swiTTreport2015

SWISS TECHNOLOGY TRANSFER REPORT

swiTT
swiss technology transfer association

GLOSSARY

FTE	Full Time Equivalent (for the number of employees)
IP	Intellectual Property
PRO	Public Research Organisation
RI	Swiss Federal Research Institutions in the ETH domain
swiTT	Swiss Technology Transfer Association
SME	Small- and Medium-sized Enterprises (<250 employees)
Start-up	Newly established company founded or co-founded by researchers from the respective institution and which either relies on a formal license of IP or on know-how developed at the institution
TT	Technology Transfer
TTO	Technology Transfer Office(s)
UAS	Universities of Applied Sciences
Universities	Cantonal Universities and Swiss Federal Institutes of Technology

IMPRESSUM

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Cover picture: Empa

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swiTT

swiTT, the Swiss Technology Transfer Association, is the association of the professionals in Switzerland dealing with the interaction between public research and industry. swiTT currently has more than 100 members from all parts of Switzerland. Most of them work in technology transfer at public research institutions, others are employed in the private sector.

For further information about swiTT, please refer to **www.swiTT.ch.**

Among other services, swiTT operates swiTTlist, a unique portal with current technology opportunities from Swiss public research institutions available for licensing and development by industry.

To search this opportunity database please visit **www.swiTTlist.ch.**

swiTT MISSION

- COOPERATION
- DEVELOPMENT
- SERVICES
- DIALOGUE

Facilitates and strengthens COOPERATION and technology transfer between Swiss public research institutions and the private sector;

Offers professional DEVELOPMENT to its members and other practitioners involved in technology transfer within public institutions and the private sector;

Provides SERVICES of common interest to its members, their institutions and other stakeholders involved;

Maintains an active DIALOGUE with research institutions, the private sector and the authorities to foster optimal processes and regulatory framework/regulations.

SUMMARY

The annual survey "swiTTreport" is the most comprehensive analysis of the technology transfer activities of Swiss public research organisation (PRO). The report covers two main areas, a) research collaborations of the participating institutions with private or public partners, and b) the activities for the economic exploitation of research results from these institutions. The Swiss public research institutions interact very actively with partners in the economy. These activities are collectively designated in the report as "technology transfer" (TT) activities. This report is reflecting the activities in technology transfer in all technical and scientific domains. These activities are particularly important in life sciences, natural sciences and engineering sciences.

Data on technology transfer activities from seven cantonal universities and the two Federal institutes of technology (collectively Universities), from five universities of applied sciences (UAS), and three research institutions of the ETH domain (RI) were available for this years' report.

Although the evolution of the data over the years is reported here, caution should be taken when comparing these. Missing or incomplete data from some institutions introduces a bias into the year on year evolution and leads to a clear underestimation of the real situation. The respondents reported their results to swiTT voluntarily, and the data presented in the report are on an "as-reported" basis.

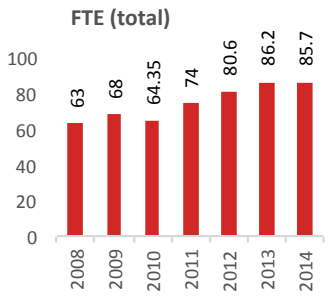
For reasons of confidentiality, the report mainly contains aggregated numbers. However, some of the key parameters are presented on an individual basis for those institutions that agreed to do so. On account of the difference in mission, organization and objectives of the three types of institutions (Universities, UAS, RI), their data are reported separately.

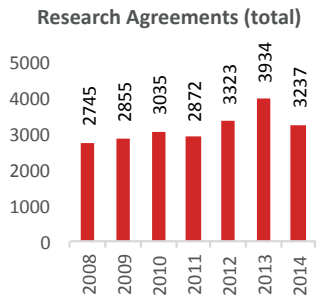
Overall, the respondents reported the following key figures on technology transfer activities in 2014:

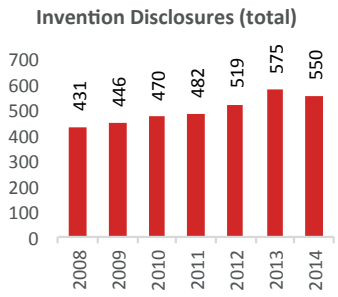
3237	New Research Projects
550	Invention Disclosures
312	Priority Patent Applications
187	License & Option Agreements
81	Start-Ups founded

Larger companies (>250 employees) and public institutions are the most common cooperation partners of the Universities and account for most of the commercialization activities with about 90% of all patent applications filed and of all licenses concluded.

The collaborative culture between academia and industry in Switzerland and the technology transfer performance of Swiss universities and other public research institutions are important location factors for industry. Easy access to academic researchers and well defined technology transfer processes are important criteria for companies to relocate their business to Switzerland. Maintaining a system which is based on fair partnership between academia and industry together with the continuous optimization of processes will be important aspects to further strengthen Switzerland's leading position in the international context.

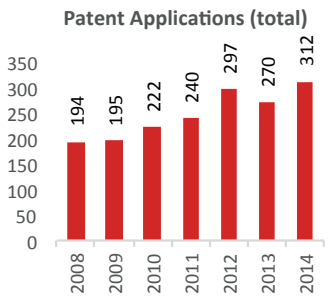


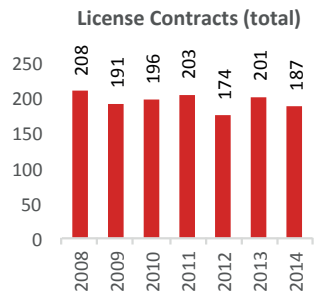


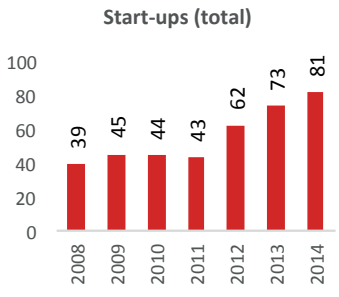


Data of the last seven years showed a solid outcome of the TT activities in Switzerland.

FTE = Full Time Equivalents







RÉSUMÉ

L'enquête annuelle "swiTTreport" est l'analyse la plus complète des activités de transfert de technologies réalisées par les institutions de recherche publiques suisses. Le rapport couvre deux domaines majeurs: les collaborations de recherche de ces institutions avec des partenaires privés ou publics et les activités liées à la commercialisation des résultats de recherche obtenus par ces institutions. Les institutions suisses coopèrent très activement avec des partenaires économiques. Le rapport désigne collectivement ces coopérations sous les termes d'activités de transfert de technologies (TT). Ce rapport reflète les activités de TT dans tous les domaines technologiques et scientifiques. Ces activités sont particulièrement importantes dans le domaine des sciences de la vie et de l'ingénierie.

Le rapport de cette année s'est appuyé sur les données relatives aux activités de transfert de technologies de sept universités cantonales et deux écoles polytechniques fédérales (Universités), de cinq universités de sciences appliquées (UAS) et de trois institutions de recherche dans le domaine des Ecoles Polytechniques Fédérales EPF (RI). Il est à noter que certaines données transmises étaient incomplètes ou partielles et que les chiffres présentés dans ce rapport sous-estiment clairement la situation réelle. Par ailleurs, les données de plusieurs institutions n'étaient pas disponibles ou étaient trop fragmentaires pour être incluses. Une comparaison entre les chiffres de l'année 2014 et les années précédentes est fournie pour la plupart des critères examinés, bien qu'une telle comparaison doit être considérée prudemment pour les raisons mentionnées ci-dessus.

Les personnes interrogées ont communiqué à swiTT leurs résultats volontairement. Ces résultats sont présentés dans ce rapport tels que rapportés. Pour des raisons de confidentialité, le rapport contient dans la plupart des cas des chiffres agrégés. Certains des paramètres clés sont toutefois présentés individuellement lorsque les institutions ont donné leur accord. Compte tenu des différences de mission, d'organisation et d'objectifs des trois types d'institutions (Universités, UAS, RI), leurs données sont présentées séparément.

Dans l'ensemble, les personnes interrogées ont communiqué les chiffres suivants sur les activités de transfert de technologies en 2014:

3237	Nouvelles collaborations de recherche
550	Déclarations d'invention
312	Demandes de brevets prioritaires
187	Contrats de licence et accords d'option
81	Création de start-ups

Les partenariats entre les grandes sociétés (>250 employés) et les institutions de recherche publiques sont les plus communs pour les Universités. Dans le cas des RI, la majorité des partenaires sont des institutions publiques.

