"Tell me and I forget, teach me and I may remember, involve me and I learn."
Origin of quote: https://quoteinvestigator.com/2019/02/27/tell/

Health Sciences e-Training Foundation

Annual report 2023

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1. Executive summary

1.1. Preamble

The Health Sciences e-Training Foundation (HSeT) is a Swiss non-profit organisation created in 2006. Its mission is to work with a broad network of leading experts from all over the world to develop online training programs in the field of health and life sciences.

Training programs developed by HSeT are provided via institution-specific websites and are designed to enrich existing curricula or develop new ones. These websites can be accessed by trainees in a self-directed manner to permit self-learning activities that can be combined or not with traditional face-to-face teaching.

HSeT develops e-learning programs that are tailored to the needs of specific groups of trainees as defined by the institutions themselves. This customised online training (COLT) approach integrates novel pedagogical strategies and tools to map and assess each individual student's progress at every step.

1.2. Foreword from the Executive Committee

Over the years, HSeT has developed a broad portfolio of e-training programs in collaboration with local, Swiss, European, and international partner institutions. During 2023, HSeT has sustained, updated, and ameliorated the existing programs, which remain highly successful. Only 1 program, the international Master of Advanced Studies (MAS) in vaccinology (IMVACC), was terminated because of the priorities of the institutional partner (UNIL/CHUV).

A major effort was devoted in 2023 to the enrichment of HSeT's portfolio by the development of two challenging new programs and by a substantial strengthening and extension of a third existing program. These three programs are now considered to be key "flagship" programs for the future of HSeT. They include an international Certificate of Advanced Studies (CAS) in biobanking, an international Master of Advanced Studies (MAS) in translational oncology (ONCOMAS), and an international e-training program in gerontology and geriatrics (e-Trigger). A shared mission of these three programs is to increase HSeT's international visibility, and to render its e-learning expertise and resources available to participants from low- to middle-income countries, where there is marked lack of distance learning opportunities comparable to those offered by HSeT.

To follow up on a discussion held during the Foundation Board meeting in 2022, a new initiative carried out successfully in 2023 was the creation and implementation of the first example of a proprietary HSeT-certified online course, namely a course on data analysis for the health sciences and medicine. As this course relies entirely on e-learning resources created by HSeT, it was developed independently of an external partner. The first edition of the course was very successful and future editions are planned. Furthermore, this course constitutes a promising test case for the development of

similar proprietary online courses in other disciplines, for which substantial amounts of e-learning resources already exist.

Another development implemented in response to a recommendation made during the Foundation Board meeting of 2022 was the formal constitution of a Scientific Advisory Board (SAB). The mandate of this SAB is to constitute a forum for independent discussions on strategic scientific, educational, and operational issues facing HSeT, and to advise the Executive Committee on these issues.

The continued recruitment of new members to HSeT's team has broadened the range of scientific expertise represented within the foundation, has favored concretization of the developments mentioned above, thereby contributing to the strengthening of HSeT's national and international standing, and has further boosted its already highly motivated and dynamic work environment.

With the aim of increasing international visibility of HSeT, thereby favouring the potential establishment of new partnerships as well as the recruitment of participants to its online education programs, an effort has been made to strengthen HSeT's presence on social media platforms (LinkedIn, Instagram, and YouTube).

Thanks to the maintenance of existing revenues, the acquisition of new sources of income, and the careful management of resources, remuneration of staff members, running costs, and the outsourcing for information technology (IT) and infographics support, HSeT has managed to maintain a stable and well-balanced budget and can face the coming year with optimism. However, ensuring sufficient income remains an ongoing challenge and a major priority of HSeT's Executive Committee. Of note in this respect, the new flagship programs, as well as the possibility of creating additional proprietary courses, offer robust new opportunities for securing funding.

Lastly, the executive committee is extremely grateful to all those without whom sustaining HSeT's mission would be impossible. We are particularly keen to express our sincere thanks to all members of the HSeT team for their enthusiastic participation in its activities, to HSeT's partner institutions for their confidence in our foundation, and to HSeT's sponsors for their generous support.

2. New Flagship Programs

2.1. e-Training Program in Gerontology and Geriatrics

Program description: In collaboration with the International Association of Gerontology and Geriatrics (IAGG) Federation of Geriatric Education (FGE), HSeT has developed an e-training program called e-TRIGGER (Figure 1), which is an acronym for "e-TRaining In Gerontology and GERiatrics". e-TRIGGER is an online training program aimed at forming the future generation of worldwide leaders in Gerontology and Geriatrics. The e-TRIGGER programme ASIO, which was first implemented in 2022, is destined for

Fig 1. Home page of e-TRIGGER

healthcare professionals in Asia and Oceania. The success of this course has prompted extension of the program to two other regions of the world, namely a) the AFMEE program for Africa, the Middle East and Europe, which was initiated in May 2023, and b) the SANAM program for South and North America, which will start in 2024.

ASIO: Following the first successful ASIO program in 2022, a second course was organized in 2023. The online training sessions comprised presentations by experts, case studies and discussions as depicted in Figure 2, and covered topics related to the science of muscle ageing, physical frailty, dementia, cognitive impairment, falls and fractures, geriatric pharmaco-therapy, gerontechnology, life course vaccination, and advance care planning. The sessions were recorded and loaded onto HSeT's e-Learning platform. Each session is punctuated by a brief exam.
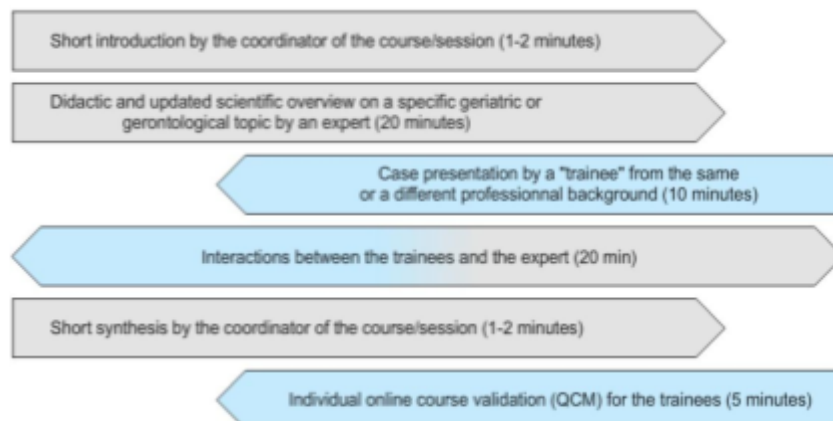

Fig 2. Structure of a 1-hour ASIO e-Learning session: activities and interventions of experts (grey) and trainees (blue).

