swiTTreport 2023

SWISS TECHNOLOGY TRANSFER REPORT

20 Years swiTT
swiss technology transfer association

CASE STUDY

UPWATER – SUPPORT OF SEWAGE PLANTS TO BECOME GREEN

Problem – Challenge

Climate change, energy crisis, water protection, water scarcity: all these current issues affect wastewater treatment plants (WWTP). WWTP have a much larger greenhouse gas footprint than previously assumed. The decomposition of nitrogen can produce large amounts of nitrous oxide (N_2O), a greenhouse gas that is more than 250 times stronger than CO_2. WWTP must therefore also make their contribution to combating climate change. In addition, WWTP require a lot of energy, which is primarily used to supply bacteria with oxygen to keep the purification process going. This often makes WWTP the largest energy consumers in a municipality and causes correspondingly high energy cost increases. At the same time, water protection is becoming ever important, which will lead to significantly stricter legal requirements. Unfortunately, WWTP cannot solve these upcoming problems with the classical engineering approaches and will therefore face a major upheaval.

Solution

'upwater' offers measurements and hardware for WWTP to support them in reducing process instabilities, greenhouse gas emissions as well as energy consumption. Off-gas montoring is a tool for determining direct greenhouse gas emissions (nitrous oxide, methane) and energy consumption (due to oxygen transfer) of the biological stage of a WWTP. With the help of these exhaust air measurements, direct greenhouse gas emissions and energy consumption can be monitored allowing for novel mitigation strategies and energy optimization. The measurement is created and set up by the spin-off. The measurement requires very little maintenance and is fully automatic. Biomonitoring is a novel diagnostic and optimization tool for quasi-real-time monitoring of the micro-biome (totality of all microorganisms), which is essential for the removal of nutrients in a WWTP. This toolset enables the early detection and solution of process problems associated with changes in the structure of the bacterial community. In addition, antibiotic resistance and viruses in wastewater can be monitored.

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SUMMARY

The annual survey "swiTTreport" is the most comprehensive analysis of the technology transfer activities of Swiss public research organisations (PRO). The report covers two main areas, research contracts of the participating institutions with private or public partners, and the activities for the economic exploitation of research results from these institutions. The Swiss PRO interact actively with partners in the economy. These activities are collectively designated in the report as "technology transfer" (TT) activities.

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

Overall, the respondents reported the following indicators on technology transfer activities in 2022:

3016	New Research Projects
587	Invention Disclosures
331	Priority Patent Applications
173	License & Option Agreements
70	Start-Ups founded

RÉSUMÉ

La présente analyse est la plus exhaustive connue sur les activités de transfert de technologies réalisées par les institutions publiques de recherche suisses. Le rapport couvre deux aspects principaux: les contrats de recherche de ces institutions avec des partenaires privés ou publics et les activités liées à la valorisation des résultats de recherche obtenus par ces institutions. Les dernières interagissent activement avec le secteur privé. Ce rapport désigne collectivement ces collaborations et activités de valorisation sous les termes de transfert de technologies (TT).

Ces données proviennent de sept universités cantonales et deux Ecoles Polytechniques fédérales (Universités), de trois universités de sciences appliquées (UAS) et de trois institutions de recherche dans le domaine des Ecoles Polytechniques Fédérales EPF (RI).

Dans l'ensemble, les personnes interrogées ont communiqué les chiffres clés suivants sur les activités de TT en 2022:

3016	Nouvelles collaborations de recherche
587	Déclarations d'invention
331	Demandes de brevets
173	Contrats de licence et accords d'option
70	Créations de start-ups

ZUSAMMENFASSUNG

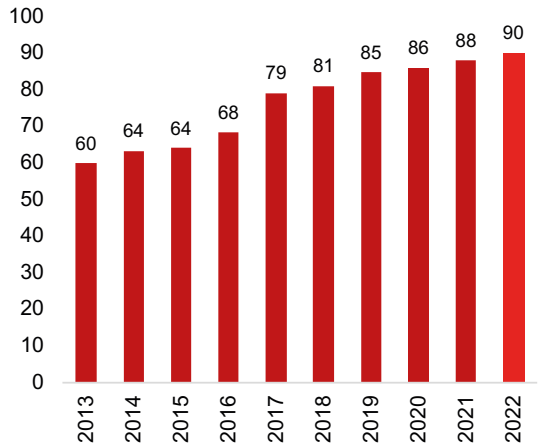
Der jährlich publizierte "swiTTreport" ist die umfassendste Analyse der Technologietransferaktivitäten öffentlicher Forschungsinstitutionen (PRO) in der Schweiz. Dieser Bericht umfasst zwei Hauptbereiche: Forschungsverträge mit privaten und öffentlichen Institutionen und die wirtschaftliche Verwertung von Forschungsergebnissen. Diese Aktivitäten werden häufig auch unter dem Begriff „Technologietransfer" zusammengefasst. Der Bericht zeigt, dass die schweizerischen PRO aktiv und erfolgreich mit der Wirtschaft interagieren.

Der Bericht umfasst die Aktivitäten von sieben kantonalen Universitäten und beiden ETHs (zusammengefasst unter Universitäten), von drei Fachhochschulen (UAS) und von drei Forschungsinstitutionen des ETH-Bereichs (RI).

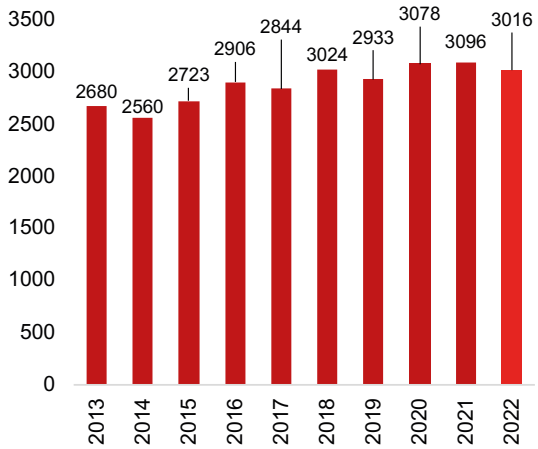
Insgesamt rapportierten die teilnehmenden Institutionen die folgenden Kennzahlen über ihre Technologietransferaktivitäten im Jahr 2022:

3016	Neue Forschungsprojekte
587	Erfindungsmeldungen
331	Patentanmeldungen
173	Lizenz- & Optionsvereinbarungen
70	Start-Ups gegründet

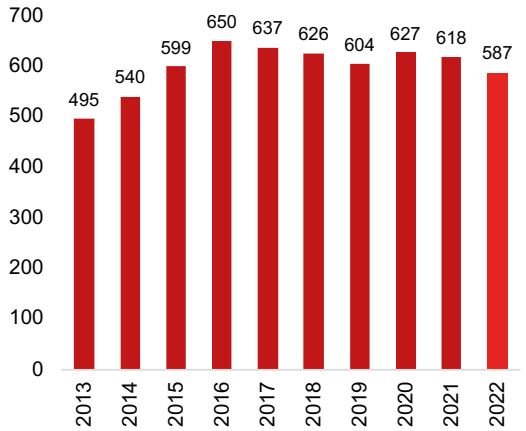
Full Time Equivalents (total)



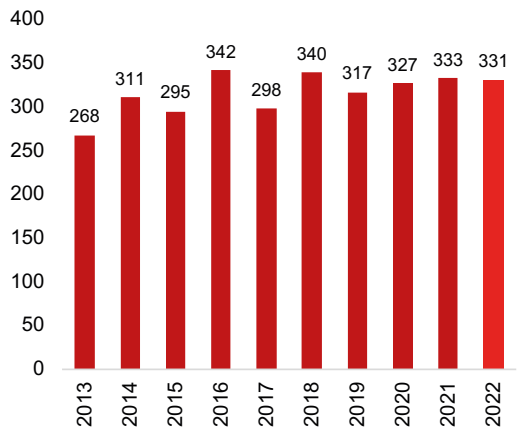
Research Contracts (total)



Invention Disclosures (total)

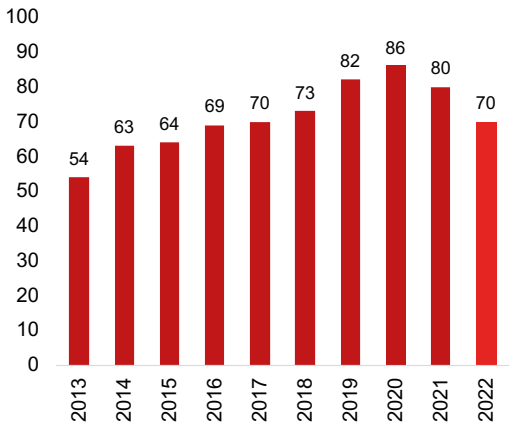


Patent Applications (total)



License Contracts (total)

Start-Ups (total)



Overall data of the last ten years show a solid outcome of the TT activities in Switzerland.

