on peptide and protein technologies, life and bioresource technologies, food and natural products and diagnostic systems. With this network of complementary areas of expertise, the institute can offer industrial partners a broad spectrum of integrated solutions.

In vitro models for neurotoxicity studies

Experts met at the first TEDD Workshop, held at the HES-SO Valais/Wallis in Sion, to present innovative cell models for industrial applications. It was the first time that a TEDD event had been organized in French speaking Switzerland and it offered local network partners an opportunity to showcase their research activities.

Preventing antibiotic resistance

In order to develop new approaches for effectively combating antimicrobial resistance, universities of applied sciences, teaching hospitals and biotechnet industrial partners are working together in a National Research Consortium supported by the CTI.

Capacity of coffee!

In the 1990s we began to understand that free radical damage is involved in artery-clogging atherosclerosis and health problems like vision loss, cancer or chronic diseases. Studies have shown that the damage especially affects people with a low consumption of antioxidant-rich fruits, vegetables...and coffee. Is this just a fairy tale promoted by the coffee industry? Scientists at the Zurich University of Applied Sciences (ZHAW) in Wädenswil wanted to get to the bottom of this.

Life sciences at FHNW Muttenz

The School of Life Sciences at the University of Applied Sciences and Arts Northwestern Switzerland (FHNW) in Muttenz excels in molecular technology, bioanalytics and in vitro diagnostics – three very active areas of current biotech research. Cooperation with industry partners enables knowledge to be transferred to the education process and gives companies access to qualified individuals and markets. It all adds up to an innovative network of strong partners

Simple diagnosis of bowel disease

Today, the examination of one's own stool for organic bowel disease is as simple as a pregnancy test or a glucose test for diabetes. During the CTI R&D project, sponsored within the CTI special measures to mitigate the effects of the strong franc, a simpler and more cost-effective method for collecting and analyzing stools was developed. The newly developed stool extraction tube is also a success story because the whole value chain, from research through to project development, is made up of Swiss firms and institutions.

For more information please visit:

swissbiotech.org/national_thematic_network

As of 2013 the National Thematic Network Swiss Biotech™, led by biotechnet Switzerland and the Swiss Biotech Association, aims to foster transfer activities in biotechnology.

The Swiss Biotech Association (SBA), founded in March 1998, is the national industry association of small and medium-sized enterprises active in all areas of biotechnology. It has some 235 member companies and is also a highly respected networking platform for the multinational companies active in the sector. For further information visit www.swissbiotech.org.

biotechnet Switzerland is the network of the Swiss Universities of Applied Sciences (FHNW, HES-SO, ZHAW), the research institutions CSEM, Empa and the Swiss Center for Regenerative Medicine at the University Hospital and University Zurich. biotechnet Switzerland is the one-stop shop for innovation in technology where companies, especially small and medium-sized ones, can easily access relevant specialists for their development work. For further information visit www.biotechnet.ch.