AFMEE: Following the initial success with the ASIO program, IAGG World decided to support the AFMEE program for training in Africa, the Middle East and Europe. The first AFMEE course started in May 2023 and will finish in April 2024. The format of the online sessions was the same as that described above for ASIO and were recorded and made available on the e-learning platform of HSeT. Further-more, PowerPoint presenta-tions and references were used by HSeT to create webpages containing images and animations aimed at facilitating access to e-learning material once the sessions are over. An example of an image is presented in Figure 3, which shows the relationship between low muscle mass and low muscle function in sarcopenia.
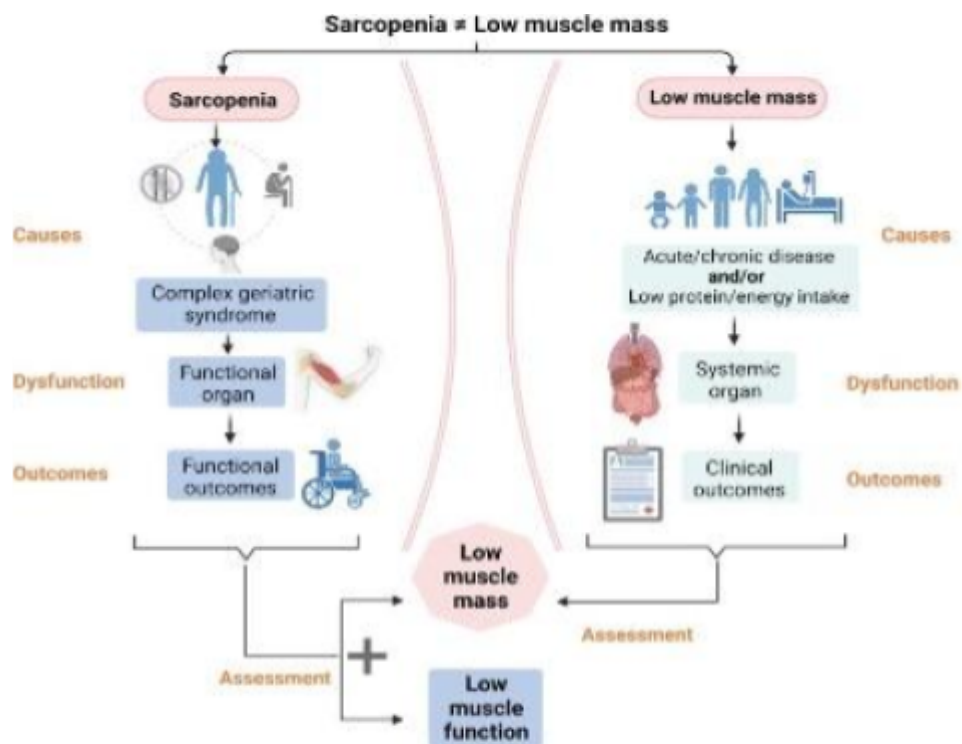

Fig 3. Illustration from one of the lectures on sarcopenia

SANAM: A third e-training program equivalent to ASIO and AFMEE destined for participants in South and North America is expected to start in 2024.

Students: The ASIO e-TRIGGER program was followed in 2023 by 145 participants from Japan, China, Taiwan, India, Thailand, Singapore, and Australia, amongst others. The AFMEE e-TRIGGER program started in 2023 with approximately 300 participants.

Project partners: The e-TRIGGER program is the fruit of a collaboration between the International Association of Gerontology and Geriatrics (IAGG) and HSeT.

Certification and credits: In 2023, 56 ASIO participants succeeded in obtaining an IAGG World certificate. Moreover, they received 36 EACCNME (European Accreditation Council for Continuing Medical Education) credits, which are valid in Europe, Canada, and the USA.

HSeT's pro bono activities: In 2023, members of HSeT devoted an estimated total of 143 hours of *pro bono* work to development of this program, which amounts to the equivalent of 14'300 CHF at a rate of 100.- CHF/hour.

Costs and revenues: IAGG Word funded the first two programs in 2022 and 2023. To cover program costs in the future, tuition fees will be introduced as of 2024. The tuition fees will vary as a function of Gross National Income per capita data (World Bank Atlas method). For 2024, we have already received ~15'000 CHF in tuition fees for the 2024 ASIO course. To ensure additional support for continuation of the program, the eTRIGGER team has solicited financial contributions from foundations active in the field of aging and related health issues. Two proposals were submitted by the end of 2023 and decisions will be communicated by the end of March 2024.

## 2.2. Continuous education program in translational Oncology (ONCOMAS)

Program description: Cancer remains one of the leading causes of death in the world, and represents a tremendous burden on patients, families, and societies, especially in low/middle income countries. The development of novel therapies and diagnostic tools depends heavily on the integration of basic and clinical science. There is a lack of international postgraduate training programs in Switzerland and Europe. Most offers in oncology are Master of Science (MSc) programs aimed at furthering academic training rather than continuous education programs aimed at healthcare professionals.

We have therefore initiated the development of a new online continuous education program in translational oncology (ONCOMAS) using innovative e-learning approaches to effectively promote integration in the rapidly changing field of oncology. The explanatory memorandum has already obtained a positive notice from the dean's office and the rectorate at the University of Geneva.

The planned Certificate/Diploma/Master of advanced studies (CAS/DAS/MAS) program will be open to i) physicians, graduates in biology, human medicine, or engineering in the life sciences who wish to improve their knowledge in research and/or work towards the development and implementation of therapeutics in the field of oncology, ii) medically oriented scientists who pursue clinical research in oncology, iii) healthcare professionals employed in the oncology-oriented industrial sector, and iv) collaborators of non-governmental organisations working for health authorities wishing to expand their knowledge in the field of oncology.

Students: The program will target national and international students. It will rely heavily on diverse e-learning formats to favour the participation of students from low/middle income countries. We anticipate the participation of up to 12 to 18 students per class.