CASE STUDY

Universität Zürich[UZH]

PHILIPS

VISUAL PATIENT AVATAR

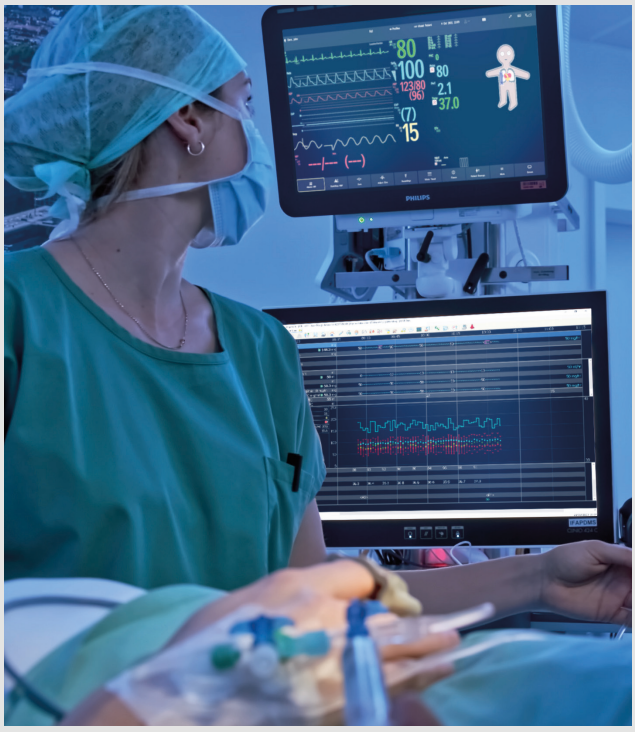
Problem – Challenge

Patient monitoring has grown in complexity over the years due to an ever-increasing number of vital signs being measured. Each new sensor introduced a new indicator to the monitor screen. Consequently, today caregivers are faced with a large number of individual indicators to interpret, which increases mental workload and makes it more challenging to achieve situation awareness. It is important to foster situation awareness as research has found that over 80% of incidents in anesthesia and intensive care settings stem from a lack of situational awareness.

Solution

Inspired by synthetic vision technology from the aviation industry, which provides pilots with an intuitive visual representation of the outside world, a patient avatar was developed. A visualization technology designed for quick and easy situation awareness for patient monitoring. It was developed based on user-centered criteria optimized for the specific perceptual abilities of humans. The visualizations used in the avatar have a logical commonality with the reality they represent. For example, the avatar changes its skin color to purple, just like the real patient, when the measured oxygen saturation decreases. Or its body pulsates rapidly when the pulse rate increases, representing the rapid pulse wave flowing through the patient's body. Caregivers can read the information from the avatar immediately and do not have to piece it together by checking waveform by waveform and number by number. In addition, the information transfer with the avatar also functions with peripheral vision, allowing the patient to be monitored even when the primary focus is not directly on the monitor, which is often the case. Furthermore, the avatar has been shown to reduce workload and increase perceived diagnostic confidence. The technology was developed at the Institute of Anesthesiology of the University Hospital Zurich and was exclusively licensed to Philips in 2018. It went on sale in Europe (CE countries) in 2023, and it is expected to become available for sale in North America in Q1 2024. The first European centers where Visual Patient is being used are the University Hospitals of Zurich and Bonn.

Visual Patient Avatar in a Philips MX750 patient monitor



A care provider monitoring a patient using a split screen view of conventional patient monitoring and Visual Patient Avatar

1. PARTICIPATING INSTITUTIONS AND DATA COLLECTION

Two Swiss Federal Institutes of Technology (ETH) and eight cantonal universities (collectively "Universities"), seven universities of applied sciences (UAS), and three research institutes (RI) in the ETH domain were contacted in spring 2023 and asked to provide data on their technology transfer (TT) activities for the year 2023. 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 members of Universities, all members of the RI as well as individual departments of two UAS. The data show that the handling of research collaborations with economic partners and other technology transfer activities varies substantially among different institutions. Of note: not all of them were able to provide a comprehensive overview and hence all aggregated data showed in this report represent the lower boundary of the actual situation. Appendix 1 shows the institutions that participated in the survey and comments on the comprehensiveness of the data provided.

The report mostly provides aggregate data for the types UNI and RI of institutions covered in this survey (Appendix 2, see end note). For those institutions that agreed to disclose individual data some key figures are listed in Appendix 3.

Comments received by the different types of institutions:

Universities

At several universities, only contracts for collaborative research projects with economic partners above a certain threshold need to be signed by university management. Therefore, not all collaborative projects can be reported by such institutions. Activities in research and technology transfer at university hospitals are usually closely linked to the respective university, hence the services of these TTOs are also available to researchers at the hospitals.

UAS

The management of technology transfer activities at the UAS varies widely among institutions and individual departments. Some departments or schools have professionals working in a centralized TTO and are able to provide comprehensive data. At other departments or schools, no centralized support functions exist and data are fragmentary or completely lacking.

RI

The research institutions that participated in the survey have centralized support functions providing technology transfer services for the researchers.

NOTE: In 2023, most of the seven universities of applied sciences could not provide data for the report. In order to show an appropriate development of the technology transfer indicators over the previous ten years, the report represents the aggregate data for types UNI and RI only.

2. INSTITUTIONAL RESOURCES FOR TECHNOLOGY TRANSFER

2.1 Services Provided

All University TTO are handling contracts for research collaborations. However, at several Institutions the finalization of research agreements with the support of a centralised administrative department (e.g. TTO) is not mandatory, or not all contracts are covered (e.g. contracts for EU project or contracts <50 kCHF not included). All University TTO deal with the handling and commercialization of intellectual property (IP), which includes the evaluation of the commercialization potential of products or services based on research results, the protection and management of IP, and the licensing or sale of IP to industrial partners. Three of nine TTO at Universities also provided support for the coaching of start-up projects.

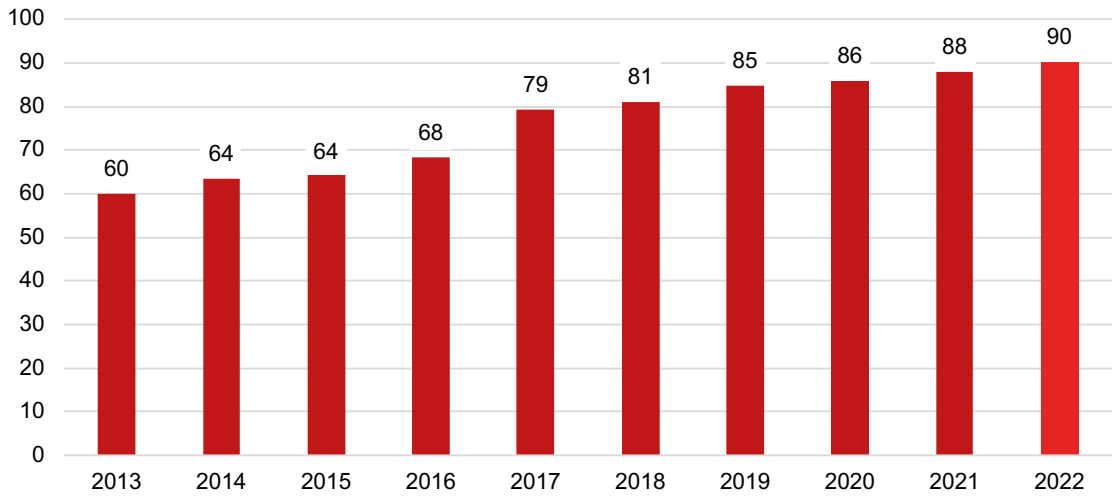
From the respondents one of two UAS TTO and all RI TTO offer support for research collaborations. The two UAS TTO and all TTO of RI deal with the management of IP. The commercialization of IP is supported by all RI TTO and by the two UAS TTO. Coaching of start-up projects is offered by one of two UAS TTO and one RI TTO.

2.2 Staffing

Staffing refers to the number of full-time equivalents (FTE) employed for TT activities at an institution. These are professionals such as licensing, intellectual property, technology or research contract managers and administrational staff, 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, patent portfolio management, patent, technology licensing and other technology transfer activities. Part of the staff may also be involved in the supporting of start-up projects (Fig.1).