Les Universités sont à l'origine de la plupart des activités de commercialisation rapportées (90% des demandes de brevet et des contrats de licence).

Plusieurs études internationales confirment une culture de collaboration bien implémentée entre les milieux universitaires et économiques en Suisse et l'excellente performance des institutions de recherche publiques suisses dans le domaine du transfert de technologies. Des politiques bien définies en matière de transfert de technologies et des règles bien établies pour interagir avec les groupes de recherche constituent des critères importants pour les entreprises envisageant de collaborer avec les institutions ou de s'installer en Suisse. A cet égard, le maintien d'un système fondé sur un partenariat équilibré entre les milieux universitaires et économiques, ainsi que l'optimisation continue des pratiques sont des aspects essentiels pour renforcer davantage la position de la Suisse à l'échelle internationale.

ZUSAMMENFASSUNG

Der jährlich publizierte "swiTTreport" ist die umfassendste Analyse der Aktivitäten der öffentlichen Forschungsinstitutionen (PRO) in der Schweiz in den Bereichen Zusammenarbeit mit der Wirtschaft und wirtschaftliche Umsetzung von Forschungsresultaten. Diese Aktivitäten werden häufig auch unter dem Begriff "Technologietransfer" zusammengefasst. Der Bericht zeigt, dass die schweizerischen PRO sehr aktiv und erfolgreich mit der Wirtschaft interagieren. Die in der Analyse erhobenen Daten beziehen sich vorwiegend auf die Fachbereiche Life Sciences, Naturwissenschaften und Ingenieurwissenschaften.

Der Bericht umfasst die Aktivitäten von sieben kantonalen Universitäten und der beiden ETH's (zusammengefasst unter "Universitäten"), von fünf Fachhochschulen (UAS) und von drei Forschungsinstitutionen des ETH-Bereichs (RI). Allerdings waren von einigen Institutionen nur Teildaten aus einzelnen Bereichen bzw. generell sehr fragmentarische Angaben verfügbar, so dass die effektiven Aktivitäten substanziell höher sind, als in diesem Bericht zusammengefasst. Daten einiger Institutionen waren so unvollständig, dass sie gar nicht berücksichtigt werden konnten. Dies führt dazu, dass die Daten mit jenen von früheren Jahren teilweise nur beschränkt vergleichbar sind.

Die teilnehmenden Institutionen rapportierten die Resultate an swiTT auf freiwilliger Basis und die Daten wurden wie berichtet verwendet. Aus Vertraulichkeitsgründen enthält der Bericht vorwiegend aggregierte Zahlen. Einige Kennzahlen werden auch auf individueller Basis publiziert, allerdings nur für jene Institutionen, die einer solchen Publikation zugestimmt haben. Die Daten der unterschiedlichen Arten von Institutionen (Universitäten, UAS, RI) werden im Bericht separat zusammengefasst.

Insgesamt rapportierten die teilnehmenden Institutionen die folgenden Kennzahlen über ihre Technologietransferaktivitäten im Jahr 2014:

3237	Neue Forschungsprojekte
550	Erfindungsmeldungen
312	Prioritätsanmeldungen
187	Lizenz- & Optionsvereinbarungen
81	Start-ups gegründet

Grosse Firmen und andere öffentliche Institutionen sind die häufigsten Kooperationspartner der Universitäten, während es an den RI vor allem andere öffentliche Institutionen sind.
Die Universitäten sind für die meisten Aktivitäten im Bereich der wirtschaftlichen Umsetzung von Forschungsergebnissen verantwortlich (90% der Patentanmeldungen und der der Lizenzen).
Die kooperative Kultur zwischen Industrie und Hochschulen in der Schweiz und die ausgezeichneten Transferleistungen der öffentlichen Forschungsinstitutionen sind auch ein wichtiges Kriterium für den Standortentscheid von Firmen. Die weitere Stärkung des partnerschaftlichen Verhältnisses zwischen Hochschulen und Industrie und der entsprechenden Prozesse sind wichtig, um die führende Rolle des Innovationsstandorts Schweiz auch künftig beibehalten zu können.

1. INSTITUTIONS PARTICIPATING AND DATA COLLECTION

Nine universities and the two Swiss Federal Institutes of Technology (collectively 'Universities'), eight Universities of Applied Sciences (UAS), and three research institutes (RI) in the ETH domain were contacted in spring of 2015 and asked to provide data on their technology transfer (TT) activities for the year 2014. The expression "technology transfer" used in this report covers the activities of these institutions with regard to research collaborations with partners from the economy and the commercialization of research results for the benefit of the economy and society overall.

The questionnaire was returned by nine Universities, individual departments of five UAS, and by three RI. However, the handling of research collaborations with economic partners and other technology transfer activities varies a lot among different institutions, and not all of them were able to provide comprehensive data in this field. *Thus, the data provided in this report are not complete and only summarize the figures reported, while the actual activities at the interface of academia and economy are considerably higher.* Appendix 1 on page 19 shows the institutions that participated in the survey and comments on the comprehensiveness of the data provided.

Comments on data received by the different types of institutions:

Universities
At several Universities, contracts for collaborative research projects with economic partners need only to be signed by university management above a certain amount. Therefore, not all small projects were reported by such institutions. At some Universities, technology transfer offices (TTO) only handle a small part of the collaborative research projects with economic partners; and at some Universities, centralized TTO were created only recently. Activities in research and technology transfer at university hospitals are usually closely linked to the respective University, hence the services of these transfer offices are also available to researchers at the hospitals. Data from the hospitals are included in the report, but not all are complete. With several hospitals, especially clinical research activities are not included.

UAS
The management of technology transfer activities at the UAS varies widely. Some departments or schools have professionals working in centralized TTO (e.g. BFH and ZHAW) and are able to provide comprehensive data. At other departments or schools, no centralized support functions exist and data are fragmentary or are completely lacking.

RI
The research institutions that participated in the survey have centralized support functions providing technology transfer services for the researchers although the scope of services provided differs.

The swiTTreport represents the most comprehensive study in Switzerland on technology transfer activities of academic and other public research institutions. The report mostly provides aggregate data for the three types of institutions covered in this survey. For those institutions that agreed to disclose individual data some key figures are listed on page 21.

2. INSTITUTIONAL RESOURCES FOR TECHNOLOGY TRANSFER

2.1 Services Provided

All TTO at the Universities are handling contracts for research collaborations. However, at several Universities the finalization of research agreements by the central office is not mandatory. All TTO deal with the management and commercialization of intellectual property (IP), which includes the evaluation of the economic value of research results, the protection and management of IP, and the licensing or sale of IP to industrial partners. Seven of nine TTO at Universities also provided support for the coaching of start-up projects. At a few Universities TT programs still are very small and focus on few core services.

The participating UAS and RI all offer support for research collaborations and IP management and commercialization. Coaching of start-up projects is offered by six UAS and two RI.

2.2 Staffing

Staffing refers to the number of full-time equivalents (FTE) employed for TT activities at an institution. These are people such as Licensing Officers, Intellectual Property Managers, Technology Managers or Research Contract Officers, whose main occupation is in the area of technology transfer. Their activities cover the drafting and negotiating of research and cooperation agreements, intellectual property management, licensing and other commercialization activities, and the coaching of start-up projects. TT activities must account for at least 20 % in this person's job description. The total number of FTE in technology transfer at the participating institutions was 86 as in the previous year. The largest TTO had 16 FTE. The average size of the offices that responded is 4.3 FTE.

TTO usually collaborate with external patent attorneys in the drafting and filing of patent applications. Several TTO also outsource legal issues to external attorneys. At some institutions, start-up projects are handled by dedicated organizations such as business incubators. Study agreements for sponsored clinical trials at university hospitals are dealt with by the legal departments in several institutions. Thus, the actual number of people supporting the transfer activities is larger than the number of FTE reported for the TTO.