Project partners: The program is an initiative by members of the Swiss Cancer Center Léman (SCCL), the Universities of Geneva (UNIGE) and Lausanne (UNIL), the two University Hospitals of Geneva and Lausanne (CHUV and HUG) and the Swiss Federal Technology Institute of Lausanne (EPFL). HSeT will
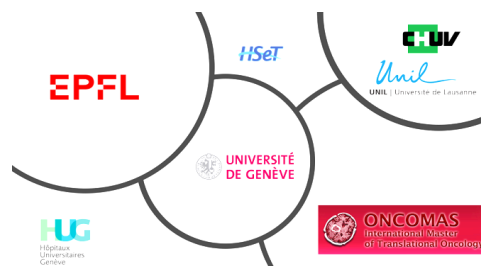
provide its expertise in distance learning. The leading house will be UNIGE.

Certification and credits: Certificates will be delivered by UNIGE. The structure of the designed program is modular. Depending on the students' interests and commitment he/she can select single modules to obtain a CAS certificate (10 ECTS credits), 3 modules to obtain a DAS certificate (30 ECTS credits) or 5 modules to obtain a MAS certificate (60 ECTS credits).

HSeT's pro bono activities: The project is supported with respect to content development by several members of HSeT's team in the form of *pro bono* activities. In 2023, members of HSeT devoted an estimated total of 480 of *pro bono* work to this course, which amounts to the equivalent of 48'000.- CHF at a rate of 100.- CHF/hour.
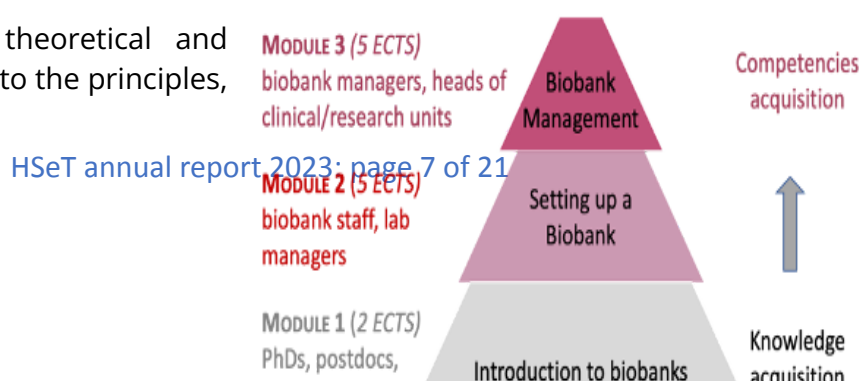
Costs and revenues: The overall projected costs for the development phase of ONCOMAS are estimated to be in the range of 400'000 CHF. Salary costs for project development are expected to be 48'960.- CHF per year. An initial contribution of 100'000.- CHF for project development was provided by Lombard and Odier. An additional in-kind contribution of 4'500.- CHF was provided by HSeT. To ensure further funding for project development, our strategy is to develop and perform the study program in parallel during 2024. Assuming a minimum number of 12 students enrolled in each module, we will be able to finance the development phase by reinvesting the inscription fees. Once active, running costs of the ONCOMAS program are expected to be in the range of 350'000 CHF per year. Revenues will depend on the number of participants, the number and types of scholarships obtained, and the tuition fees. To break even, an average of at least 12 MAS students plus 1 DAS or 2 CAS students per class would be needed.

2.3. Certificate of Advanced Studies (CAS) in biobanking

Project description: International demand for the creation and maintenance of biobanks is growing continuously because of the expanding number of available biospecimens, the development of sophisticated high-throughput technologies for analysing large collections of samples, an increasingly widespread reliance on state-of-the-art scientific and medical applications, and a growing focus on precision medicine and personalised health. There is consequently a dire need for well-trained experts in the field of biobanking, in academic and medical institutions in Switzerland, Europe and the rest of the world. Addressing this need requires well-structured continuing education and training programs in biobanking. Yet only a limited number of national and international courses are currently available. The creation of a certificate of advanced studies (CAS) in biobanking is thus highly timely and responds to an increasing unmet need.

The CAS will be open to a broad public, including healthcare professionals, researchers, clinicians, biobank managers and database managers from Switzerland and abroad. A particular effort will be made to favour the participation of students from low- and middle-income areas of the world, such as Africa.

The CAS will provide theoretical and applied training relevant to the principles,

MODULE 3 *(5 ECTS)* biobank managers, heads of clinical/research units — Biobank Management — Competencies acquisition

MODULE 2 *(5 ECTS)* biobank staff, lab managers — Setting up a Biobank

MODULE 1 *(2 ECTS)* PhDs, postdocs, — Introduction to biobanks — Knowledge acquisition

skills and operations required to create and implement new biobanks, or to further develop and professionally manage existing ones. It will consist of online content and learning activities dispatched in 3 progressively more complex modules, proceeding from basic knowledge acquisition to the development of practical and usable competencies. This organisation will permit targeting the needs of a broad audience, ranging from basic and clinical researchers for module 1 to biobank staff or laboratory managers for modules 1-2, and biobank managers or heads of clinical and research units dealing with biological samples for the entire CAS (modules 1-3). The following non-exhaustive list of themes will be addressed in the three modules: basics and importance of biobanking; governance and planning; quality management systems; biosafety & biosecurity; regulations; ethics, privacy, security, and informed consent; biospecimen collection, processing, storage, and distribution; data systems and records management; specificities of different types of biobanks (e.g. microbiological samples, healthy and pathological tissues, body fluids).

The Customised on-line training (COLT) paradigm developed by HSeT will be used, as it offers flexibility, accommodates the time constraints of trainees, reduces long-distance travel and on-site lodging/living expenses, and will therefore favour the participation of trainees from low- and middle-income countries. The bulk of the program will consist of online case studies, problem-solving exercises, and other self-learning activities performed online under the supervision of expert tutors, who will remain in regular online contact with the trainees to guide them, answer questions, follow their progress and maintain momentum. The acquisition of knowledge will be ascertained regularly based on their answers to quizzes associated with the online training activities and learning supports. The online training period will be followed by a limited number of face-to-face sessions comprising practical exercises and a final exam.

Students: Enrolment of the first students will start in June 2024. Once fully operational, the expected numbers of trainees are 30 for Module 1, 15 for modules 1+2, and 10 for the entire CAS. We will aim for a Swiss and international public. Fellowships will be sought for participants from low- and middle-income countries.