TTO typically collaborate with external patent firms for the drafting, filing and prosecution of patent applications and may mandate specific legal issues to external attorneys. At some institutions, start-up projects are handled by dedicated organizations such as business incubators.

Fig.1: Development of Staffing Level / Full Time Equivalents



3. RESEARCH CONTRACTS WITH PARTNERS

3.1 Research Contracts Handled by the TTO

In 2022, the UNI and RI TTO handled a total of 3016 research contracts with economic and public partners. Research contracts handled by UNI decreased by 2 % and research contracts handled by RI decreased by 5 %.

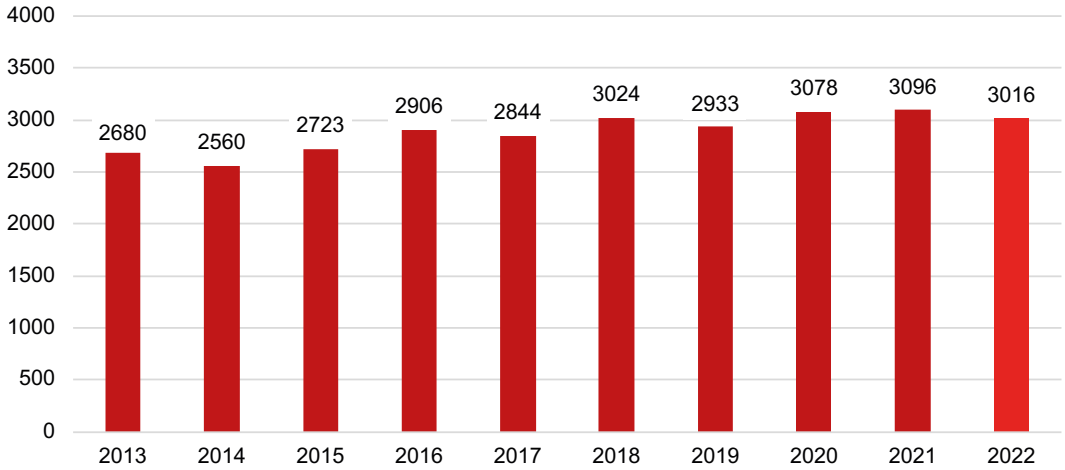
This number includes collaboration agreements, clinical trial agreements, Innosuisse IPR and EU collaboration agreements. SNSF projects (with funding provisions) are only included in these numbers if they involve multiple partners and therefore a collaboration agreement (Fig. 2).

Research collaborations between academia and industry are a key aspect of TT, they do indeed bring benefits to academia and the economy. They not only allow industry to access the know-how and infrastructure of academia, companies also gain access to academic talents through such collaborations. Likewise, academic labs can also benefit from the know-how and infrastructure of the industrial partners. The funding of joint projects by partners from the economy may account for a significant part to the research budgets of certain PRO.

Such collaborations are a great opportunity to feed and enrich each other in cutting edge innovation areas.

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 2022, the institutions reported altogether 2420 such other types of TT agreements.

Fig. 2: Number of Research Agreements and EU Contracts Handled by TTO

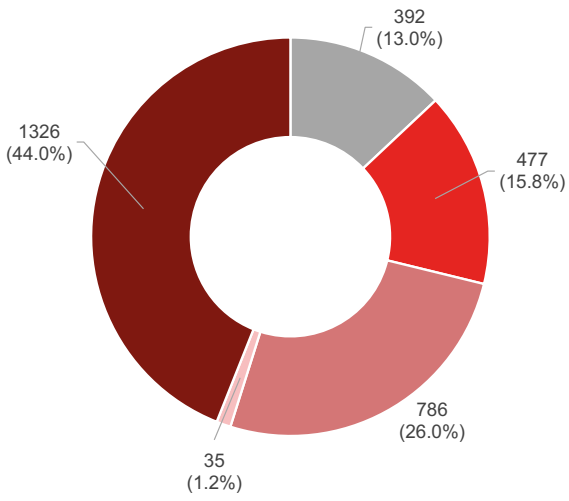


3.2 Type of Collaboration Partners

With respect to the type of collaboration partner, disregarding the TTO reporting "don't know", the small- and medium-sized enterprises (SME), i.e. companies with fewer than 250 employees, account for 23.2 % of total research contracts reported for 2022 (Fig. 3).

If one considers only reported collaborative projects with the private sector (SME plus large companies and multiple partners), SME account for 43.4 % of all projects with commercial partners.

Fig.3: Type of Collaboration Partner



CASE STUDY

BIMINI

Institute of Oncology Research

BIMINI – HEMATOLOGICAL CANCER TREATMENT

Problem – Challenge

Specific lymphoma subtypes, in particular mantle cell lymphoma and diffuse large B-cell lymphoma, pose a formidable management challenge due to their aggressive nature and poor prognosis. Despite therapeutic improvements, relapses remain too high, particularly among elderly patients who can't endure intensive treatments. Thus, an urgent unmet need exists for effective therapies that overcome treatment resistance and significantly enhance patient outcomes.

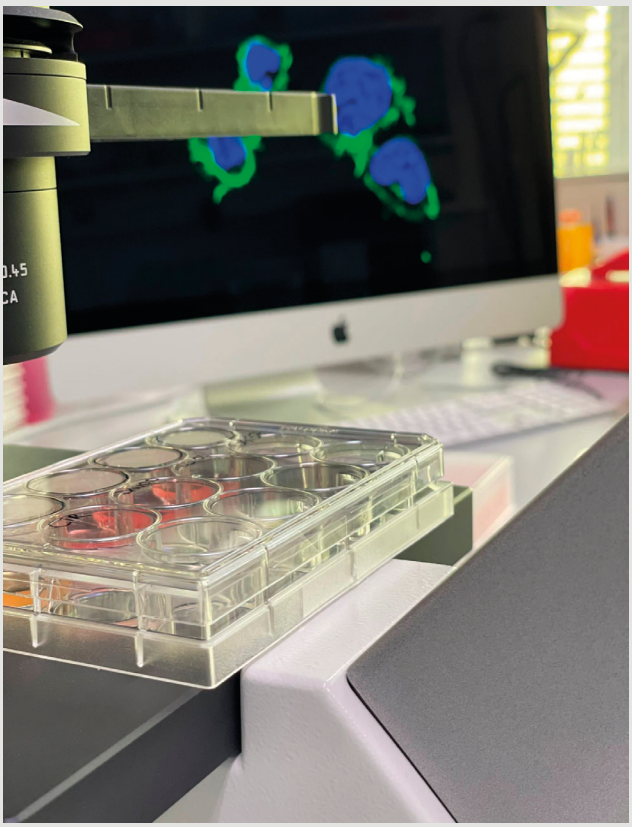
Solution

An innovative compound, BM-011 (also known as EG-011), was identified at the Institute of Oncology Research (IOR), affiliated to Università della Svizzera italiana (USI), by the group of Prof. Francesco Bertoni. BM-011 showcases anti-cancer efficacy in both in vitro and in vivo settings. In view of the promising results IOR filed for patent protection. The compound has been later successfully licensed to the early-stage company BIMINI Biotech, which is in lead for bringing this innovative compound to the market.

The quality of the project has been further acknowledged and awarded a Eureka Eurostars grant with the aim of developing novel therapeutics for lymphomas with a total project budget of 1.7 million euros.

The core strategy revolves around activating the Wiskott Aldrich Syndrome protein (WASp), exclusive to hematopoietic cells, crucial in lymphoma aggressiveness. Through the groundbreaking WASp activation, BM-011 induces genomic instability, triggering cancer cell death. WASp implications are not restricted to lymphomas; its reach extends to leukemias, multiple myeloma, and more, promising innovation across medical horizons. BIMINI's pioneering stride aligns with the broader vision of reshaping oncology treatment, transcending boundaries for a new era in cancer care. This paradigm shift not only addresses immediate lymphoma treatment gaps but opens avenues for future approaches to overcome current treatment limitations. The strategic partnership exploits Prof. Francesco Bertoni's team insights and IOR's research, merging academic excellence with entrepreneurial drive.

Bimini is now pre-incubated in the start-up program at the USI Startup Centre to open a branch in Ticino or even relocate there.