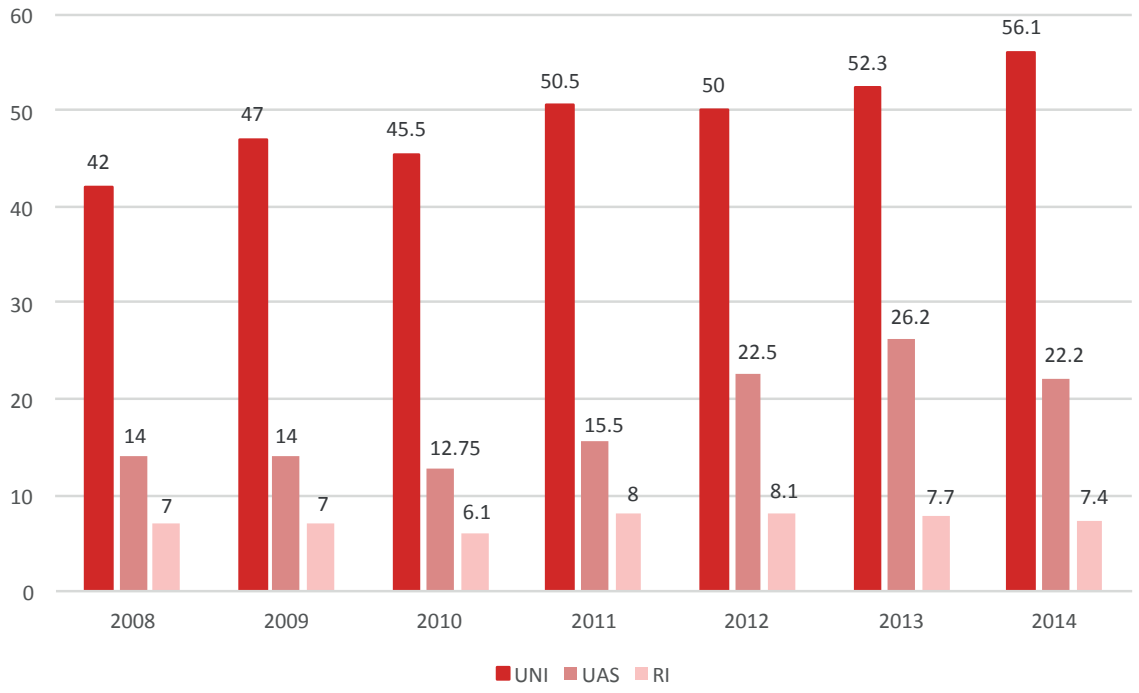


Fig.1:
Development of Staffing Level
Full Time Equivalents

3. RESEARCH COLLABORATIONS WITH PARTNERS FROM THE ECONOMY

3.1 Research Agreements Handled by the TTO

In 2014, the TTO handled contracts for a total number of 3237 research projects with economic partners. This number is lower than the number reported for the previous year (–18%). This drop could partially be explained by the uncertainty created around collaboration with the EU in the aftermath of the voting on mass immigration. However, in view of the incomplete data provided by the institutions the comparison of such figures remains difficult.

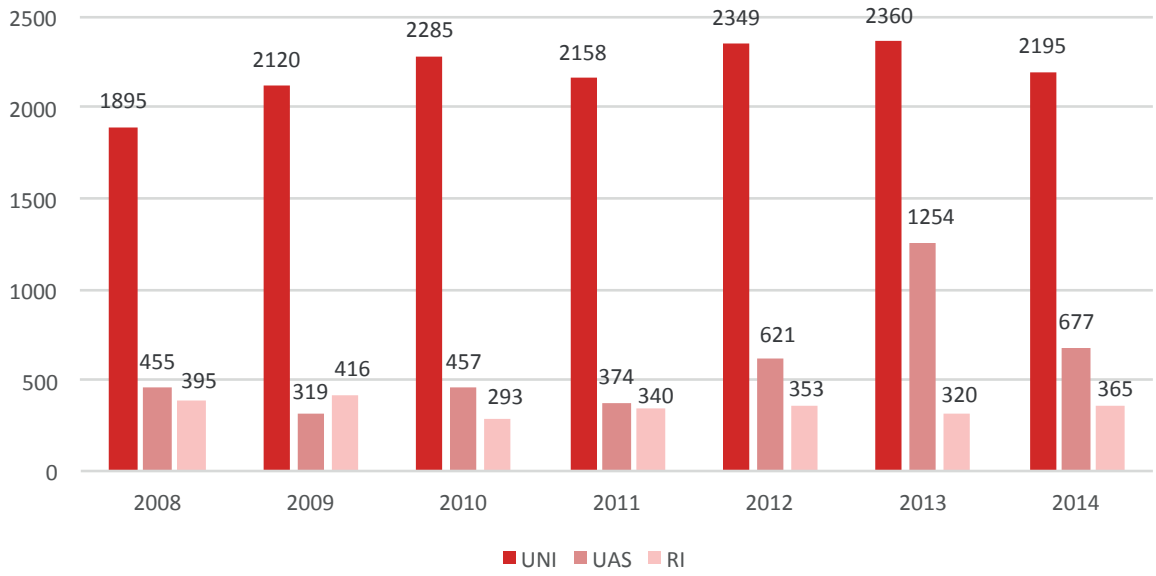
For the Universities the number of new co-operative research projects dropped slightly to 2195 (–7%). The RI reported 365 (+14%) projects and the participating UAS 677. Unfortunately only a minor percentage of data on TT activities in UAS is available for this report. Therefore, the figure cannot be compared easily with previous years. The lack of data results in a significant underestimation of the real situation. Research collaborations are key for technology transfer (TT) potentially leading to a variety of benefits to all the partners involved. They not only allow industry to access the know-how and infrastructure of academia, companies also gain access to young academic talents through such collaborations.

At the same time, the academic partners can also benefit from the know-how and infrastructure of the industrial partners. In addition, the funding of joint projects by industry and partners from the economy accounts for a significant contribution to the research budgets of a number of public research institutions. In that perspective, research collaborations are a dominant and frequent method of TT.

For the collaborative research projects handled by the TTO, survey respondents reported total cash contributions from collaboration partners in 2014 of 371 million CHF. The average cash contribution of the business partner per project is 114´000 CHF. Projects at UAS are typically rather small with average cash payments of 79'000 CHF per project. The average contribution per project at Universities was 121'000 CHF, and at RI's 141'000 CHF.

In addition to research collaborations, TTO handle other types of agreements which foster the cooperation between academia and economic partners, such as consulting agreements, material transfer agreements (MTA), and non-disclosure agreements (NDA). In 2014, the TTO of the institutions reported altogether 2654 such other types of agreements supporting technology transfer activites.

Fig. 2:
Number of Research Agreements and EU Contracts handled by TT Offices



3.2 Type of Collaboration Partners

With regard to the type of collaboration partners, the small- and medium-sized enterprises (SME), i.e. companies with fewer than 250 employees, account for 18% of total projects reported. A higher number (29%) of projects were performed with large companies, and 33% with public institutions. If one considers only collaborative projects with the private sector SME account for 38% of all industrial projects.

Both UAS and RI did not specify the type of partner or have multiple partners per project for a high percentage of the projects.

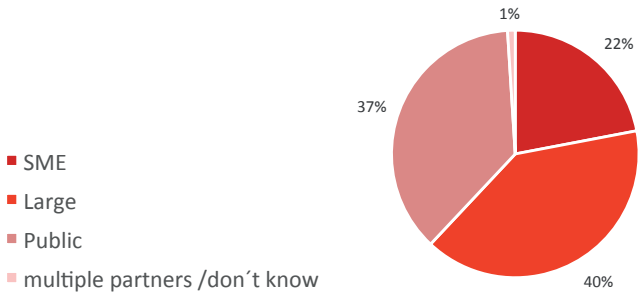


Fig. 3a:
Partners in Research Projects of Universities in 2014

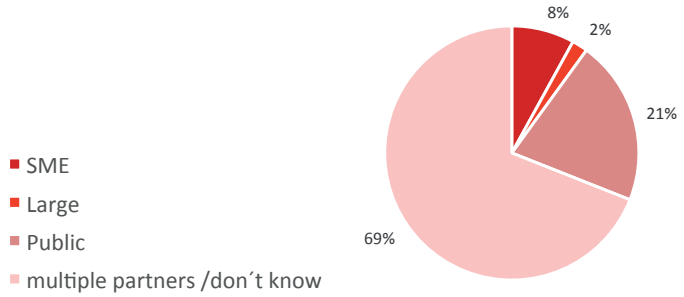


Fig. 3b:
Partners in Research Projects of UAS in 2014

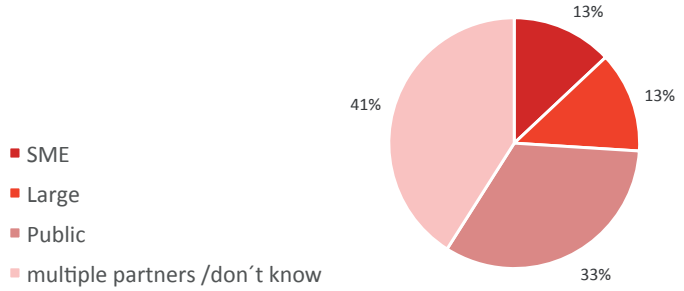


Fig. 3c:
Partners in Research Projects of RI in 2014

CASE STUDY

FEMTOPRINT

The Idea

FEMTOPRINT® technology consists in a table-top 3D printer to produce glass microsystems with nano-scale features. It applies an ultrafast low power femtosecond laser to fused silica or other transparent substrates. The laser, focused inside glass, locally modifies the refractive index of the material and increase the etching rate. The result is the possibility to create 3D optical waveguides or 3D micro-nano pattern with a maskless process.