Project partners: The CAS is an extension of an online biobanking course that is offered by the Institut Pasteur (IP) Paris and is focused on infectious diseases. This course was created through a collaboration between the IP, the Network of Biological Resources of the IP (BIPnet), the European Virus Archive goes Global (EVAg), and the HSeT Foundation. The CAS proposed here is being created and will be managed by a partnership between the Faculty of Medicine of the University of Geneva (FACMED-UNIGE) the Swiss Biobanking Platform (SBP), the Institut Pasteur Paris (IP), and the HSeT foundation.
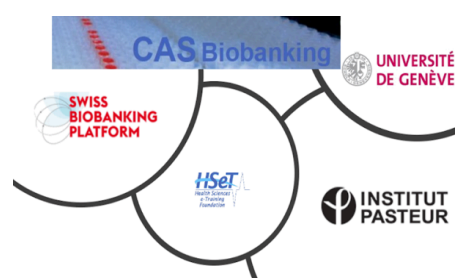
Certification and credits: Certificates will be delivered by UNIGE. The full CAS is valued at 12 ECTS corresponding to approximately 375-450 hours. The distribution of ECTS per module will be as follows: Module 1 – 2 ECTS, Module 2 – 5 ECTS, modules 3 – 5 ECTS.

Participants will be able to enrol in only Module 1, only Modules 1+2, or all three modules according to their background and needs. Certificates will be provided for each individual module but only completion of the CAS will be awarded a CAS diploma and the full 12 ECTS.

HSeT's pro bono activities: In 2023, members of HSeT devoted 279 hours of *pro bono* work to development of this course, which amounts to the equivalent of 27'900 CHF at a rate of 100.- CHF/hour.

Costs and revenues: The total estimated cost for CAS development is 200'000.- CHF. Part of the development costs has already been contributed through EVAg, which invested 49'000.- Euros towards development of the IP biobanking course, of which approximately 30% can be adapted and reused for the CAS. The FACMED/UNIGE has contributed a 20% salary (33'993.- CHF/year) for 2 years for coordinating CAS development. SBP has obtained a grant of 100'000.- CHF from the "Loterie Romande" for CAS development. The continuous education service of UNIGE has contributed 20'000.- CHF for CAS development. Once the CAS is up and running the entire budget will be covered by the students' tuition fees: 1'500.- CHF for Module 1, 4'000.- CHF for modules 1+2, and 6'000.- / CHF for the entire CAS. A share of revenues will be earmarked as an overhead for HSeT.

3. New initiative: HSeT-Certified Courses

3.1. Creation of HSeT-certified courses

A new initiative of the HSeT foundation is the creation of proprietary [HSeT-certified courses](). A first course example of such a course, on [Data Science for life sciences and medicine,]() was created and implemented successfully as a test case. Additional courses are planned.

3.2. Data science course for the life sciences and medicine

Course description: Our short course in data science is designed to equip professionals and students in the life sciences and medical fields with the essential skills and knowledge required to effectively analyze and interpret data and hence to improve decision-making in their research, patient management, and other activities. It is being offered in an online blended learning format.
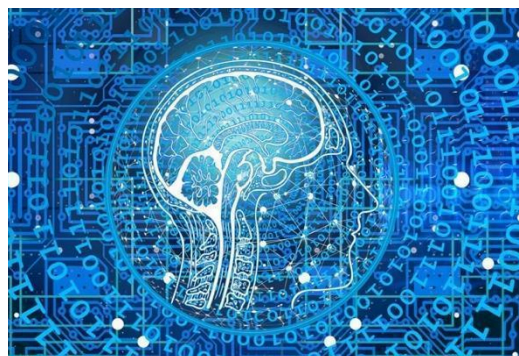
With a comprehensive curriculum covering approximately 95% of common statistical tests, this course provides participants with a solid foundation in data analysis. Through

a combination of distance learning, live coaching sessions, and hands-on examples, participants can acquire the necessary expertise required to work on their own data.

What sets this course apart from others is its connection to a master experiment, making it easier for the participants to grasp critical theoretical and practical aspects. This enables them to relate their own experiments and data to this core experiment, thereby fostering a deeper understanding of statistical concepts. Our e-tool serves as a plug-in tool, allowing the students to effortlessly apply the concepts they have learned to custom-created experiments and data.

Students: The program targets national and international students. The e-tool was used in 2023 in the framework of a new MS program in ultraprecision engineering at the University of Bern (UNIBE), and we are planning to use it in the department of biochemistry at the University of Lausanne (UNIL). Furthermore, in the framework of the new initiative of creating proprietary HSeT-certified courses, we have offered a 12-week online data science course. 23 Students from 6 different countries attended the course. The participation of 13 students from low-income countries was made possible through HSeT scholarships.

Project partners: The e-learning tool was developed in collaboration with members of UNIL and UNIBE.

HSeT's pro bono activities: In 2023, members of HSeT contributed directly to development of the e-tool in the form of 100 hours of *pro bono* work, which amounts to the equivalent of 10'000.- CHF at a rate of 100.- CHF/hour.

Costs and revenues: Costs for course development have been supported by the Foundation of Biochemistry of UNIL. Income based on registration fees was 4400 CHF.
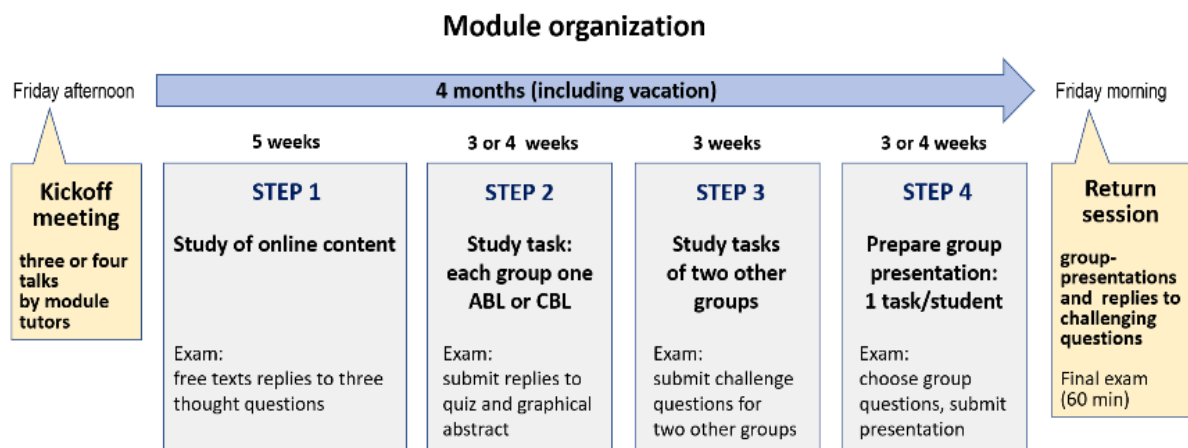
4. Other Active Programs

4.1. CAS/DAS in Translational Nephrology

Program description: This blended e-learning course in Translational Nephrology (TN), offered by the University of Zurich (UZH, leading house) and the University of Bern (UNIBE), leads to a joint Certificate (CAS) or Diploma (DAS) of Advanced Studies. The course offers a 2-year cycle of 6 modules covering the main topics in Nephrology (TN web site at UZH, TN web site at UNIBE).