Experiments with EG-011 in the IOR laboratory

CASE STUDY

VERSANTIS – FIGHTING LIVER DISEASES

Problem – Challenge

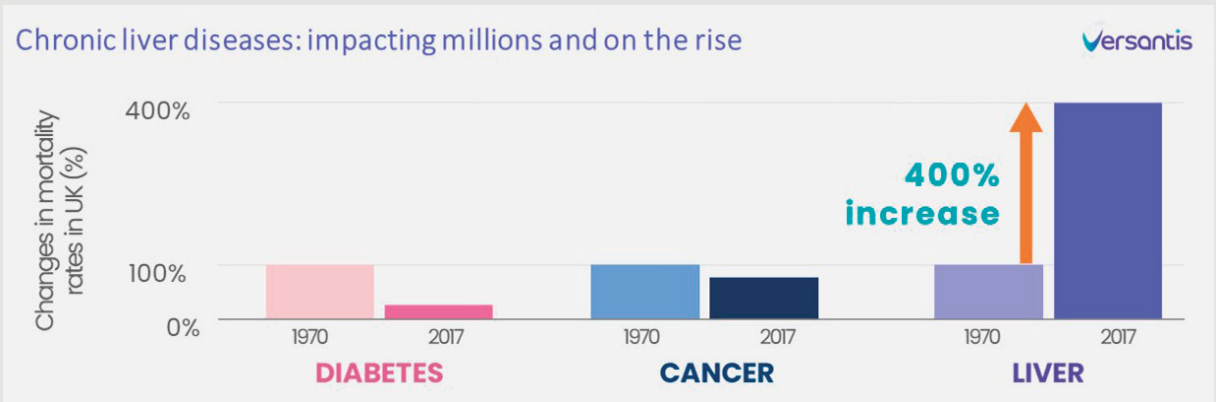
Despite the liver playing a central role in a myriad of vital functions, liver disease has been neglected to the point that it is now one of the fastest-growing causes of death (see figure). Every fourth person today is affected by chronic liver disease, many of them undiagnosed. A sick liver can no longer eliminate toxins and wastes the body produces, which triggers a whole cascade of health issues leading to multiple organ failure and Acute-on-Chronic Liver Failure, a severe condition associated with up to 75 % mortality within a month. Getting swiftly rid of the toxins will stop that cascade, allow the body time to activate its own healing process, and reverse the fatal course of the acute event.

Solution

A first patent filed in 2012 protected a dialysis method for the treatment of hyperammonemia and drug intoxication. A liposome composition is injected into the patient's abdomen where it captures and traps the toxins. It can then be removed from the abdomen with the excess toxins. The ETH spin-off Versantis was founded, which pivoted the application from drug intoxication towards liver diseases, identifying this growing market as their most promising entry point for their product. The spin-off stayed in touch with their Alma Mater and licensed three more patents covering the manufacturing of the liposomes, the use of polymersomes in diagnostics and a new urease inhibitor. In 2022 the French company GENFIT acquired Versantis, which at that point had progressed into Phase 2 clinical development with their first drug candidate. The deal included a payment of CHF 40 million, with additional contingent consideration of up to CHF 95 million upon successful clinical and regulatory milestones.

The founders of Versantis:
Meriam Kabbaj, Vincent Forster and Jean-Christophe Leroux
(not in the picture) – copyright Hannes Heinzer / ETH Foundation

Liver disease has been neglected to the point that it is now one of the fastest-growing causes of death. (chart by Versantis, data from the British Liver Trust, Impact report, June 2019)



20 Years swiTT

swiss technology transfer association

INVITATION

PROGRAM

2:45
Welcome and registrations

3:15
Introduction (swiTT President)

3:25
Official part

4:40
Networking apero and poster session

5:40
Guided visit of Kunsthaus

7:00
Dinner + Party

12:00
End

Introduction
Matthias Kuhn – swiTT

Our Guest Speakers
Annalise Eggimann – Innosuisse
Michael Friedrich _ Distalmotion
Albert Zeller – RC Tritec

The 20th Anniversary of swiTT: Pioneering Swiss Technology Transfer

In the heart of the Swiss innovation landscape, the Swiss Association for Technology Transfer Professionals (swiTT) celebrated a remarkable milestone: two decades of catalyzing knowledge exchange, fostering collaboration, and propelling cutting-edge research from academia to industry.

Founded in 2003, swiTT emerged as a response to the growing need for effective technology transfer mechanisms. Switzerland, renowned for its scientific excellence and vibrant startup ecosystem, sought a bridge between laboratories and commercial ventures. swiTT stepped into this role, uniting professionals across disciplines under a common banner.

On September 7, 2023 we raised our glasses to commemorate this journey:

Happy Birthday, swiTT!

swiTT THANKS ITS

LONGSTANDING SUPPORTING MEMBERS

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swiTT > Swiss Technology Transfer Association > CH-3000 Bern
Phone: +41 79 232 19 23 > E-Mail: office@switt.ch

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20 years of technology transfer, collaboration, education and impact

swiTT, the Swiss Technology Transfer Association

Vortragssaal Kunsthaus Zurich, 7 September 2023

Matthias Kuhn, MBA
President swiTT
Unitec, Technology Transfer Office, University of Geneva, CH

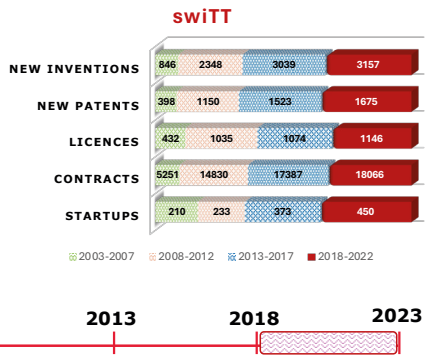
20 Years swiTT swiss technology transfer association

20 years in technology transfer words and numbers

Resistell EPFL — USD 16.5 M

planted. ETH zürich — USD 300 M

ANAVEON Universität Zürich — CHF 110 M



20 Years

swiTT

swiss technology transfer association


Mentors
SME
Innovation Mentoring
KUNSTHAUS ZÜRICH

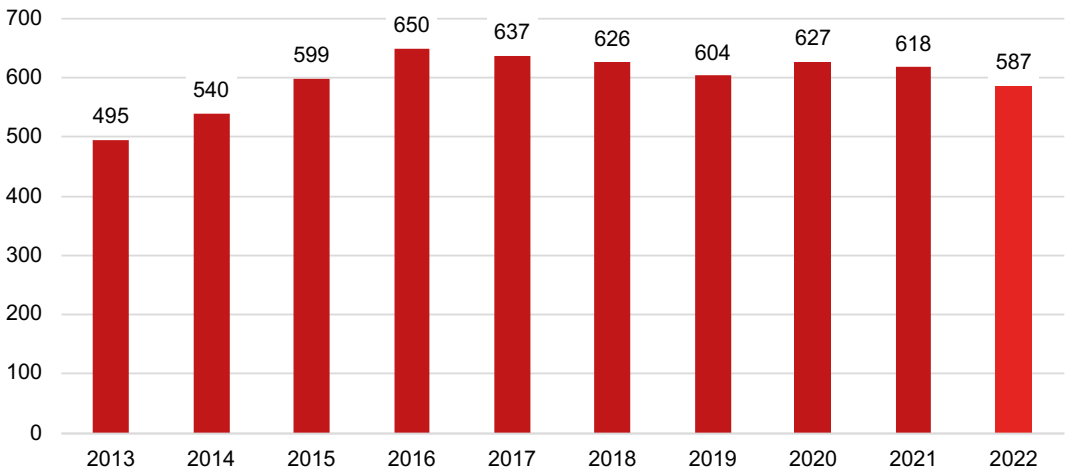
4. COMMERCIALIZATION ACTIVITIES

Research results of Universities, UAS and RI do have potential to form the basis for innovative products and services 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. To raise the attractiveness of academic TT and licensing for industry, research results with socio-economic potential need to be screened and identified, and the corresponding intellectual property rights need to be secured. While software is protected by copyright, protection of most new technologies is sought in form of patent applications. Without an appropriate protection of the intellectual property, industrial or financial investors in many industry sectors will not consider investing for the research and development of products that are then free to be copied by competitors.

With regard to patentable inventions, this process involves the following main steps: identification and evaluation of research results through invention disclosures, filing of patent applications, identification of suitable licensing partners, negotiating and concluding license agreements with existing companies or newly created start-up companies. Within many institutions, the creation of such start-up companies is supported by various additional services.

Sections 4.1 – 4.4. of this report describe the key TT indicators on commercialization activities from the participating institutions, section 4.4 is in particular related to start-ups.

Fig.4: Number of Invention Disclosures



4.1 Invention Disclosures

A total number of 587 invention disclosures were reported for 2022, a slightly decreased number compared to the previous year (Fig. 4).

4.2 Patenting Activities

4.2.1 Priority Patent Applications

The protection of intellectual property in the form of patents is of great importance in many industry sectors. This is particularly true for industries with high product development costs and long product lifecycles, e.g. biotechnology and pharmaceuticals. The TTO at PRO 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.