Solution

This simple process opens interesting new opportunities for a wide range of users to create their own microsystems rapidly and without the need for expensive infrastructure. A broad variety of microsystems with feature sizes down to the nano-scale can be produced. These patterns can be used to form integrated optics components or be 'developed' by chemically etching to form 3D structures like fluidic channels and micro-mechanical components.

Worth noticing, sub-micron resolution can be achieved and sub-pattern smaller than the laser wavelength can be formed. Thanks to the low-energy required to pattern the glass, table-top femtosecond lasers not exceeding the volume of a shoe-box are sufficient to produce such micro- and nanosystems.

CASE STUDY

A SMARTPHONE APP AGAINST TICKS

Problem – Challenge

Approx. 9'700 accidents with ticks causing costs of 7.7 mio CHF are annually reported to insurers in Switzerland. Appropriate clothing and vaccination can prevent against tick bites and their consequences, however, not everyone active outdoors is vaccinated and up-to date with all relevant information how to deal with tick bites. In addition, the actual occurrence of ticks at specific location is highly variable and depends on the habitat conditions and local recent weather conditions. Providing interactive information on the actual occurrence of ticks at the individual location as wells as basic information on the removal of ticks and symptoms of tick-borne diseases are valuable online support for all outdoor lovers.

Solution

In a CTI project and with additional funding from the Swiss and Liechtenstein's Office of Public Health, researchers from the Institute of Natural Resources and Environment, ZHAW together with Andreas Garzotto GmbH developed an interactive tick-prevention-app. The central element of the app is a dynamic geographic risk mapping for tick bites based on biological, geographical and local weather. The prevalence of tick-borne diseases is not calculated, however local vaccination recommendations are given. How to remove a tick is explained and a "tick bite diary" helps to follow symptoms and gives advice if it ist necessary to consult a doctor. A&K Strategy GmbH has been founded as ZHAW spin-off. The app "Zecke" is the first product of A&K Strategy GmbH, specialised in the application of "tick knowledge".

Headpart of a castor bean tick, Ixodes ricinus (SEM, ZHAW-Phytomedizin 2014).

In case of a tick bite, consequences and explanations of the next steps. A tick bite diary to register bites, inclusive Borrelia warnings chronologically after 5, 10 and 20 days. The dynamic, tick map with risk analysis functions, a innovation of A&K Strategy GmbH.

4. COMMERCIALIZATION ACTIVITIES

Research results of Universities, UAS and RI may form the basis for innovative products which are developed and later commercialized by companies. The public institutions strive to make research results with a potential for socio-economic impact available to the private sector. Usually this is done through licensing of technologies to companies. Research results need to be identified, evaluated and where relevant protected by patents or other suitable measures. Without suitable protection of the intellectual property industrial or financial investors in many industrial sectors will not consider investing.

With regards to patentable inventions, this process involves the following main steps: identification and evaluation of research results through invention disclosures, filing of patent applications, negotiating license agreements with existing companies or newly created start-up companies. At many institutions, the creation of such start-up companies is supported by various additional services. In Sections 4.1 – 4.4, the main activities of the institutions participating in this report are described.

4.1 Invention Disclosures

A total record number of 550 invention disclosures were reported for 2014 which is substantially more than in the previous year. The vast majority of invention disclosures were reported by Universities (92.4 %). The three RI accounted for 5.8 % of the invention disclosures, the UAS for 1.8 %.

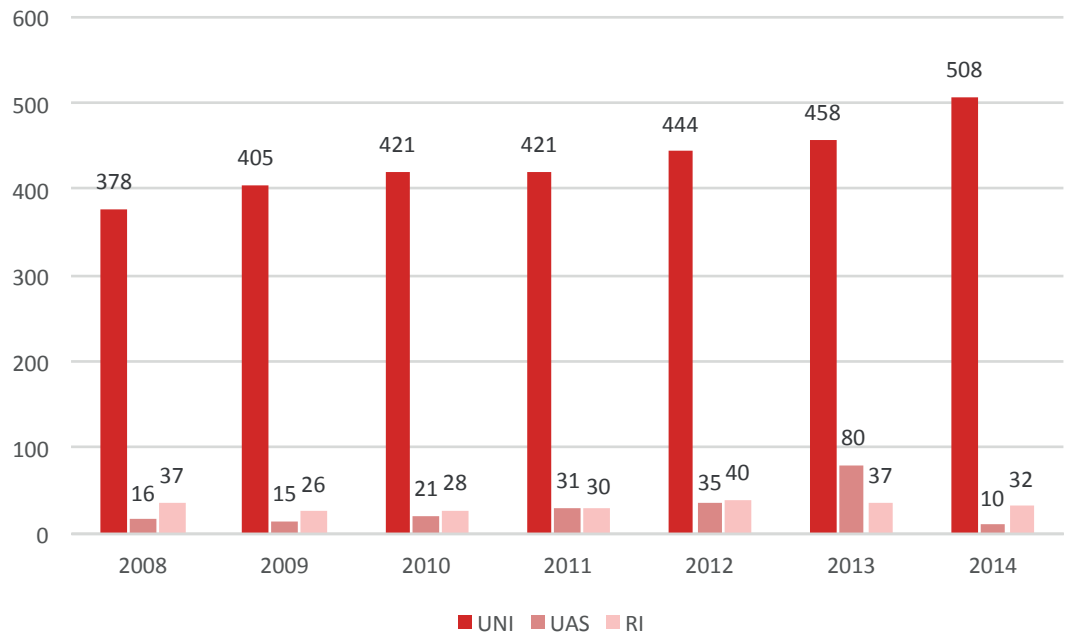


Fig. 4:
Number of Invention Disclosures

4.2 Patenting Activities

4.2.1 Priority Patent Applications

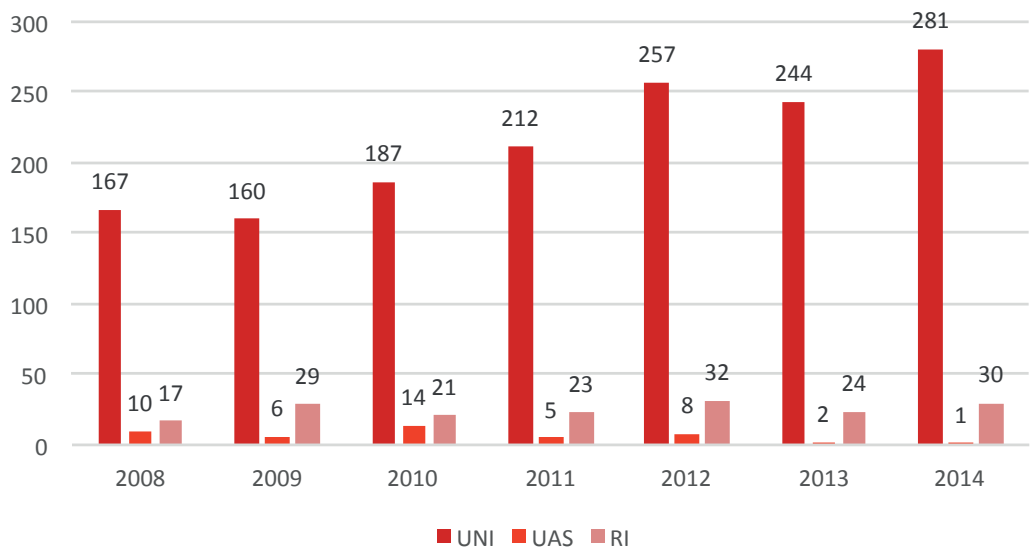
In 2014 the institutions reported 312 new priority patent applications. The majority of these applications were again filed by Universities (90.1 %), followed by the RI (9.6 %). In total 78.5 % of all patent applications were filed by the three TTO; ETH Transfer, the TTO of EPFL and Unitectra (for the Universities of Basel, Bern and Zurich).