Starting in 2012, the TN course was developed and run by HSeT together with principal investigators from the Swiss National Science Foundation (SNSF)-financed research network National Centre of Competence in Research (NCCR) Kidney.CH. Its original aim was the education of PhD students and postdocs of the NCCR in Kidney Physiology and Pathophysiology. From 2019 on, the program was progressively adapted and opened for nephrologists. Given that the NCCR ended in 2022, the academic lead of this course at the University of Zurich is now held by the newly created Zurich Kidney Centre.
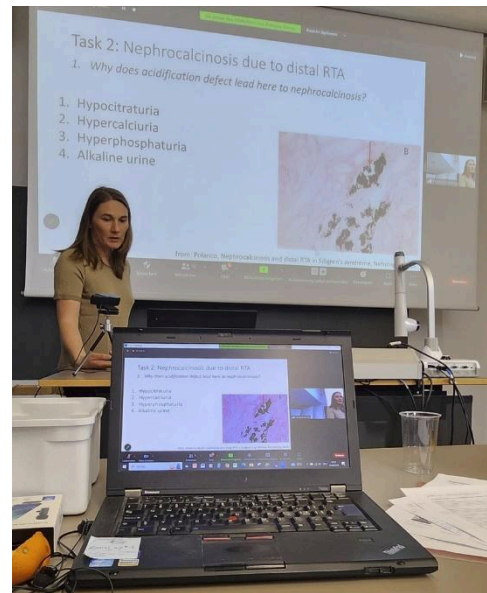
Participants in the TN course acquire and strengthen their basic knowledge in the pathophysiology of kidney diseases. The topics treated in the six modules of the program are 1) Salt, Water and Hypertension, 2) Acid-Base Homeostasis, 3) Calcium and Phosphate, 4) Oxygen Signalling and Cancer, 5) Metabolism and Kidney Function and 6) Inflammation and Immunology.

Module organization

Friday afternoon	4 months (including vacation)				Friday morning
	5 weeks	3 or 4 weeks	3 weeks	3 or 4 weeks	
Kickoff meeting three or four talks by module tutors	**STEP 1** Study of online content Exam: free texts replies to three thought questions	**STEP 2** Study task: each group one ABL or CBL Exam: submit replies to quiz and graphical abstract	**STEP 3** Study tasks of two other groups Exam: submit challenge questions for two other groups	**STEP 4** Prepare group presentation: 1 task/student Exam: choose group questions, submit presentation	**Return session** group-presentations and replies to challenging questions Final exam (60 min)

Students: There were 12 active participants at the end of 2023, half of which from Switzerland. The others 6 were from Vietnam, Armenia and Germany and took part online to the kick-off and return sessions held at the University of Bern. Eight of the twelve participants were nephrologists, the four others MD-PhD or PhD students.

Project partners: The CAS/DAS in TN is led by a steering committee (Leitender Ausschuss) that is chaired by Professor Johannes Loffing (UZH) and is composed of two Professors from UZH, two professors from UNIBE, one professor from the University of Lausanne and one professor from the University of Geneva. The HSeT Foundation is mandated to organise the course and Professor F. Verrey (HSeT and UZH) functions as the program chair (Studiengangleitung). Former members of the NCCR Kidney.CH and other selected ad hoc specialists function as tutors for the different modules.

Certification and credits: The structure of the program is modular. Depending on the students' interests and commitment he/she can complete 5 e-learning modules to obtain a CAS (15 ECTS credits), or by completing additional modules and a thesis to obtain a DAS (30 ECTS credits).

HSeT's pro bono activities: The steering committee, the program chair and the tutors work all *pro bono*. This represents currently about 750 h/year which, counting only CHF 100.-/h, amounts to CHF 75'000.-/year.

Costs and revenues: The entire development of the program was financially supported by the NCCR Kidney.CH, which from 2012 to 2022 paid >CHF 500'000.- and thereby also financed the participation of its PhD students and postdocs. As of 2019, with the opening of the course to nephrologists who are not part of the NCCR, new participants have paid CHF 500.- for each module, which amounts to CHF 3000.- for a CAS or CHF 4000.- for a DAS.

As the *pro bono* activity amounts to approximately CHF 75'000.- per year, the running costs of the course are relatively low. However, the periodic costs of new adaptations are not included. Fees paid by the students amount to 3 x CHF 500.- per year, which for 12 participants amount to CHF 18'000 per year. From this income 5% go to the UZH's further education program (as overheads) and 30% go to HSeT. A major portion of the remaining income (CHF 11'700) is used to finance secretarial support of the course organisation.
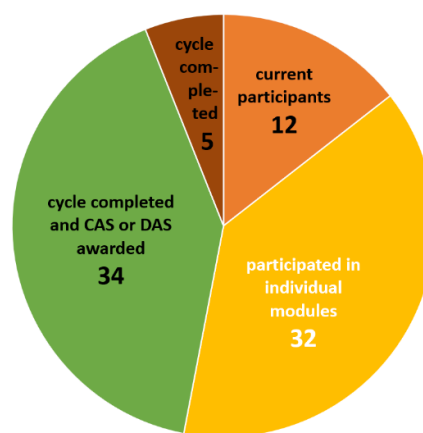
4.2. CAFE-S program

Program description: Prospective students are often unaware of the required levels when they decide to study sciences at university. This is particularly true for secondary but eliminatory subjects, such as mathematics for a bachelor's degree in biology or pharmaceutical sciences. This situation may result in failure or redirection to other studies and may also lead to a drop in the overall level of a class of students.

To remedy this situation, the Faculty of Science of the University of Geneva, in close collaboration with HSeT, launched in 2022 the [CAFE-S](#) program, which stands for "Conseils, Accompagnement, auto-Forma-tion et auto-Evaluation à la Faculté des Sciences". The aim of CAFE-S is to provide future students with the tools and framework necessary to assess and improve their level of knowledge in critical prerequisite disciplines.