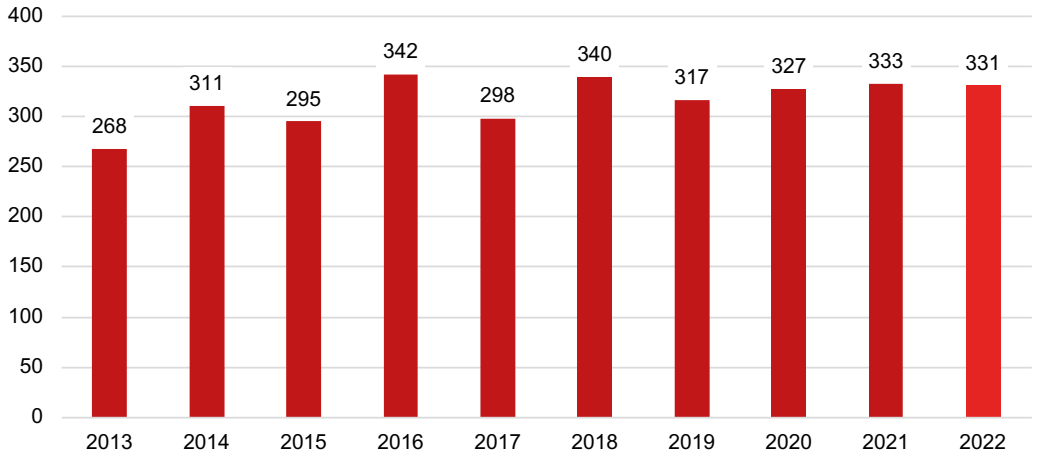
Thus, patenting activities of PRO can be a prerequisite for entering into a partnership with an industrial partner. The reported number of 331 priority applications filed in 2022 is on the same level as in previous years (Fig. 5).

4.2.2 Patent Portfolio – Active Patent Cases End of 2022

At the end of 2022, the institutions participating in the survey reported 3408 (+15.1%) 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 PRO through various channels. Identifying the responsible person within the organization of a potential licensee is a challenge, and often existing contacts of researchers are used to approach companies. To support the research institutions in their technology marketing efforts, swiTT runs the searchable national technology portal swiTTlist (www.switt.ch/swittlist) providing industry with a quick and easy, up-to-date overview of current technology opportunities from Swiss PRO. TTO regularly upload new technologies to this searchable portal. 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



4.3 Licensing

4.3.1 Licenses and Sales of Intellectual Property (IP)

In 2022, overall 173 (-16.4 %) new IP agreements, usually licenses, were reported by UNI and RI, in a few cases the agreements involved a sale of the IP rather than a license (Fig. 6). In total 94.2 % of all agreements were handled by Universities.

4.3.2 Type of Licensing Partners

PRO regularly license technologies to their start-up companies, that are included in the SME share (Fig. 3). 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 on to the market.

Frequently, projects or start-ups are acquired by larger companies once their products or services have reached sufficient maturity.

4.3.3 License Portfolio and License Income

The number of active licenses under management by UNI and RI at the end of 2022 was reported as 1485 (+8.7 %) cases.

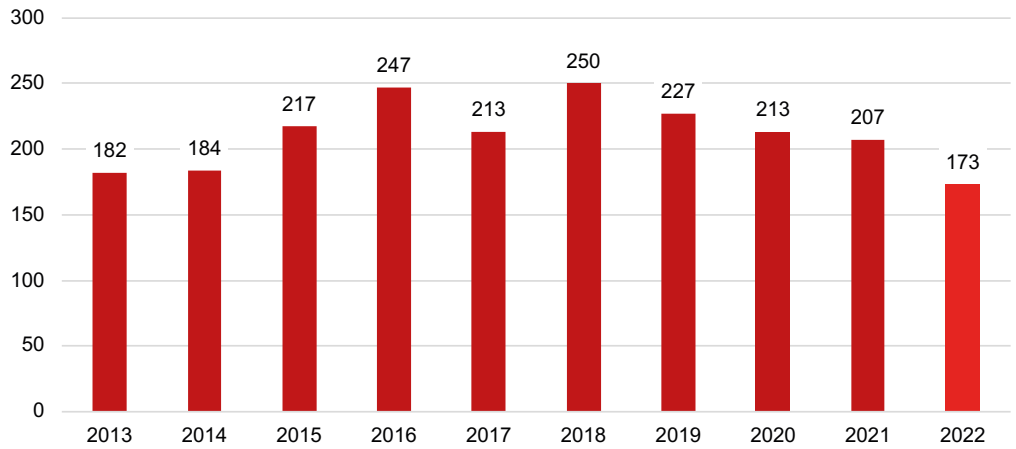
Of these active licenses 34.3 %, namely 510 cases resulted in license income to the institutions and the researchers involved. This figure has increased continuously in the past years in line with the growing number of products sold on the market that are based on research results of PRO. In the other 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 PRO. 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. The development risk is often high for these early stage technologies, and a significant number of projects are stopped before a marketable product is ready.

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 the past years more institutions started to accept equity as part of their license deals, thus reducing the annual licensing income and adding the management of an equity portfolio to their services.

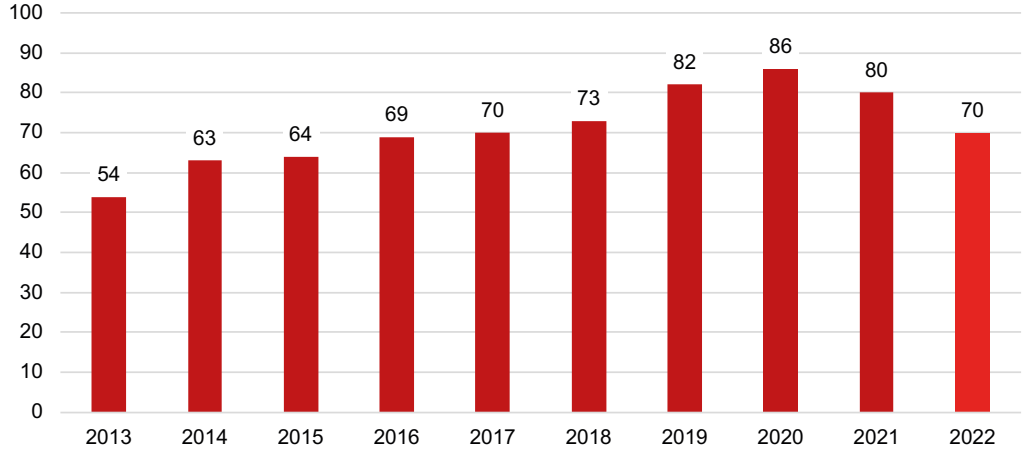
Fig. 6: Number of new License, Option or Sales Agreements for Intellectual Property Rights (IPR)



4.4 Start-up Companies

In 2022 the TTO reported a total of 70 (65 by UNI and 5 by RI) new start-up companies (-12.5 %), whereby 28 of these companies (40.0 %) relied on a license or a contractual transfer of intellectual property from a PRO (Fig. 7). The remaining companies were created on the basis of know-how developed at the research institutions without a formal license.

Fig. 7: Number of Start-up Companies Founded



CASE STUDY

Empa
Materials Science and Technology

hochuli advanced
Composite Extrusion

EFFICIENT AND ENVIRONMENTALLY FRIENDLY INSULATION WEBS

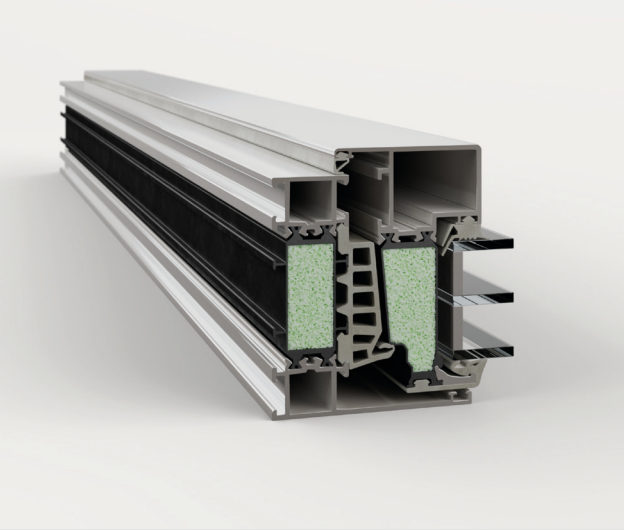
Problem – Challenge

Insulation webs are ubiquitous in buildings: They are stuck inside aluminum and metal profiles for windows and facade glazing – as thermal separators between the outside and inside, because cold or heat would otherwise flow unchecked through the metal frames. An inconspicuous component, but one that is becoming ever more important due to global warming and the urgent need to curb CO_2 emissions – and there is potential for improvement: insulation webs with even lower thermal conductivity and a higher level of sustainability.