The protection of intellectual property in the form of patents is of great importance in many industrial sectors. This is particularly true for industries with high product development costs and long product lifecycles, e.g. biotechnology and pharmaceuticals. The TTO at public research institutions must decide at an early stage about filing patent applications because patenting of an invention is no longer possible after the results have been rendered public in scientific journals or through other channels. Moreover, many companies will not consider evaluating a new technology if it is not protected by a patent. Thus, patenting activities of public research institutions can be a prerequisite for entering into a partnership with an industrial partner.

4.2.2 Patent Portfolio – Active Patent Cases

At the end of 2014, the institutions participating in the survey reported 1969 active patent cases which were either licensed to a company or for which they were searching for a licensee. Marketing of such technology opportunities is done by the research institutions through various channels. The existing contacts of researchers are often used to approach companies. To support the research institutions in this promotion and to provide a quick and easy overview of current technology opportunities for industry, the association swiTT established the national portal swiTTlist (www.swittlist.ch). Through their TTO, the Swiss public research institutions lists technologies on this searchable portal which have an economic potential and which are available for licensing and development by industry. With the help of an automatic alert system, company representatives are informed immediately each time a new technology is available in their field of interest.

Fig. 5: Number of Priority Patent Applications filed



CASE STUDY

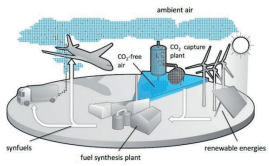
CLIMEWORKS – HOW TO FILTER CO_2 OUT OF AMBIENT AIR

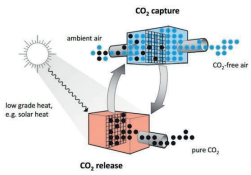
Problem – Challenge

Extracting greenhouse gases from the atmosphere and thus mitigating climate change, remains one of the most important challenges of the 21st century. Burning fuels creates mainly CO_2 and H_2O. This reaction can be reversed with available industrial technology. Synthetic fuels can be produced from CO_2, water and electricity as the only inputs. By supplying atmospheric CO_2 and renewable energies for fuel synthesis, the resulting fuel is carbon-neutral and an efficient means of storing and transporting renewable energy.
The storage of renewable energy in synthetic fuels is an alternative to storing it by means of batteries or hydrogen. The transportation sector can be supplied with carbon-neutral fuels, while the existing hydrocarbon fuel infrastructure can be maintained.

Solution

A newly developed CO_2 adsorber technology from the ETH Zurich spin-off Climeworks AG is based upon a cyclical adsorption/desorption process with a new cellulose-based filter material, which was developed at the Swiss Laboratories for Materials Science and Technology (Empa) in collaboration with Climeworks and the ETH Zurich. The new material can adsorb CO_2 from humid air, store it, and then desorb it again as highly pure gas by heating the material to approximately 90° C, such as for technical use in the production of synthetic fuels. The adsorber can be used for a large number of adsorption/desorption cycles. Meanwhile, Climeworks is running a CO_2-adsorber pilot plant on industrial scale that is capable of extracting 50 tons of the gas per year. The collaboration with Empa on the up-scaling of the cellulose-based material is on-going.





CASE STUDY

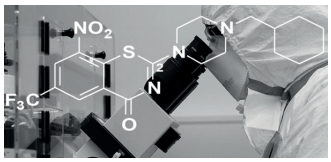
IM4TB, A FOUNDATION FOR DRUG DEVELOPMENT TO TREAT MULTIDRUG-RESISTANT TUBERCULOSIS

Multidrug-resistant Tuberculosis

In 2013, an estimated nine million people developed active tuberculosis (TB), of whom 360,000 were HIV-positive, while the disease or its co. mplications proved fatal for another 1.5 million. TB now ranks as the 8th cause of death in emerging countries. Founded in 2013 as a not-for-profit foundation, the EPFL spin-off Innovative Medicines for Tuberculosis (iM4TB) is adressing the challenge with a promising new drug. Called "PBTZ169", the molecule has been very effective in combination with the standard therapy pyrazinamide, as well as with the more recent drug, Bedaquiline (approved by the European Union and the U.S. FDA for cases of multidrug-resistant TB). PBTZ169 works by destroying the bacterium's cell wall, which shields it against the immune system of the host and antibiotics. In vivo studies show that PBTZ169 is effective and quicker than current drugs recommended by the World Health Organization.

A promising drug candidate

The EPFL and iM4TB have entered into a partnership with the company Nearmedic (Moscow, Russia) for developing and commercialising the drug in countries of the former Soviet Union, which are experiencing a resurgence of the disease that is resistant to most treatments. iM4TB has also be granted an award from the Bill & Melinda Gates Foundation that will help move PBTZ169 into human trials, initially planned to occur in collaboration with the Centre Hospitalier Universitaire Vaudois (CHUV) in Lausanne. iM4TB is chaired by the world renowned TB expert Professor Stewart Cole. He also directs EPFL's Global Health Institute. iM4TB enjoys as well advice from the HIV-discoverer and Nobel laureate Françoise Barré-Sinoussi (Institut Pasteur), as Patron of iM4TB: "I am happy to support and encourage iM4TB's work on tuberculosis drug development," she states. "I applaud their aim to stop this disease that is a major threat to persons infected with HIV and kills three people every minute worldwide."



4.3 Licensing

4.3.1 Licenses and Sales of Intellectual Property

Intellectual Property = IP

The number of reported IP agreements, usually licenses, was similar to the previous year. Overall 187 deals were reported, 89.8 % of them by Universities, 8.6 % by RI and 1.6 % by UAS. In a few cases the agreements involved a sale of the IP rather than a license. In total 75.4 % of all agreements were handled by three TTO; EPFL, ETHZ and Unitectra.

4.3.2 Type of Licensing Partners

As in previous years the majority of the licenses granted in 2014 went to SME (53 %). This is mainly due to two reasons. On one hand, SME are often more interested in and more flexible to in-licensing and developing technologies from academia. Large companies have their own R&D programs and will only in-license technologies which will complement their existing portfolio.

On the other hand, public research institutions regularly license technologies to their start-up companies. Thus, start-up companies play an important role in developing university technologies. Depending on the industry segment and on the particular product these companies will either market the final products themselves or will sublicense the technologies to larger companies that have the necessary know-how and resources to bring the product successfully to the market.

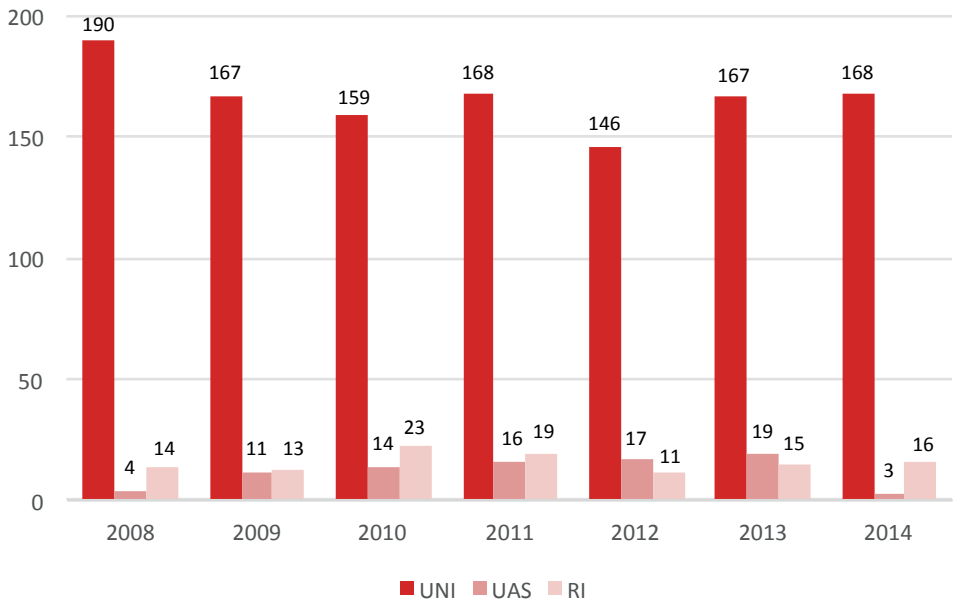
4.3.3 License Portfolio and License Income

The number of active licenses under management at the end of 2014 was reported as 1437 cases, 6 % more than the previous year. Thereof, 91.9 % of active licenses were handled by the Universities, 8.00 % by the RI and 0.1% by the UAS.