CAFE-S focuses on mathematics, a core discipline for the various curricula in the Faculty of Science. The program is structured around three major axes: self-assessment, self-learning, and a refresher course. Self-assessment and self-learning are both implemented through cooperation with an international academic website, OMB+, hosted by the University of Aachen. In September, before the beginning of the fall semester, a week-long refresher course, including question-and-answer sessions, is organized with advanced mathematics students hired as tutors (see photo).

In 2023, CAFE-S expanded its offer of support to future students by developing a digital skills component. This integrates the reflections and work of the institutional [Make-IT-easy](#) project, which aims to evaluate and improve digital skills in the university community.

The program has received excellent ratings by students: the majority of the students deemed that it was useful and met expectations.

Students: In 2022 and 2023, the CAFE-S program was a great success with 123 (2022) and 144 (2023) participants in the course, corresponding in both cases to ≈25% of the future students in the Faculty of Sciences at the University of Geneva participated in the course. Approximately 20% of the participants were from Geneva, 32% from Switzerland, 48% from France and 19% from other countries. The participants were enrolled in the following bachelor programs: pharmaceutical sciences, biology, biochemistry, chemistry, mathematics, informatics, physics, and earth and environmental sciences.

Project partners: CAFE-S was the fruit of a close collaboration between HSeT and the Faculty of Science of the University of Geneva.

HSeT's pro bono activities: In 2023, the program organiser, who is a member of HSeT's steering committee, devoted approximately 320 hours of *pro bono* work to this program, which amounts to the equivalent of 32'000 CHF at a rate of 100.- CHF/hour.

Costs and revenues: The development of the program was financially supported by the University of Geneva, which contributed the salary of a 50% position to CAFÉ-S as coordinator for 3 years, in addition to the collaboration of professors, teachers and

academic advisors. Moreover, CAFÉ-S obtained 30'000.- CHF for 3 years from the Moser Foundation. Of this amount, 23'000.- were used in 2022 and 2023 to train and support 9 tutors hired to assist students during the refresher course. This leaves CAFÉ-S with 6'300.- left for 2024, which will be sufficient because tutors will no longer need to be trained and fewer tutors will be needed. It will be necessary to obtain additional funds from the Faculty, the University, or private sources for the future.

4.3. Sitem-Insel School

Project description: HSeT has continued its collaboration with the Sitem-Insel School by providing e-learning material for teaching. The focus of the project was to provide the necessary services for running the Master/Diploma/Certificate of advanced studies (MAS/DAS/CAS) in Translational Medicine and Biomedical Entrepreneurship (TMBE) and Master/Diploma of advanced studies (MAS/DAS) Medical device regulatory affairs and quality assurance (MDRQ).

Students: National and international students are enrolled in both study programs. International students are mostly from Europe. In 2023, a new class of 11 students started with the 1st module of the TMBE program and a class of 5 students with the 1st module of the MDRQ program.

Project partners: Sitem-Insel AG and the University of Bern (UNIBE) are the responsible partners for both study programs.

Certification and credits: Certificates are awarded by UNIBE. Completion of a CAS results is awarded 15 ECTS, completion of a DAS is awarded 30 ECTS and completion of a MAS is awarded 60 ECTS.

HSeT's pro bono activities: Members of HSeT have supported the collaboration with respect to administrative tasks through 10 hours of *pro bono* work, which amounts to the equivalent of 1'000.- CHF at a rate of 100.- CHF/hour.

Costs and revenues: For its information technology services and manpower invested in the program, HSeT has been remunerated by Sitem-Insel with 42'050.- CHF for the year 2023.

4.4. Master of Advanced Studies (MAS) in Toxicology

Project description: The MAS in Toxicology is a continuous education course offered by the University of Geneva (UNIGE). HSeT has continued its collaboration with UNIGE for the 2022-2024 class. HSeT contributes both proprietary e-learning material and material developed by specifically for the MAS. A new class (2024-2025) will start in September 2024.

Students: Twelve national and international students are enrolled in the study program.

Project partners: The University of Geneva (UNIGE) is the responsible partner for the study program.

Certification and credits*:* MAS certificates are delivered by UNIGE. Completion of the MAS programme is awarded 90 ECTS credits, including the completion of 14 modules (60 ECTS credits) and a Master Thesis (30 ECTS credits). Module 1 is awarded 6 credits.

HSeT's pro bono activities: In 2023, members of HSeT contributed to this program through 100 hours of *pro bono* work, which amounts to the equivalent of 10'000.- CHF at a rate of 100.- CHF/hour.

Costs and revenues: The entire development of the program, its information technology services, and manpower were financially supported by the Swiss Centre for Advanced Human Toxicology ([SCAHT](#)): CHF 50'000.- in 2011 & 2012, then CHF 25'000 up to 2024. Discussions about the future financing by SCAHT will take place in June 2024 with Ellen Fritsche, the new Director of SCAHT.

4.5. Master of Science in Medical Biology

Project description: HSeT contributes e-learning resources for a [Master of Science in medical biology](#) taught at the University of Lausanne (UNIL). It comprises courses in immunology and oncology, toxicology, and biostatistics.

Students: The program was followed by 66 participants in 2023.

Project partners: HSeT collaborates with selected teachers (S Luther, J Esser von Bieren, M-C Broillet, and F Schütz) from UNIL.

Certification and Credits: HSeT contributes to part of a 15-ECTS course certified by UNIL.

Costs and revenues: Pascale Anderle - senior scientist and project manager in HSeT - was remunerated by the Fondation de Biochimie and HSeT.

4.6. Bachelor Courses in Medicine

Project description: HSeT has made long-standing contributions to the bachelor curriculums of the [Faculty of Medicine of the University of Geneva](#) (FACMED-UNIGE) and of the medical school of the University of Mauritius [medical school of the University of Mauritius](#) (UoM). These programs were continued at both institutions in 2023. Specific portions of the learning material were updated and adapted to satisfy requests made by UNIGE.

Students: HSeT's online teaching resources were used by students following all units of the medical bachelor curriculum at UoM and several Problem Based Learning units taught in the 2nd and 3rd years of the medical curriculum at FACMED-UNIGE.

Project Partners: The program is maintained in the context of a tripartite collaboration between HSeT, UoM and UNIGE.

HSeT's pro bono activities: Members of HSeT have devoted an estimated 50 hours of *pro bono* work for the maintenance, modification and updating of online teaching resources in 2023.