Solution

A team from Empa's Mechanical Systems Engineering lab, together with experts from the Swiss company hochuli advanced, has developed a novel variant. The highlight of the Alpet insulation web: Inside the glass-fiber-reinforced plastic is a foam strip made of PET from recycled bottles. Within this layer, numerous air pores provide efficient insulation: The thermal conductivity of the prototypes averages about 0.1 W/mK, depending on the web width – far less than a standard insulation web made of polyamide (about 0.25 W/mK) and significantly lower than high-end products available today.

Turning the idea into a viable product required a lot of conceptual work. Take the production method, for instance: After testing different processes, the experts decided on extrusion, in which heated, molten plastic is pressed through a slot as a soft dough and shaped in this way. From numerous samples, the developers distilled seven variants for testing, from which the final prototype emerged as the basis for commercial products. According to hochuli advanced, there are already official certifications for fire behavior, static load capacity and thermal insulation. Detailed tests are also carried out by the manufacturers in their own laboratories and with their own profile systems. Negotiations on this are underway; the first customers are already involved in trials.



*Alpet insulating web made of plastic.
The greenish color of the filling material
comes from the use of PET from recycled bottles.
Image: Hochuli advanced*

CASE STUDY

DOPPL – PERSONALIZED MEDICINE IN ACTION

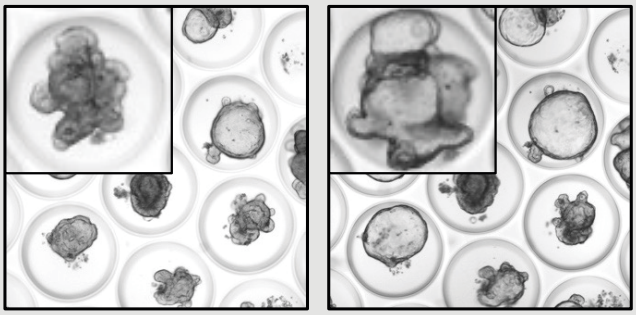
Problem – Challenge

Personalized medicine presents both promising opportunities and significant challenges in the realm of healthcare. Tailoring medical treatments to an individual's unique genetic makeup, lifestyle and environment holds the potential to revolutionize patient care, leading to more effective and targeted treatments. While genetics plays a crucial role in personalized medicine, it has proven not sufficient on its own. While genes can provide valuable insights into predispositions, they do not account for the full complexity of health outcomes. Interactions between multiple genes are often intricate and not fully understood. Genetic testing may reveal certain risk factors, but it remains a mere prediction to disease development and outcome. The hurdle is to develop a laboratory test to predict patient-specific treatment responses based on genetic information.

Solution

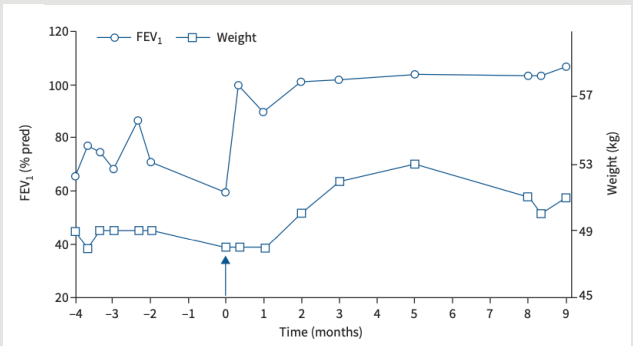
DOPPL is a 2022 spin-off of SUN bioscience with a business focus on the application of organoids in pharmaceutical pre-clinical testing and clinical personalized medicine strategies. Organoids have emerged as a powerful tool in the field of personalized medicine, offering the potential to revolutionize how we approach disease treatment.

In the first case study in Switzerland, DOPPL worked with the University Hospital of Lausanne (CHUV) and EPFL on organoid guided treatment prescription for Cystic Fibrosis (CF) patients suffering from rare and poorly characterized mutations that are not eligible for modern CF medications. Based on organoid data generated by DOPPL, a young CF patient was prescribed a CF modulator medication, that within the course of 10 days, lead to a complete restoration of lung function.



Case study of a complete restoration of lung function following organoid-guided treatment with a CFTR modulator in a patient with the rare 1677delTA/R334W genotype.

Patient organoids before and after CF medication screening.



Evolution of lung function and body weight over time. The black arrow indicates the date of CF treatment start.

APPENDIX 1 – INSTITUTIONS WITH TECHNOLOGY TRANSFER ACTIVITIES CONTACTED FOR THE SURVEY AND COMMENTS ON THEIR DATA PROVIDED

Universities	TT-Office	Comments on data provided
Ecole Polytechnique Fédéral (EPF) Lausanne	TTO	Complete data, research contracts <50 kCHF only partly
Eidgenössische Technische Hochschule (ETH) Zürich	ETH transfer	Complete data, research contracts <50 kCHF only partly
Universität Basel / Universitätsspital Basel	Unitectra	Only aggregated data, data only for the Medical, Natural Sciences and Psychology Faculties, partial data for hospital
Universität Bern / Inselspital	Unitectra	Only aggregated data, data only for the Medical, Vetsuisse and Natural Science Faculties, no data for research agreements of other faculties
Université de Fribourg, including Adolphe Merkle Institute	Tech Transfer Fribourg	Partial data, not all contracts pass through TTO, especially SNSF or EU-grants are treated separately
Université de Genève / Hôpitaux universitaires de Genève	Unitec	Complete data for commercialization activities, research contracts
Université de Lausanne / Centre Hospitalier Universitaire Vaudois Lausanne	PACTT	Complete data for commercialization activities, research contract
Université de Neuchâtel	TTO	No data
Università della Svizzera italiana (USI) / Institute for Research in Biomedicine (IRB) / Institute for Oncology Research (IOR)	SRIT	Complete data
Universität Zürich / Universitätsspital	Unitectra	Only aggregated data, data only for the Medical, Vetsuisse and Natural Science Faculties, no data for research agreements of other faculties

Universities of Applied Sciences	TT-Office	Comments on data provided
Berner Fachhochschule (BFH)	TTO	No data
Fachhochschule Nordwestschweiz (FHNW)	TTO	Data available from School of Life Sciences (HLS)
Ostschweizer Fachhochschulen (OST)	TTO	No data due to reorganization
Zürcher Hochschule für Angewandte Wissenschaften (ZHAW)	Ressort F&E	Only data on TT FTEs (School of Engineering, Life Sciences, Facility Management and the Ressort F&E)
Lucerne University of Applied Sciences and Arts (HSLU)	Ressort F&E	No data
Haute Ecole Spécialisée de Suisse occidentale (HES-SO)	HES-SO	No data
Scuola Universitaria Professonale della Svizzera Italiana (SUPSI)	SUPSI	No data

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

Following universities with main scope in humanities were not contacted:
University of Lucerne, University of St. Gallen, FHS St. Gallen – University of Applied Sciences

APPENDIX 2 – DETAILED DATA 2013 – 2022

All Public Research Organisations	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Full-time equivalents (FTE)	60.0	63.5	64.3	68.4	79.3	81.2	84.9	85.5	88.1	90.3
Research contracts (incl. EU contracts)	2680	2560	2723	2906	2844	3024	2933	3078	3096	3016
Invention disclosures	495	540	599	650	637	626	604	627	618	587
Priority patent applications	268	311	295	342	298	340	317	327	333	331
Active patent cases end of the year	1912	1960	2182	2388	2505	2567	2696	2776	2960	3408
License agreements	182	184	217	247	213	250	227	213	207	173
Active license agreements end of the year	1332	1435	1472	1588	1412	1541	1647	1462	1366	1485
License agreements with revenues in resp. year	368	373	246	461	450	380	400	442	605	510
New start-ups	54 (37)	63 (39)	64 (41)	69 (46)	70 (51)	73 (40)	82 (58)	86 (53)	80 (32)	70 (28)

Universities	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Full-time equivalents (FTE)	52.3	56.1	55.5	59.2	70.2	70.3	73.7	74.5	77.1	79.3
Research contracts (incl. EU contracts)	2360	2195	2303	2465	2435	2574	2508	2603	2548	2493
Invention disclosures	458	508	565	606	593	592	568	589	579	558
Priority patent applications	244	281	262	320	271	314	293	301	307	304
Active patent cases end of the year	1779	1839	2008	2202	2318	2376	2492	2560	2743	3179
License agreements	167	168	192	229	198	228	206	189	173	163
Active license agreements end of the year	1213	1320	1352	1478	1313	1438	1543	1393	1306	1430
License agreements with revenues in resp. year	337	339	203	410	429	357	373	414	584	491
New start-ups	49 (35)	61 (38)	58 (41)	64 (44)	61 (44)	71 (38)	78 (54)	80 (49)	77 (32)	65 (27)

UAS	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Full-time equivalents (FTE)	26.1	22.2	24.9	24.0	21.6	30.0	28.4	16.2	14.6	n.a.
Research contracts (incl. EU contracts)	1254	677	574	442	727	871	944	353	372	n.a.
Invention disclosures	80	10	9	9	10	36	27	7	4	n.a.
Priority patent applications	2	1	3	1	2	17	12	7	2	n.a.
Active patent cases end of the year	39	9	9	41	14	44	48	22	23	n.a.
License agreements	19	3	3	4	2	23	10	6	8	n.a.
Active license agreements end of the year	19	2	2	18	1	17	16	5	1	n.a.
License agreements with revenues in resp. year	18	3	3	1	1	9	15	1	1	n.a.
New start-ups	19 (8)	18 (10)	9 (6)	5 (2)	2(1)	16 (4)	20 (5)	4 (2)	3 (2)	n.a.