Of these active licenses 376 cases resulted in license income to the institutions and the researchers involved. In 219 cases such license income came from product sales. This figure has increased continuously in the past years in line with the growing number of products sold on the market that are based on research results of public research institutions. In the other cases income resulted from other type of license fees, e.g. license issue fees or milestone payments for products still in the development process.

These figures reflect the typical situation of licenses granted to industry by public research institutions. Many of the licensed technologies are at an early stage and require extensive development by the licensee. It often takes several years until a product reaches the market. Moreover, due to the early stage, the development risk is often high, and a significant number of projects are stopped before a marketable product is ready. Further, the figures are also typical for a still rather young license portfolio because many of the Swiss TTO have only been in operation for a relatively short period of time.

Fig. 6: Number of new Licenses, Options or Sales Agreements for Intellectual Property Rights



Data on license income are incomplete and were reported only by about half of the institutions participating in this survey. The total license income of these institutions amounted to 18.7 million CHF, more than 26% higher than in the previous year.

When licensing to start-up companies, some institutions may accept equity in such companies as a partial compensation for the licensing of technology. Such equity transactions usually replace down-payments or early milestone payments in order to avoid any cash drain from the start-up at the early stage of development. This results in a deferral of license revenues from such licenses until the shares in such start-up companies are sold by the institutions. In 2014, the institutions reported equity transactions for 23 of the 49 new start-up companies created that involved a license (see Section 4.4). In the past years more institutions started to accept equity as part of their license deals.

4.4 Start-up Companies

The number of newly created start-up companies from public research institutions remains at a high level. In 2014 the institutions reported a total of 81 new start-up companies (+11%), whereby 49 of these companies relied on a license or a contractual transfer of intellectual property from a public research institution. The remaining companies were created on the basis of know-how developed at the research institutions, but without a formal license.

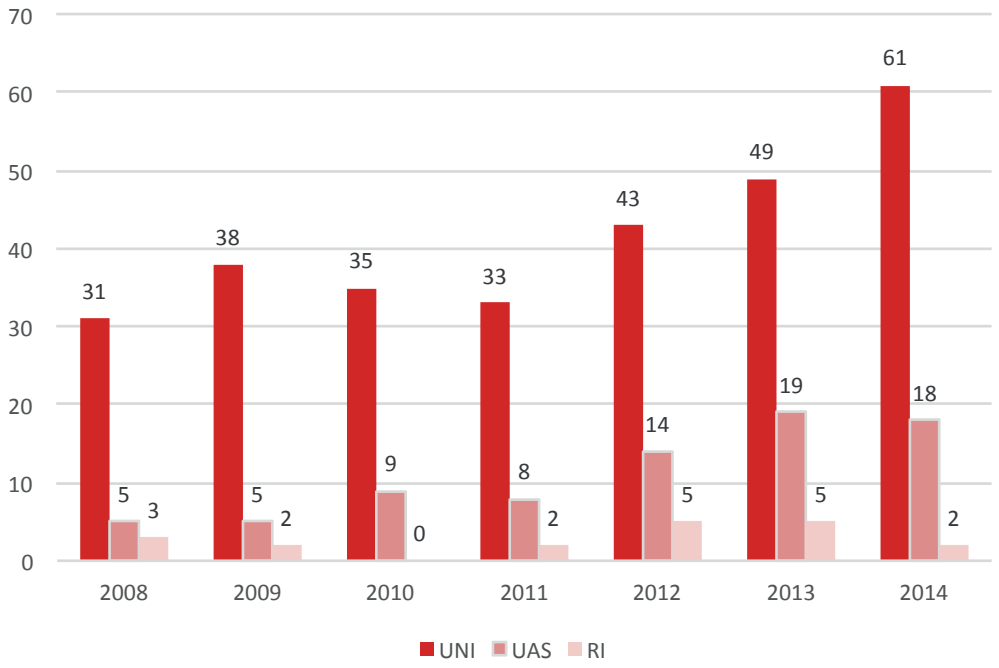


Fig. 7:
Number of Start-up Companies founded which were based on Licensing or Contractual Transfer of an Institution's Technology

CASE STUDY

AUTOMATED SPECTRAL DIAMOND INSPECTION

UNI BASEL

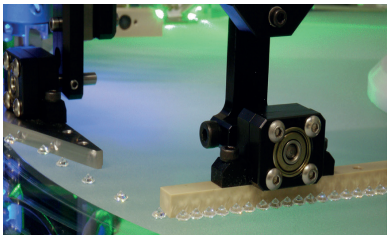
unitectra
Technology Transfer of the Universities of Basel, Bern and Zurich

Problem – Challenge

The watch and jewellery industry uses large quantities of polished colourless natural diamonds (often of small size) for their luxury products. They have a high interest to separate such diamonds from other kinds of colourless diamonds, such as natural diamonds containing chemical impurities which have been treated to appear colourless, colourless synthetic diamonds, or colourless diamond imitations. So far, there was no technology to automatically separate such diamonds. The separation is therefore performed manually, being very time-consuming and costly.

Solution

The University of Basel (Michael Steinacher, Insitute of Physics) and the Swiss Gemmological Institute SSEF have joined their expertise and developed the first device which can analyse very large quantities of small colourless diamonds at low cost. A Raman probe identifies all possible diamond imitations and rejects them. Then, in order to identify and reject treated natural or synthetic diamonds, a highly sensitive spectrometer checks the short wave ultraviolet (SWUV) transparency of each diamond. The average sorting speed is 4'000 stones per hour.
The devices are now marketed and sold by the newly formed company SATT GEMS. They are already operating at major Swiss diamantaires and major Swiss watch and jewellery groups.



CASE STUDY

TUNABLE OPTICAL LENSES

ETH zürich

Empa
Materials Science and Technology

optotune

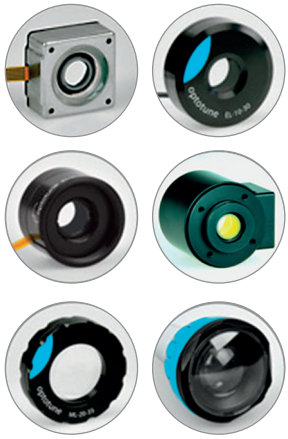
Problem – Challenge

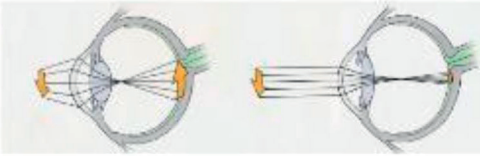
Traditional optics are based on solid glass or plastic lenses, which are moved back and forth to focus or zoom. A very old but successful system, however, is completely different: the eye! It consists of an elastic lens material, which is bent in order to focus. Optotune has developed and patented a series of lenses that basically copy the principle of the eye.

Solution

Optotune's focus tunable lenses are shape-changing lenses based on a combination of optical fluids and a polymer membrane. The core element consists of a container, which is filled with an optical liquid and sealed off with a thin, elastic polymer membrane. A circular ring that pushes onto the center of the membrane shapes the tunable lens. The deflection of the membrane and with that the radius of the lens can be changed by pushing the ring towards the membrane or by exerting a pressure to the outer part of the membrane or by pumping liquid into or out of the container. Optical systems can be designed more compact, oftentimes with less lenses and usually with less or no translational movement. Accordingly, there is no more need for expensive mechanical actuators. Less movement also leads to a more robust design. The materials employed are lighter than glass, saving overall weight. Less movement and weight also means less power consumption and that the response time of systems with tunable lenses can be very low, in the order of milliseconds. Less optical parts are moved combined with the tunability of the radius during operation results in reduced tolerance sensitivity and thus higher yield rates.