Costs and revenues: for its information technology services and manpower invested in the maintenance, updating and adaptation the program, HSeT has been compensated by the UoM with 2'000.- CHF in 2023. FACMED-UNIGE invests a 30 % salary for the program, and houses HSeT's content management system on its server. It has made no other direct or indirect financial contributions to HSeT in 2023.

4.7. Pasteur Institute Courses

A services agreement between the Institut Pasteur (IP) and HSeT became effective as of March 1st, 2023. This Agreement defines the general terms underlying the collaboration between the IP and HSeT, where HSeT will be mandated to contribute to the development of e-Learning programs in courses and workshops organized by the IP. HSeT is currently implicated in three activities organized by the IP.

Project descriptions:

a) *Biobanking.* The IP course in biobanking is an online program adapted to the training and transfer of knowledge to students and staff of biobank structures, particularly in developing countries. The third edition of the biobanking course was held in 2023 using a blended format combining a three-month period of online training followed by a 4-day face-to-face practical session in Paris. The IP has now joined partners from the University of Geneva, the Swiss Biobanking Platform and HSeT to create a Certificate of Advanced Studies (CAS) in Biobanking (see section 2.3), which may in due course replace the IP biobanking course.
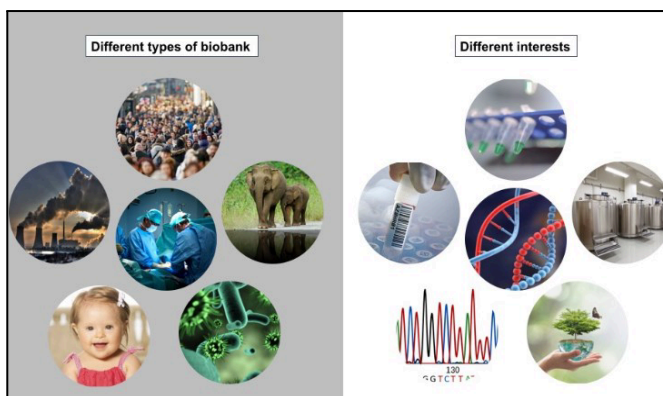
b) *Vaccinology* HSeT has contributed for numerous years to a vaccinology course organized by the IP. The 15th edition of this course was held in 2023. The course consisted of online self-directed learning in the form of annotated articles and self-learning webpages combined with face-to-face lectures and a workshop on Vaccine Design held in a blended format (partly online and partly face-to-face). Access to online aspects of the course was offered by HSeT via a Moodle platform as Learning Management System (LMS) and with links to HSeT's Content Management System (CMS). The course was followed by a 3-day symposium entitled "Vaccine development: the pre- and post-Covid-19 era" organized to celebrate the 15th anniversary of the IP Vaccinology course. All trainees participated in the symposium.

c) *Surveillance and control of rabies.* In 2023,

the IP organized an 11-day [workshop on rabies](#) in Yaoundé, Cameroon. A distance-training session was organized prior to the workshop to bring participants up to speed and to promote discussions and interactions. The pre-workshop sessions consisted of two parts: the first part consisted of activities performed individually by the applicants through the study of eight annotated articles and by addressing key thought questions; the second part consisted of a group activity for which the trainees were divided into five groups, each being requested to address selected questions related to the surveillance and control of rabies, after which the five groups worked together to redact a final document that was presented during the workshop. The on-site workshop focused on practical sessions designed to complement the theoretical training, such as bench work, demonstrations, field vaccination of dogs and hands-on sessions.

Students: 40 trainees participated in the biobanking course, of which 17 completed the practical session and 13 completed all activities and passed the final exam. The vaccinology course was followed by 20 trainees from all over the world. 40 candidates applied for the rabies course, of which 30 were selected and 26 passed the final exam.

Project Partners: Partners for IP course include the Network of Biological Resources of the IP (BIPnet), the European Virus Archive goes Global (EVAg) and HSeT. HSeT is a long-standing partner for the IP vaccinology course. Providers of support and partners for the IP rabies course include the World Health Organization ([WHO](#)), the World Organization for Animal Health ([OIE](#)), the HSeT foundation, the Food and Agriculture Organization of the United Nations ([FAO)](#) and the Global Alliance for Rabies Control ([GARC](#)).

Accreditation and credits: The 13 students who completed the biobanking course and passed the final exam received a certificate with 5 ECTS from the University of Lausanne. For the vaccinology course, a certificate was offered by the IP to students that passed the final exam. Participants who passed the final exam of the rabies received 8 ECTS from the University of Lausanne

HSeT's pro bono activities: In 2023, members of HSeT devoted an estimated 130 hours of *pro bono* work to the three IP courses, which amounts to the equivalent of 13'000.- CHF at a rate of 100.- CHF/hour.

4.8. Course in applied statistics

Project description: With the rise of digitalization in science and medicine, and the resulting generation of massive data sets, the importance of appropriate education of students working in these fields has become an essential factor to be considered. A solid knowledge of data science, i.e., in depth understanding of applied statistics and its application, should nowadays be a prerequisite for any student. While statistics courses are present in most curricula, there continues to be a consistent gap between the educational material that is offered and the knowledge and skills that are acquired. The main goal of our project is to motivate and empower young as well as more experienced science students to take a leading role in the decision process of data analysis. More specifically, we have developed an e-learning tool that facilitates the understanding of statistical concepts and their application to real-life problems, more

specifically to custom data. The e-learning tool is designed in such a way that it can be easily adapted to any topic of interest. It can be used as a standalone e-learning tool or complement face-to-face courses.

Students: The e-tool targets mostly national students and is being offered in a blended learning format. We have used the tool in 2023 in the framework of a new [Master's of Science program in precision engineering](#) at the University of Bern (UNIBE), and are planning to use it in the department of biochemistry at the University of Lausanne (UNIL).

Project partners: The e-learning tool has been developed in collaboration with members of UNIL and UNIBE.

Certification and credits: The e-tool will be part of a course corresponding to 5 ECTS.