RI	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Full-time equivalents (FTE)	7.7	7.4	8.8	9.2	9.1	10.9	11.2	11.0	11.0	11.0
Research contracts (incl. EU contracts)	320	365	420	441	409	450	425	475	548	523
Invention disclosures	37	32	34	44	44	34	36	38	39	29
Priority patent applications	24	30	33	22	27	26	24	26	26	27
Active patent cases end of the year	133	121	174	186	187	191	204	216	217	229
License agreements	15	16	25	18	15	22	21	24	34	10
Active license agreements end of the year	119	115	120	110	99	103	104	69	60	55
License agreements with revenues in resp. year	31	34	43	51	21	23	27	28	21	19
New start-ups	5 (2)	2 (1)	6 (0)	5 (2)	9 (7)	2 (2)	4 (4)	6 (4)	3 (0)	5 (1)

For new start-ups the numbers in parentheses refer to start-ups on basis of a formal license.
The number of the institutions that participated in the survey varies between years.

APPENDIX 3 – KEY PARAMETERS FOR INDIVIDUAL INSTITUTIONS FOR 2022

Institution	Name TTO	Start TTO	# of TTO FTE	# research contracts	# of invention disclosures	# of priority applications	# of IP agree-ments	# of start-ups
Universities								
Ecole Polytechnique Fédéral (EPF) Lausanne	EPFL-TTO	1993	15.4	259	144	86	43	21
Eidgenössische Technische Hochschule (ETH) Zürich	ETH transfer	1995	26.1	652	170	104	29	26
Universität Basel / Universitätsspital Basel Universität Bern / Inselspital Universität Zürich / Universitätsspital Zürich	Unitectra	1999	13.4	1230	158	77	66	10
Université de Genève / Hôpitaux universitaires de Genève	Unitec	1998	10.2	78	43	21	8	5
Université de Lausanne / Centre Hospitalier Universitaire Vaudois Lausanne	PACTT	2000	10.2	204	29	8	13	2
Università della Svizzera italiana (USI) / Institute for Research in Biomedicine (IRB) / Institute for Oncology Research (IOR)	SRIT	2018	2.0	45	6	3	3	0
RI								
Swiss Federal Institute for Materials Science and Technology (Empa)	Empa-Eawag TTO	2005	4.0	196	18	18	10	2
Swiss Federal Institute of Aquatic Science and Technology (Eawag)	Empa-Eawag TTO	2001	1.7	63	1	0	0	3
Paul Scherrer Institut (PSI)	PSI TTO	1999	5.3	264	10	9	n.a.	n.a.

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

GLOSSARY

EPF	Ecoles Polytechniques Fédérales
ETH	Swiss Federal Institutes of Technology
EU	European Union
FTE	Full Time Equivalent (for the number of employees)
IP	Intellectual Property
MTA	Material Transfer Agreement
NDA	Non-Disclosure Agreement
PRO	Public Research Organisation
RI	Swiss Federal Research Institutions in the ETH domain
SME	Small- and Medium-sized Enterprises (<250 employees)
SNSF	Swiss National Science Foundation
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
swiTT	Swiss Technology Transfer Association
TT	Technology Transfer
TTO	Technology Transfer Office(s)
UAS	Universities of Applied Sciences
UNI	Cantonal Universities and Swiss Federal Institutes of Technology

CASE STUDY

UNIVERSITÉ DE FRIBOURG
UNIVERSITÄT FREIBURG

XEMPERIA®
bio-inspired diagnostics

BLOOD TEST FOR BREAST CANCER DETECTION AND MONITORING

Problem – Challenge

Breast cancer is the leading cause of cancer-related mortality in women. Currently, mammography screening is the primary method for breast cancer detection, however, it has some significant drawbacks, such as limited specificity and sensitivity, unpleasant procedure, low compliance, and the risk of X-ray-induced DNA damage. Additionally, as more and more effective therapies for advanced breast cancer are entering clinical practice, there is a growing need for detecting relapses as early as possible to effectively adapt therapy, but no specific tests exist for this purpose. The absence of such testing approaches often leads to an (unnecessary) overtreatment and delays in adjusting the therapy, causing unwanted consequences not only for the patients but also for physicians and the healthcare system. To fill these gaps, the team – led by Prof. Curzio Rüegg, MD – is currently working on a first-in-class blood test for the early detection of breast cancer and active monitoring of post-cancer treatment evolution.

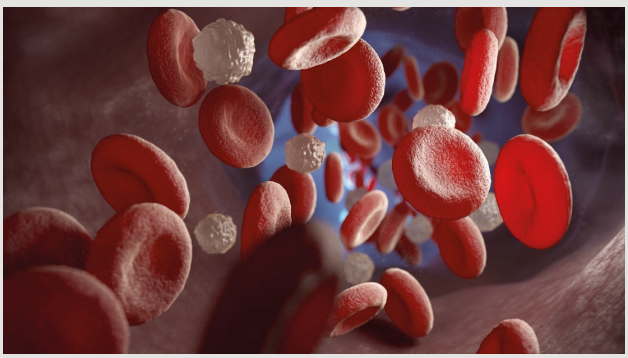


Photo: licensed from Adobe Stock Images

Solution

The project aims at introducing a new generation of advanced diagnostic solutions in medicine for benefitting patients and society as a whole. In collaboration with clinical partners, the University of Fribourg team has been addressing this outstanding challenge by setting up a novel multi-omics approach to identify biomarkers associated with the presence of primary or metastatic breast cancer. This is a ground-breaking idea compared to the traditional method of detecting cancer-derived biomarkers.

The test is based on multiple cancer-induced alterations in blood leukocytes in response to the tumour. The organism's response is detected by monitoring protein and gene expression changes in circulating immune cells. In order to enhance target detection, advanced bio-inspired nano-sensors based on DNA-origami nanotechnology were developed by the team. These nanosensors allow for the detection of multiple targets (multiplexing) at pico-femtomolar concentrations with minimal preanalytical processing and preparation, and with fluorescence readouts that are compatible with the existing diagnostic equipment, such as fluorimeters.

This blood-based screening test for breast cancer has significant and numerous implications. Such a novel screening test can revolutionize the breast-cancer screening process. The screening could be performed more frequently without any radiation exposure risk, and with increased specificity and sensitivity compared to mammography. Also, the test could serve as a complementary method to traditional mammography and other imaging approaches. Importantly, the test would be integrated into the existing follow-up protocols for monitoring patients during and after adjuvant therapy to rapidly detect potential breast cancer relapses. As new drugs and protocols are being developed to effectively treat relapses, there is a strong interest and need to detect relapses as soon as possible to maximize the efficacy of these novel treatments.