Optotune's most popular focus tunable lenses





APPENDIX 1 – INSTITUTIONS CONTACTED FOR THE SURVEY AND COMMENTS ON THEIR DATA PROVIDED

Universities	TT-Office(Total 10)	Comments on data provided
ETH Zürich	ETH transfer	Complete data, research agreements <50kCHF only partly
EPF Lausanne	TTO	Complete data, research agreements <50kCHF only partly
Universität Basel / Universitätsspital Basel	Unitectra	Complete data only for the Medical, Natural Sciences and Psychology Faculties, partial data for hospital
Universität Bern / Inselspital	Unitectra	Complete data only for the Medical, Vetsuisse and Nat. Science, Faculties, no data for research agreements of other faculties
University of Fribourg	TTO	Partial data available
Université de Genève / Hôpitaux	Unitec	Complete data for commercialization activities, research contracts
Université de Genève	Université de Genève	Université de Genève only partly handled by TTO
Université de Lausanne / Centre Hospitalier Universitaire Vaudois Lausanne	PACTT	Complete data for commercialization activities, research contracts only part handled by TTO
Université de Neuchâtel	TTO	Fragmentary data, research contracts only partly handled by TTO
University of St.Gallen	TTO	No data available
Universität Zürich / Universitätsspital	Unitectra	Complete data only for the Medical, Vetsuisse and Nat. Sciences, no data for research agreements of other faculties

Universities of Applied Sciences	TT-Office (Total 7)	Comments on data provided
Berner Fachhochschule	TTO	Complete Data (AHB,TI,WGS,HKB,HAFL)
Fachhochschule Nordwestschweiz (FHNW)	TTO	Data available from 4 departments
Fachhochschule Ostschweiz TTO	TTO	No data available
Zürcher Fachhochschule ZHAW ZHAW	TTO	Data only available from ‹Zürcher Hochschule für Angewandte Wissenschaften› (ZHAW)
Hochschule Luzern	Ressort aFuE/WTT HS LU	Partial data available
Haute Ecole Spécialisée de Suisse occidentale (HES-SO)	TTO	No data available
Scuola Universitaria Professonale della Svizzera Italiana (SUPSI)	Agire	Partial data available

Research Institutes	TT-Office(Total 3)	Comments on data provided
Paul Scherrer Institut	PSI TT-Office	Complete data on research projects
Empa, Swiss Federal Institute for Materials Science and Technology	Empa-Eawag TT-Office	Complete data
Eawag, Swiss Federal Institute of Aquatic Science and Technology	Empa-Eawag TT-Office	Complete data

APPENDIX 2 – DETAILED DATA 2008 – 2014

All respondents	2008	2009	2010	2011	2012	2013	2014
Full-time equivalents (FTE)	63	68	64	74	81	86	85.7
Research contracts (incl. EU contracts)	2745	2855	3035	2872	2349	3924	3237
Invention disclosures	431	446	470	482	519	575	550
Priority patent applications	194	195	224	240	297	270	312
Active patent cases end of the year	924	1512	1573	1606	1818	1951	1969
License agreements	208	191	196	203	174	201	187
Active license agreements end of the year	1079	1143	1237	1249	1307	1351	1437
kCHF of net licensing revenues	9479	8197	8533	7665	13303	14776	18729
License agreements with revenues in respective	271	289	288	299	308	386	376
New start-ups on basis of formal license	39	45	44	43	62(29)	73(45)	81(49)

Universities	2008	2009	2010	2011	2012	2013	2014
Full-time equivalents (FTE)	42	47	45	50.5	50	52.3	56.1
Research contracts (incl. EU contracts)	1885	2120	2285	2158	2348	2360	2195
Invention disclosures	378	405	421	421	444	458	508
Priority patent applications	167	160	187	212	257	244	281
Active patent cases end of the year	779	1355	1358	1450	1664	1779	1839
License agreements	190	167	159	168	146	167	168
Active license agreements end of the year	1013	1058	1135	1459	1167	1213	1320
kCHF of net licensing revenues	8338	7686	7829	7029	10519	9713	14170
License agreements with revenues in respective	252	268	258	257	270	337	339
New start-ups on basis of formal license	31	38	34	33	43(23)	49(35)	61(38)

RI	2008	2009	2010	2011	2012	2013	2014
Full-time equivalents (FTE)	7	7	6	8	8	7.7	7.4
Research contracts (incl. EU contracts)	395	416	293	340	353	320	365
Invention disclosures	37	26	28	30	40	37	32
Priority patent applications	17	29	21	23	32	24	30
Active patent cases end of the year	97	110	141	112	112	133	121
License agreements	14	13	23	19	11	15	16
Active license agreements end of the year	61	81	90	103	123	119	115
kCHF of net licensing revenues	961	337	190	170	2217	4463	4532
License agreements with revenues in respective	16	20	17	19	21	31	34
New start-ups on basis of formal license	3	2	0	2	5(1)	5(2)	2(1)

UAS	2008	2009	2010	2011	2012	2013	2014
Full-time equivalents (FTE)	14	14	13	15.5	23	26.1	22.2
Research contracts (incl. EU contracts)	455	319	457	374	621	1254	677
Invention disclosures	16	15	21	31	35	80	10
Priority patent applications	10	6	16	5	8	2	1
Active patent cases end of the year	48	47	56	35	42	39	9
License agreements	4	11	14	16	17	19	3
Active license agreements end of the year	5	4	12	15	17	19	2
kCHF of net licensing revenues	180	174	514	466	567	600	27
License agreements with revenues in respective	3	1	13	23	17	18	3
New start-ups on basis of formal license	5	5	9	8	14(5)	19(8)	18(10)

Note (i): For new start-ups the numbers in parentheses refer to equity deals.
Note (ii): The number of institutions that participated in the survey varies between years.

APPENDIX 3 – KEY PARAMETERS FOR INDIVIDUAL INSTITUTIONS

Institution	Name TTO	Start TTO	TTO FTE	Total number of research contracts	Number of invention disclosures	Number of priority applications	Number of IP agreements
Universities							
EPFL	EPFL-TTO	1993	12	228	121	99	46
ETH	Transfer	1995	16	492	145	82	35
Uni Geneva	Unitec	1998	7.3	74	59	17	19
Uni Lausanne	PACTT	2000	6.8	184	32	16	5
RI							
Empa	TT Office	2005	3.8	127	19	18	12
Eawag TT	TT Office	2001	1	88	1	0	0
UAS							
BFH	TT Office	1999	12.9	200	6	1	2

Note: The table lists individual data of those institutions that agreed to publish it.

APPENDIX 4 – THE QUESTIONNAIRE

swiTT Technology Transfer Survey 2014 (online survey)

Preliminary Notes:

- All questions refer to the calendar year 2014. Please make your statements accordingly.
- If no answer is available for certain questions, please indicate with n.a. Questions for which your office or your institution does not collect data should be left open (n.a.) and should not be answered by giving an estimate.