HSeT's pro bono activities: In 2023, members of HSeT contributed directly to development of the e-tool in the form of 100 hours of *pro bono* work, which amounts to the equivalent of 10'000.- CHF at a rate of 100.- CHF/hour.
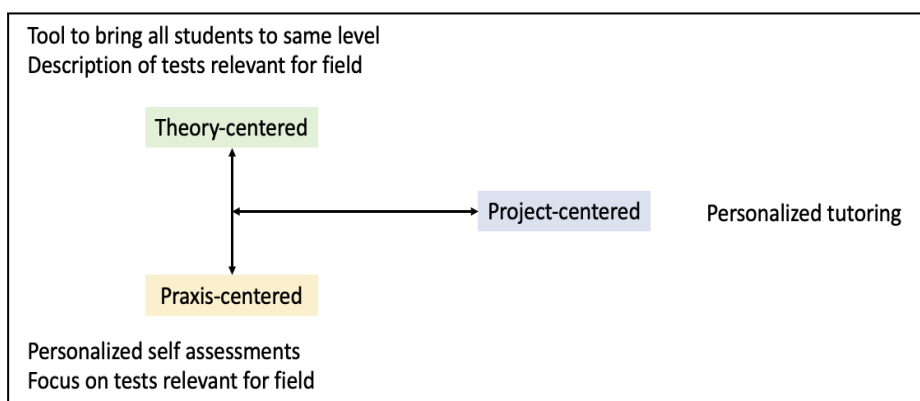
Costs and revenues: Costs for program development have been supported by a FIP project at UNIL (26'000.- CHF) and the Foundation of Biochemistry of UNIL (40'000.- CHF per year for 5 years). HSeT also received 6'000.- CHF for program development from the school of precision engineering at UNIBE and will obtain another 3'000.- CHF in the following year for hosting of the material.

5. Perspectives, opportunities, and challenges

A key mission of HSeT is to create and participate in programs that are accessible to students from low- and middle-income regions of the world, such as Africa. For several years now, this mission has been exemplified our close ties with the Pasteur Institute and our participation in the courses that it organizes. More recently this mission has been markedly strengthened via establishment and extension of the e-TRIGGER program, development of the CAS in Biobanking and the MAS in translational oncology,

and creation of the HSeT-certified course in data science. All four of these new programs are all aimed at attracting a wide international public, with an emphasis on participants from low- and middle-income countries. As registration fees for such programs can be prohibitive for many interested students from low- and middle-income countries, two efforts are being made to favour their participation. Firstly, for the e-TRIGGER program and the data science course, registration fees are modulated as a function of the economic status of the country of origin. Second, a major effort is currently being devoted to obtaining grants from diverse foundations with the aim of providing fellowships for trainees from low- and middle-income countries.

Over the past few years, changes in the composition of the Foundation board and broadening of the scientific expertise represented in the executive committee, the scientific advisory board and the HSeT team have expanded our network and set the stage for the development of new national and international programs, which will strengthen HSeT's visibility and standing in the field of online teaching in biomedical science. This broader national and international visibility and recognition has already created new opportunities for enriching our portfolio and will continue to do so in the future.

A trend that has become more evident during recent years is a marked reorientation of HSeT's activities towards a greater emphasis on postgraduate and continuous education programs. Our desire to attract students from abroad, notably from developing countries, has been one of the drivers underpinning this reorientation. A second reason is that postgraduate and continuous education programs offer better opportunities for funding of HSeT's activities.

As it stands our current projections are that HSeT's budget will be sufficient to sustain its ongoing activities throughout 2025 and beyond. This projection does not consider additional income derived from our new flagship projects. The creation of additional proprietary HSeT-certified course could also create new sources of income. However, ensuring financial perennity of HSeT will remain a major challenge that is receiving attention by the executive committee with a high level of priority.

Thanks to the considerations outlined above, particularly the internal development of HSeT and extension of its online teaching portfolio, we believe that HSeT can look forward to the future with confidence.
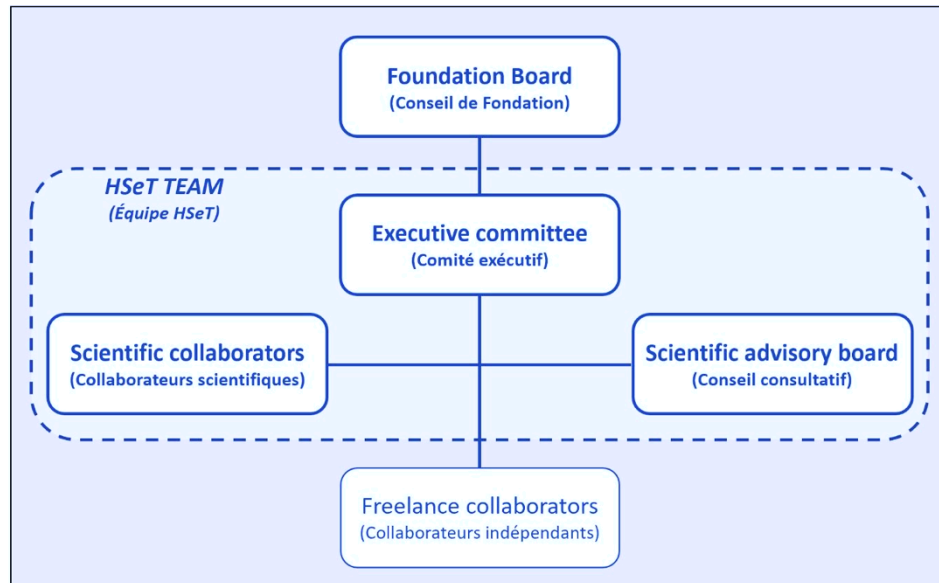
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- François Verrey, secretary (UZH)
- Jean Gruenberg, treasurer (UNIGE)
- Uyen Huynh-Do (UNIBE)
- Jean-Pierre Kraehenbuhl (UNIL)
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- Michelle Rossier (HSeT, Lausanne)

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- Bernard Rossier (UNIL)
- Pascale Anderle (HSeT, UNIBE)

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- Ivana Knezevic (WHO, Geneva)
- Li Long (HSeT)
- Jean-Pierre Michel (IAGG, Geneva)
- Bernard Rossier (UNIL)

All team members (discipline)   ## Freelance collaborators

- Pascale Anderle (translational medicine)
- Amos Bairoch (bioinformatics)
- Alia Benkahla (bioinformatics)
- Marie-Christine Broillet (pharmaco/toxicology)
- Aviva Sugar Chmiel (medical pedagogy)
- Rafaela da Silva (cardiology, translational medicine)
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- Li Long (computer science)
- Jean-Pierre Michel (gerontology, geriatrics)
- Walter Reith (immunology, molecular biology)
- Bernard Rossier (nephrology, pharmacology, toxicology)
- Michelle Rossier (laboratory medicine, pharmaco/toxicology)
- François Verrey (nephrology)

- Alain Meystre (infographics)
- Jose Torralbo (computer science)