CASE STUDY

Hôpitaux Universitaires Genève

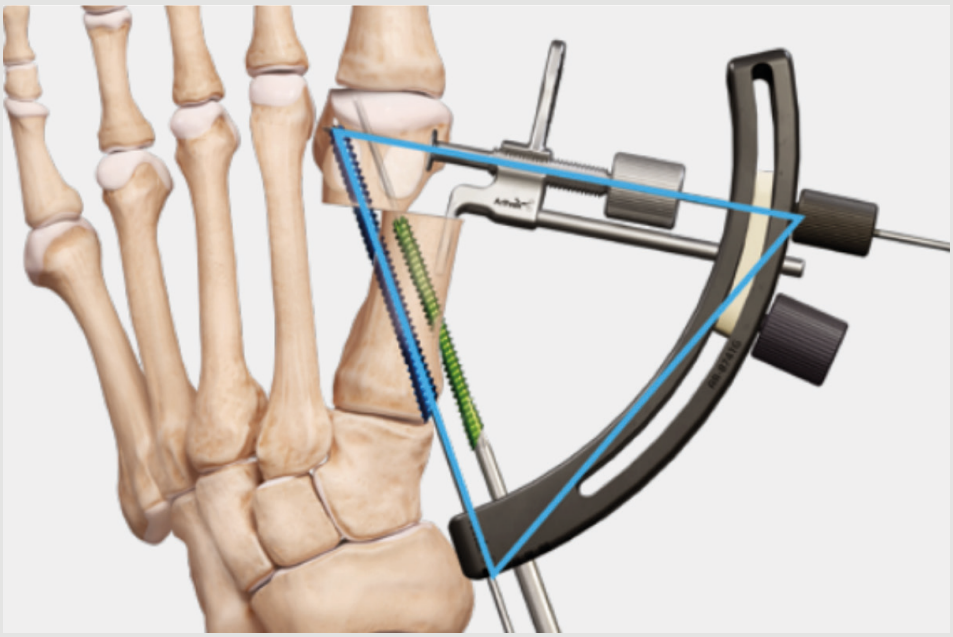
MINIMALLY INVASIVE BUNIONECTOMY SYSTEM

Problem – Challenge

Our feet often change as we get older and a bump, known as bunion (medical term: Hallux valgus) may start appearing on the joint when the big toe starts leaning in towards the other toes. It is estimated that about 1 out of 3 people over the age 65 have a bunion to some degree, which are far more common in women than in men. Bunions can vary a lot in severity and can cause severe problems with chronic pain. Surgery is then the only way to treat the cause of the symptoms by correcting the misalignment. It consists of cutting the toe bone to straighten the affected joint with pins or screws. The difficulty of this surgery is to place the screw correctly to obtain an optimal result.

Solution

In collaboration with the company Arthrex Inc., Dr. Dubois-Ferrière at HUG invented a new minimally invasive Bunionectomy System. This new surgical instrument has been conceived to allow precise and reproducible targeting of the placement of the screw. A patent for this invention was filed by Arthrex Inc. and an agreement was signed between HUG and Arthrex Inc. to ensure the commercialization of this medical device, starting in 2022.



Minimally Invasive Bunionectomy System commercialized by Arthrex Inc

APPENDIX 4 – THE QUESTIONNAIRE

swiTT Technology Transfer Survey 2022 (online survey)

Preliminary Notes:

- ► All questions refer to the previous calendar year. Please make your statements accordingly.
- ► If no answer is available for certain questions, please indicate with "**-1**". Questions for which your office or your institution does not collect data should be as well indicated with "**-1**" and should not be answered by giving an estimate.

1. Confidentiality

Do you agree to the publication of your individual data collected in the questions marked [pub] under your institution name? ☐ Yes ☐ No

Note: In case you tick "Yes", your input for the questions marked [pub] will be published both in aggregated format as well as related to your institution (in the Appendix 3). In case you tick "No", your input for the questions marked [pub] will be published in aggregated format only.

2. Background Information

2.1 Name of the academic institution

2.2 Is your institution associated with a university hospital? ☐ Yes ☐ No

Note: If "Yes", all figures given below should include the numbers of the hospital(s).

2.3 Does your institution have a dedicated office (TTO) / responsible person for TT activities? ☐ Yes ☐ No

If "Yes", in which year did the TT program start? [pub]

2.4 Name of the responsible contact person for the survey

2.5 Contact information of the TTO (or the responsible person for TT activities)

Name Institution:	
Name TTO:	
Street:	
Postal Code:	
City:	
Telephone (1):	
Telephone (2):	
E-Mail:	

3. Activities and Human Ressources

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) Support and/or Coaching of start-up projects	☐ Yes	☐ No
(E) Financial administration of research projects	☐ Yes	☐ No

3.2 Full time equivalents FTE employed in your TTO on Dec. 31st of last year [pub] FTE

Note: Please consider staff with main occupations (> 20%) in the area of technology transfer, such as 'Licensing Officers', 'Intellectual Property Managers', 'Technology Managers', or 'Research Contract Officers'. Please do not include project managers carrying out transfer projects.

3.3 Of these FTE, how many were employed to work on

(A) Technology transfer activities	FTE
(B) Administration and general management	FTE

Comment 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)

4. Research and Development

4.1 Total number of new research contracts handled by your TTO [pub]

Note: The number should include collaboration agreements, service agreements, clinical trial agreements, Innosuisse complementary and EU agreements. The number should not include MTAs, NDAs, other TT contracts (see 4.3) and SNSF contracts.

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?

Note: Companies with 250 or less employees should be considered as SME.

SME:	
Large Company:	
Public Institution:	
Multiple Partners:	
Don't know:	

4.2 Amount of cash payments due to your institution from research contracts that were handled by your TTO according to 4.1 CHF

Note: Please give the amount of cash due to your institution, without any material assets e.g. for machinery. Please consider not the total amount of research projects, 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. Please do not split the amount if the contract is covering several years but report the full amount in the year the contract is signed.

4.3 Number of other technology transfer contracts handled by your TTO

Note: Please consider non-disclosure agreements (NDA), Material Transfer Agreements (MTA), consulting contracts, inter-institutional contracts, sponsoring, donations. Please do not include the contracts already considered for 4.1 and do not include license, optioan and sales agreements.

Comment 4.1 - 4.3
(e.g. restrictions/regulations of your institution. Knowledge of ALL contracts or only contracts above a certain amount)

5. Patent-Related Activities

5.1 Number of invention disclosures received by your TTO [pub]

5.2 Number of priority applications filed by your TTO
Note: Priority application being the very first application in any patent office.

5.3 Overall number of active patent cases at the end of last year managed by your TTO

Note: Active patents cases are pending patent applications or granted patents on an invention (patent family). Applications in various countries on one invention (claiming the same priority date) 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 CHF

Note: Amount should include all external costs for patent filing, prosecution, maintenance, litigation, expenses or costs for drafting or support in negotiation of contracts.

6.2 Amount of patenting costs and legal fees invoiced to commercialization partners CHF

Note: Amount should not include patenting costs or legal fees paid directly by licensees or external partners to patent attorneys, patent offices or other service providers.

7. License, Option and Sales Agreements

7.1 Number of license / option / sale agreements of protected or unprotected IP your TTO did execute [pub]

Note: Please count only the agreements for different technologies, i.e. 30 licenses for the same software library count as one agreement. 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 should not be included in this question unless the invention / software that is licensed / sold exists already at the execution date of the research contracts (background IP).

Of these license / option / sale agreements, how many were licensed to SME, how many to large companies or public institutions?
Note: Companies with 250 or less employees should be considered as SME.

SME:
Large Company:
Public Institution:
Multiple Partners:
Don't know:

7.2 Number of license / option / sale agreements including equity?
Note: Equity shall mean 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 Overall number of license/option/sale agreements active as of December 31 last year

Comment 7.1 - 7.3
(e.g. large variations to previous years, special situation, i.e. with free software licenses, openBSD, etc)

8. Number of License Agreements

8.1 Total number of license / option / sale agreements yielding revenues

8.2 Total number of license / option / sale agreements yielding running royalties
Note: Running royalties are based on product sales and are only due after the launch of a product in the market.

9. Start-up companies (*)

9.1 Total number of start-up companies formed at your institution [pub]

(A) Of these start-up companies, how many are dependent on license / option / sale agreement(s) with your institution?

(B) Of these start-up companies, how many are dependent on unprotected know-how or technology of your institution (without formal agreement)?

9.2 Number of new start-up companies in which your institution holds equity

(*) As "Start-up company" all enterprises should be considered, that had their first entry in the trade registry in the previous year and that have a business case dominantly based on research of your organisation and that have at least one (co-)founder with affiliation to your organisation (employee, graduate, alumnus).

10. Post-Licensing Activities

Number of your institution's licensed technologies that became available for consumer or commercial use last year
Note: If you have success cases for publishing in the report, please use the template sent to you or contact swiTT.

Comments

(if you want to bring additional comments or suggestions to the attention of the team of the swiTTreport, please post them here)

20 Years swiTT
swiss technology transfer association

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 120 members from all parts of Switzerland. Most of them work in technology transfer at public esearch 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.**

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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.

IMPRESSUM

Editor
swiTT – Swiss Technology Transfer Association
3000 Bern
office@switt.ch I www.switt.ch I https://www.linkedin.com/company/switt

Printed by
Druckerei Lutz AG, 9042 Speicher, Switzerland