1.	**Confidentiality**	
	Do you agree to the publication of the individual data collected in the questions marked *[pub] under your institution's name? All other data will only be published in the aggregated format by type of institution? *All other data will only be published in the aggregated format by type of institution.*	❑ Yes ❑ No
2.	**Background Information**	
2.1	Name of the academic institution/s	
2.2	Is your institution associated with an university hospital? *(If yes, please note that all figures given below should include the numbers of the hospital, too.)*	❑ Yes ❑ No
2.3	Does your institution have a dedicated office / responsible person for TT activities (TTO)?	❑ Yes ❑ No
	If yes, which year did the TT program start?	*[pub]*
2.4	Name of responsible for TT program	
	Name of responsible for survey data	
2.5	TTO address and contact information	
	Office Name	Telephone
	Street	e-mail
	City	Postal code
3.	**Activities and FTEs**	
3.1	What are the activities of your TTO?	
(A)	Research contracts (drafting, negotiating, controlling)	❑ Yes ❑ No
(B)	Evaluation, protection and management of IP	❑ Yes ❑ No
(C)	Commercialisation of IP (licensing, marketing)	❑ Yes ❑ No
(D)	Coaching of start-up projects	❑ Yes ❑ No
(F)	Financial administration of research projects	❑ Yes ❑ No
3.2	How many full time equivalents FTE were employed in your TTO on December 31st 2011? *(Do NOT include researchers working as project managers in transfer projects in this number)*	FTE *[pub]*
3.3	Of these FTE, how many were employed to work on	
(A)	Technology transfer activities *(Staff with main occupations (> 20%) in the area of technology transfer, such as 'Licensing Officers', 'Intellectual Property Managers', 'Technology Managers' or 'Research Contract Officers'. Do NOT include project managers carrying out transfer projects)*	FTE
(B)	Administration and general management	
	Comments to 3.1 - 3.3 *(e.g. if additional people outside your TTO but inside your institution are also working in technology transfer activities according to 3.1, special organisation with specific faculties, centralized/decentralized organisations)*	FTE
4.	**Research and Development**	
4.1	Total number of new research contracts handled by your TTO *(Collaboration agreements, service agreements, clinical trial agreements, CTI complementary and EU agreements, NO MTA, NO NDA or other TT contracts (see 4.3) and NO SNSF contracts)*	[pub]
	Of these research contracts, how many were executed with small and medium enterprises (SME), how many with large companies and how many with public partners? *(Definition: SME are companies with 250 or less employees.)*	A) SME: (B) Large Company (C) Public Institutions: *(Sum shall equal 4.1!)*
4.2	Amount of cash payments due to your institution from research contracts that were handled by your TTO according to 4.1 *(Please give the amount of cash due to your institution, NO material asset e.g. for machinery and NOT the total amount of Research Project, e.g. if an EU project adds up to 3 Mio. EUR but your institution gets only 200'000 thereof, the latter shall be given. Do not split the amount, if the contract is covering several years but report the full amount in the year the contract is signed.)*	CHF
4.3	Number of other technology transfer contracts handled by your TTO *(Non Disclosure Agreements (NDA), Material Transfer Agreements (MTA), consulting contracts, inter-institutional contracts, sponsoring, donations, but NO licenses, options, sales)*	

	Comments to 4.1 – 4.3 *(e.g. restrictions/regulations at your institution, knowledge of ALL contracts or only contracts above a certain amount)*	
5.	**Patent-Related Activity**	
5.1	How many invention disclosures were received by your TTO?	[pub]
5.2	How many priority applications were filed by your TTO? *(Priority application being the very first application for a new technology in any patent office of the world.)*	[pub]
	(A) Of these, how many are based on research significantly funded by SNSF.	
5.3	What was the overall number of active patent cases at the end of 2011 managed by your TTO? *(Active patents cases are pending or granted patents on a technically unique invention (patent family). Applications in various countries on ONE technically unique invention count as ONE patent case.)*	
6.	**Patenting Costs and Legal Fees**	
6.1	Amount spent by your TTO/institution on patenting costs and external legal fees? *(Including all external costs for patent filing, prosecution, maintenance, litigation expenses or costs for drafting or support in negotiation of contracts.)*	CHF
6.2	Amount of patenting costs and legal fees invoiced to commercialization partners? *(Does NOT include patenting costs or legal fees paid DIRECTLY to the patent attorney or other service providers by licensees or external partners.)*	CHF
7.	**License, Option and Sales Agreements**	
7.1	How many licenses/options/sales of protected or unprotected IP did your TTO execute? *(Count only the agreements for different technologies, i.e. 30 licenses for the same software library count as ONE. If a license agreement is combined with a research agreement (e.g. advanced sale of the results of a research project), this contract shall count only as research contract and NOT be included in this question unless the invention/software that is licensed/sold, exists already at the execution date of the research contract.)*	[pub]
	Of these licenses/options/sales, how many were licensed to SME, how many to large companies or public institutions? *(Definition: SME are companies with 250 or fewer employees)*	(A) SME: (B) Large Company: (C) Public Institutions: *(Sum shall equal 7.1!)*
	(D) Of these licenses/options/sales how many are based on research significantly funded by SNSF?	
7.2	How many licenses/options/sales included equity? *(Equity meaning the ownership of interest in a company such as shares, options, warrants, etc. in consideration for granting a license or sale of IP.)*	
7.3	How many licenses/options were active as of December 31, 2011?	
	Comments to 7.1 – 7.3 *(e.g. large variations to previous years, special situations, i.e. with free software licenses OpenBSD, etc)*	
8.	**License Income**	
8.1	What was the total number of licenses/options/sales yielding revenue?	
8.2	How many licenses/options/sales yielded running royalties? *(Running royalties are based on product sales and areonly due after the launch of a product in the market)*	
8.3	What was the total amount of license/option/sales revenue received at your institution? *(WITHOUT patent cost and fees invoiced in 6.2.)*	CHF
9.	**Start-up Companies**	
9.1	Total number of start-up companies formed at your institution	
	(A) Of these start-up companies, how many are dependent on licensing or transfer of your institutions technology?	
	(B) Of these start-up companies, how many are dependent on unprotected know-how or technology of your institution (without license agreement)?	
	(C) Of these start-up companies, how many are based on research significantly funded by SNSF?	
9.2	In how many of the new start-up companies does your institution hold equity?	
10.	**Post-Licensing Activities**	
10.1	Did one or more of your institution's licensed technologies become available for consumer or commercial use in 2011?	❑ Yes ❑ No
	If yes, how many?	
10.2	Information about the launched products *(Please give a short title of each product success story and the e-mail of the contact person for additional information.)*	[Title, Contact Person]
	Comments	
	(If you want to bring any additional comments or suggestions to the attention of the team of the swiTTreport, please post them here)	

Thank your for your input!

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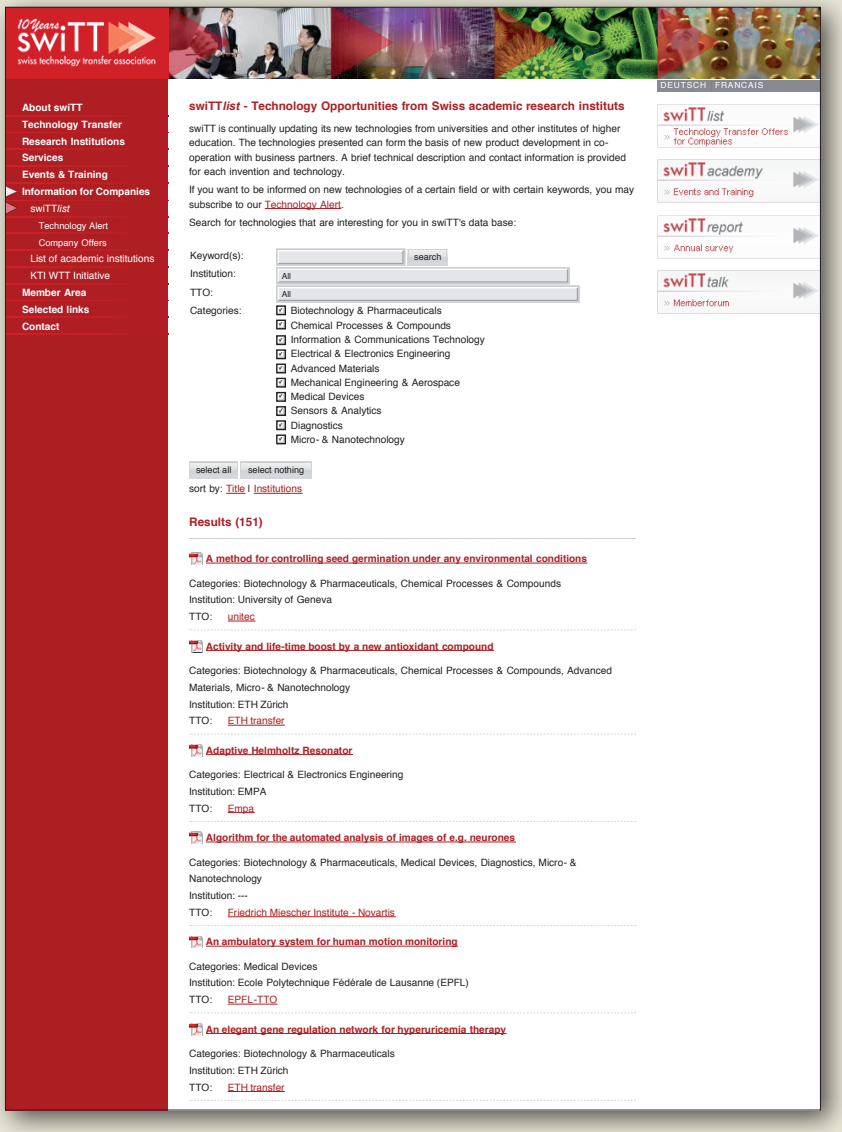

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